

Investor Reliance on the Crowd

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ABSTRACT: Using Yahoo Finance search data, we document that when investors search for investment information they by far and large rely on the information of crowds. The results indicate that this reliance significantly varies across industries, and is most pronounced in firms with greater uncertainty and weaker information environments. Moreover, significant increases in the reliance on message boards consistently predict future negative stock returns and increases in information asymmetry, suggesting that investors' increasing reliance on crowds provides insights into their expectations of firm performance and future sell-offs.

KEYWORDS: Investor reliance, crowd information, negative returns, uncertainty, information environment.

JEL CLASSIFICATION: M41, G11, and G14.

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I. INTRODUCTION

The purpose of this study is to provide insights into investors' reliance on crowd-sourced information for investment decisions. Effective crowd information, often referred to as "the wisdom of crowds", has been documented to have significant influence in consumers' purchasing decisions (e.g., Gartner 2010; Deloitte 2014) and has become increasingly prevalent in the financial markets in recent decades with now widespread use of stock message boards and social media to support investment decisions (e.g., Antweiler and Frank 2004; Zhang 2010). While the literature has documented mixed evidence to the usefulness of the crowd information, evidence points to the inferences that opinions presented in stock message boards and commentaries lead trading volumes, and predict future returns and earnings surprises (e.g., Wysocki 1998; Antweiler and Frank 2004; Carson and Felton 2004; Clarkson, Joyce, and Tutticci 2006; Das and Chen 2007; Sabherwal, Sarkar, and Zhang 2008, 2011; Chen, De, Hu, and Hwang 2014), suggesting that crowd information is useful for investment decisions.¹ Of course, reliance on crowd-generated information may not be an effective mechanism for incorporating value-relevant information into stock prices, and may be more associated with sentiment and momentum effects such that crowd reliance may cause prices to differ from fundamental values. From the earliest depictions of crowd-based information, they have been shown to present both foolhardy (e.g., Mackay 1852) and wise (e.g., Galton 1907) signals.

In this setting, we use the term "reliance" to indicate the extent to which investors consume company-specific information of a particular type, as a fraction of the total amount of information consumed for that company. A firm for which investors devote a small fraction of

¹ Additional studies documenting benefits to stock message boards include: Wysocki (2000); Liu, Gu, Konana, and Ghosh (2006), and Lerman (2010). Studies providing mixed evidence concerning the market effects or usefulness of stock message boards include: Hittle (2001), Tumarkin and Whitelaw (2001), Tumarkin (2002), Dewally (2003), and Das, Martinez-Jerez, and Tufano (2005), Jones (2006), and Zhang and Swanson (2010).

their information consumption to crowd-sourced data would have a low reliance on crowd information, whereas a firm for which investors devote a large fraction of their information consumption to crowd-sourced data would exhibit a high reliance on crowd information.

Examining investors' reliance on crowd information (or just "reliance", as crowd information is the primary subject of our study) is important for several reasons. First, an understanding of this reliance provides insights into investors' perceptions of the usefulness of crowd information, and whether it is sought to interpret other types of financial information, or whether it is relied upon when other types of potentially more reliable information are not available. Higher reliance may signal industries or companies where the required SEC disclosures and financial statements are less adequate in appeasing investors' informational needs or where investors' perceptions of idiosyncratic risk are high. Second, appreciating the circumstances where investors turn to crowds provides an indication where investors may not be fully confident over their investment position and where they may need help to understand recent changes in the stock's valuation or information environment. This rationale is consistent with the help-seeking and learning literatures which show that the individuals' perceptions of personal inadequacy (e.g., Rosen 1983) and loss of confidence (e.g., Fisher, Nadler, and Whitcher-Alagna 1982) explain and predict help-seeking. Third, identifying significant increases in crowd reliance across individual firms or the market as a whole is likely to provide insights into investors' expectations for future performance or simply concerns that other investors may sell based on message board discussions. Trading based on the anticipated action of others represents a higher-order belief condition that may lead to selling pressure following increases in message board activity. Such downward pressure is expected to be higher when traditional investor information sources such as financials or analyst estimates provide limited transparency (e.g., Morris and

Shin 2002; Allen, Morris, and Shin 2006; Gao 2008). Building on these rationales, a significant increase in reliance may signal either that the crowd provides valuable incremental information about firm value, or it may prompt investors to trade based solely on the anticipated actions of other traders. Da, Engelberg, and Gao (2011, 2015) study Google Trends search index to identify the effects of investor attention, and while such searches may provide investors with access to some crowd-generated information, their studies cannot specifically identify the type of information that investors might consume as a result of their search.

To measure reliance, we examine investors' information searches on Yahoo Finance from 2014 to 2016. Yahoo Finance is the most popular financial web site in the U.S. with over 78 million unique monthly visitors and visitor growth exceeding 40 percent in 2016 (CNBC 2016), indicating the importance of Yahoo Finance to the U.S. investment community. Yahoo Finance provides a range of financial information for all publicly-listed companies on U.S. exchanges, including a message board for each stock, so we are able to use firm-specific page views to isolate investors' use of crowd information (i.e., usage of the message board discussions). Because of this unique setting where we can observe investor demand for both crowd-sourced information on a company's message board and demand for other information (e.g., analyst estimates and financial statements), we are able to construct a reliance measure by comparing investors' views of message board activity to their views of other types of information. We use message boards to measure crowd reliance, as message boards not only reflect the comments of investors and short-sellers, but they may also reflect messages from past and current employees (e.g., Felton and Kim 2002), company representatives and executives (e.g., Wysocki 1999), regulators, and institutional investors (e.g., Zhang 2014). Consequently, message boards capture

comments and information from many stakeholders and accordingly are likely to be the single best proxy for the company's investment crowd.

We begin our analyses by providing descriptive evidence on the extent of investors' crowd reliance. When investors proceed from each company's Yahoo Finance summary page to consume more detailed investment information, they by far and large rely on crowd information. Specifically, we find that 74 percent of all non-summary views relate to the firm-specific message boards, followed by views of financial reporting information (key statistics, SEC filings, and financial statements combined) at 6 percent, views of analyst information at 4 percent (analyst estimates and analyst opinions combined), and views of historical prices at 3 percent. Page views for each of the other 14 different types of information available on Yahoo Finance during the sample period (e.g., company profile information, options data, order book data, insider transactions, news headlines, etc.) are each 3 percent or less. Hence, the vast majority of investor searches for stock information relate to stock message boards and suggest that the average Yahoo Finance user finds crowd information to be very useful for supporting investment decisions. Given the extensive levels of crowd reliance by investors, it is not surprising that prior research documents significant stock market effects to the wisdom of crowds.

The reliance on crowd information significantly varies across industries. For example, reliance is highest in pharmaceutical, mining, electrical equipment and precious metals, whereas it is the lowest in textiles, shipping, beer and liquor, and business services. The variation across industries likely provides insights into where SEC disclosures, financial statements, and analysts are more and less adequate in appeasing investors' informational needs and consequently, where investors look to the crowds for value-relevant information. These high-reliance industries

appear to be those commonly associated with greater uncertainty about future cash flows and valuation (metals, pharmaceuticals, and technology products), and hence where historical financial information and analysts may provide more limited insights. On the other hand, firms with low reliance tend to be in predictable and stable industries (shipping containers, textiles, beer and liquor), potentially those where investment-relevant information are more readily available. Additionally, it is interesting to note that the variation across industries is much less pronounced for the reliance on financial reporting information, indicating that financial information provides more consistent value across industries.

We then proceed to investigate the determinants of the crowd reliance. Consistent with the industry level analyses, we find that uncertainty and weak information environments are two of the greatest determinants of reliance. Specifically, supporting the uncertainty inference, we find that reliance is increasing in firms with higher levels of return volatility, negative earnings and returns, bid-ask spread, and short interest. Additionally, we find that reliance is higher for lower price firms and firms with lower levels of analyst coverage, suggesting that the reliance on crowds is more pronounced across firms with weaker information environments. Furthermore, we find that reliance is increasing in financial reporting complexity, consistent with the notion of the crowds assisting with the interpretation of more complex financial reporting information.

Next, we examine whether increases in crowd reliance provide insights into investors' expectations for future performance and the probability of investor sell-offs. In this analysis, we first highlight that the firms with the largest increases and decreases in reliance are typically the same firms, as there is usually a shock to reliance, which then mean-reverts in subsequent weeks. For example, 54.0 percent of observations in the lowest decile of weekly changes (i.e., decreases) in crowd reliance were in the highest decile of weekly changes in the previous week.

We then find evidence indicating that significant increases in crowd reliance consistently predict negative future performance and increases in information asymmetry for the subsequent quarter and beyond. Specifically, we find that firms in the highest decile of weekly changes in crowd reliance have negative cumulative abnormal returns for the subsequent 12 weeks of -1.7 percent, in addition to the significant drop of -1.2 percent in week t (i.e., the change in reliance week). Moreover, over the same period, these firms also experience up to 42.2 percent increases in abnormal bid-ask spreads, increases in analyst forecast dispersion of up to 5.2 percent, and abnormal media coverage of up to 39.6 percent in the high increase in reliance week, but a decrease of 77.9 percent in the subsequent 12 weeks. Additionally, these firms have the largest absolute earnings surprises at the subsequent earnings announcements, indicating a significant increase in fundamental uncertainty has occurred. Furthermore, analyses of long run stock returns suggest that the price declines are somewhat transitory as there is evidence of price reversals in the 20 to 36 weeks following a large increase in crowd reliance. Hence, increases in crowd reliance appear to be associated with permanent stock price declines, though immediate returns may represent an overreaction.

We highlight that our measure of crowd reliance is a different construct than the extent of message board postings. While we are unable to include the frequency and details of the message board posts on Yahoo Finance in our main analyses due to changes in the Yahoo Finance platform in July 2016, using data from this date to December 2016, we find that the frequency of message board postings explains less than 3.4 percent of the variation in investors' searches for crowd information. Moreover, given the millions of unique monthly visitors on Yahoo Finance, our measure of crowd reliance is likely representative of the reliance of the U.S. retail investors rather than that of professional investors. However, as Shiller (2015) notes the distinction

between retail and professional investors may be subtler than once thought, and in turn, the inferences in this study may also apply to professional investors.

Our study makes the following main contributions. First, it separates the impact of crowd information relative to other information by identifying a comparative reliance, rather than a level of message board activity, which may be related to information releases or other drivers of investor attention. We corroborate previous research using market reactions to document the usefulness of crowd information by providing evidence showing that investors, based on the level of reliance relative to their consumption of other financial information, perceive crowd information to be useful. Second, the study provides evidence concerning the circumstances where investors may not be fully confident in their own abilities or the traditional information set, and consequently turn to the crowd for potential insights. We show that when aggregated across all investors, these increases in crowd reliance signal investors' expectations of firms' future performance and potential sell-offs. Third, the results highlight that required SEC disclosures and financial statements, and analysts' reports and recommendations do not adequately appease investors' informational needs, and that investors' use of crowd information dominates all of these sources of information combined. Overall, the study provides novel evidence on the importance of crowd information to investors, and in turn, that the crowds have a large audience to which they can project their voices.

II. DATA AND SAMPLE CONSTRUCTION

In this study, we are primarily interested in the conditions that are associated with reliance by investors on crowd information and the impact of such reliance on capital markets activity. From July 1, 2014 to July 2, 2016, we obtained web logs for page views on the Yahoo

Finance web site for all NYSE, NASDAQ, and NYSE listed companies. In our analyses, we limit observations to firms with market capitalization greater than \$50 million, in order to reduce the impact of small firm outliers.² Investors visit the Yahoo Finance web site to consume general financial news and to access a variety of firm-specific information, including news, financial, fundamental, and message board information, organized by stock ticker. Investors generally access the firm-specific information pages by searching for a company name or ticker symbol on the Yahoo Finance site, or they may be directed to a firm-specific page from a general search engine such as Google. Yahoo records page views based on a firm's ticker symbol and the type of information viewed, so for each firm we can observe investors' reliance on the different types of information presented on Yahoo Finance by comparing the proportion of views for each type of information to all firm-specific page views.

Firm-specific searches initially lead investors to a company's Yahoo Finance Summary page, illustrated in Figure 1, which provides an overview of the stock including the most recent price; the day's price chart; recent news headlines; and certain key statistics including beta, 52-week price range, P/E ratio and dividend yield. A column of links on the left-hand side of the Summary page provides access to 23 other firm-specific information pages. Our primary construct of interest in this study is investors' use of the crowd-sourced information presented on a stock's message board page, relative to other types of information presented by Yahoo Finance. This reliance on crowd information reflects the extent to which investors value such information relative to all of the other information that is provided by third parties with established reputations: e.g., fundamental data is provided by Capital IQ, SEC filings by EDGAROnline, and analyst estimates by Thomson Reuters. Message board information is generated by users with

² All results are qualitatively similar but stronger when we include all firms.

varying motivations and users' opinions may in general lack verifiability or credibility, but we note that users are constrained by enforcement of the Yahoo privacy policy and terms of service governing message board posting and the risk of legal action for fraud or other offences (e.g., Zhang 2014, Ch. 3).³ Figure 2 provides an illustration of a message board page for a single stock, and the primary information presented are messages organized by conversation threads, ordered with the most recent activity at the top of the list.

Investor page views of the Message Board pages is the primary underlying data illustrating investor demand for crowd-generated information on a firm. We construct *Message Board Reliance*, the primary measure of investor reliance on crowd-sourced information, as follows:

$$\text{Message Board Reliance} = \frac{\text{Message Board Page Views}}{\text{Other Detail Page Views}},$$

where *Other Detail Page Views* are views of firm-specific detail pages, other than the Message Board and Financial pages (i.e., Total Page Views, less Summary, Message Board, and Financial page views). These other detail page views include analysts' opinions and estimates, historical prices, options, insider transactions, news headlines and press releases, industry, and competitor information. We create the single category, Financial, which reflects the detail page views of the Key Statistics, SEC Filings, Income Statement, Balance Sheet, and Cash Flow pages, in order to compare the reliance on crowd-generated information to the reliance on financial reporting information. We construct *Financial Reliance*, the measure of the relative demand for financial information, as follows:

³ Yahoo may share identifying information of message board posters with authorities or others to "...investigate, prevent, or take action regarding illegal activities, suspected fraud, ..." Available at: <https://policies.yahoo.com/us/en/yahoo/privacy/index.htm>

$$Financial\ Reliance = \frac{Financial\ Page\ Views}{Other\ Detail\ Page\ Views}$$

We aggregate page views on a weekly basis. In addition to the Yahoo Finance page view data, we obtain fundamental and financial information from FactSet and bid-ask spreads from CRSP. The Appendix lists detailed definitions of all variables.

In Table 1, we present descriptive statistics for the variables used in our analyses. The sample contains 385,665 firm-week observations, with a mean *Message Board Reliance* of 2.116, and a median value of 0.666 indicating that for the mean firm-week, investors visit the Message Board pages close to three times more than they visit all of the other detailed non-Financial firm-specific pages combined. Moreover, these mean and median values indicate that the demand for message board information is right-skewed and concentrated among relatively few firms and weeks. The mean value of *Financial Reliance* is 0.396, which is relatively consistent with the median value of 0.370, indicates that *Financial Reliance* is more evenly allocated across firms and weeks than *Message Board Reliance*, and that for the mean firm-week, investors visit the Financial pages approximately 60 percent less than they visit all the other detailed non-Message Board firm-specific pages combined. Furthermore, the distributions of *Message Board Reliance* and *Financial Reliance* indicate that the use of the Message Board pages is approximately seven times that of all the Financial pages combined. Hence, when investors consume information beyond a firms' Summary pages on Yahoo Finance, they by far use Message Board pages the most out of all available information categories.

Figure 3 illustrates this finding, highlighting that 74 percent of all non-Summary page views relate to the Message Board pages. The next most accessed category is Financial pages representing 6 percent of all non-Summary page views, followed by Analyst pages at 4 percent;

Historical Prices pages, Profile pages, and Options pages at 3 percent. Page views for each of the other 13 different types of information available on Yahoo Finance (e.g., news headlines, press releases, events, insider transactions, etc.) are less than 2 percent of all non-Summary page views. These descriptives are consistent with those reported in Lawrence, Ryans, and Sun (2017, Table 7), who use Yahoo Finance search data from 2014 to 2015 to examine investors' demand for analyst information. Returning to Table 1, the distributions of the weekly changes in message board reliance (Δ *Message Board Reliance*) and financial information reliance (Δ *Financial Reliance*) confirm the notion that financial reliance is less volatile across firm-weeks than is crowd reliance.

Moving to the reliance determinants and market effect variables, the mean and median values of weekly *Abnormal Return* are -0.035 percent (i.e., -3.5 basis points) and -0.034 percent (i.e., -3.4 basis points), respectively. As we use the S&P 500 returns as the benchmark returns to calculate abnormal returns, the negative weekly abnormal returns reflect the fact that stocks with smaller market capitalizations had lower returns than the S&P 500 from July 2014 through July 2016.⁴ Moreover, the mean (median) firm-week in our sample has *Short Interest* as a percentage of shares outstanding of 4.4 percent (2.6 percent), 0.699 (0.429) *Media* articles per week, 9 (6) *Analyst Following* the firm, a \$35.16 (23.70) share *Price*, 33.2 (34.5) percent of the available Compustat items (*Complexity*), and a *Market Capitalization* of \$7.4 billion (\$1.2 billion). Additionally, the mean and median values of the weekly *Abnormal Bid-Ask Spread* and *Abnormal Volume*, *Abnormal Media*, *Analyst Forecast Dispersion*, and *Change in Ratings* are 0.7 percent (-2.2 percent), 4.2 percent (-9.8 percent), 12.6 percent (-32.4 percent), 0.003 (0.001),

⁴ Inferences are similar if we use CRSP value-weighted returns.

and -0.001 (0), respectively. The distributions of the other remaining control variables are similar to those documented in prior research.

III. WHAT DRIVES RELIANCE?

In this section, we examine the determinants of reliance on crowd information. We first consider univariate correlations among *Message Board Reliance* and other variables of interest, measured weekly. Table 2 presents Pearson correlation coefficients and shows that *Message Board Reliance* is most correlated with *Return on Assets* ($corr = -0.36$), followed by *Past Return Volatility* over the preceding 12 weeks ($corr = 0.35$), *Analyst Forecast Dispersion* ($corr = 0.25$), *Short Interest* ($corr = 0.22$), *Log Market Capitalization* ($corr = -0.20$), share *Price* ($corr = -0.20$), *Volume* ($corr = 0.15$), and *Log Analyst Following* ($corr = -0.10$). These correlations provide initial evidence that crowd reliance is most pronounced among firms with higher levels of return volatility, analyst forecast dispersion, short interest, and negative earnings, and lower analyst following and smaller share prices; in short, firms with weaker information environments and greater levels of uncertainty. In comparison to the drivers of crowd reliance, we note that *Financial Reliance* is less correlated with firm attributes, and it is also more pronounced among smaller firms (*Log Market Capitalization*, $corr = -0.146$; share *Price*, $corr = -0.07$), firms with lower analyst following (*Log Analyst Following*; $corr = -0.11$), and larger *Bid-Ask Spread* ($corr = 0.11$). However, unlike crowd reliance, financial information reliance is more pronounced for profitable firms (*Return on Assets*, $corr = 0.16$), and firms with lower volumes (*Volume*, $corr = -0.17$) and *Short Interest* ($corr = -0.09$).

Given that crowd reliance significantly relates to firm attributes, we next investigate the impact of industry membership on crowd reliance for each of Fama and French's 48 industries. We find that the level of reliance on crowd-sourced information varies significantly based upon

industry membership, and it is interesting to note that this variation is dramatically different from the level of reliance on financial information. Figure 4, Panel A illustrates the average level of reliance on crowd-generated information by industry, where the plot shows the mean level of *Message Board Reliance*, as well as the 95 percent confidence interval range. The most crowd-reliant industry is Pharmaceutical Products, with a ratio of 6.44, indicating that there are close to six times as many message board page views as all other non-Financial detail page views combined. Other industries with high levels of *Message Board Reliance* are Non-Metallic and Industrial Metal Mining, Precious Metals, Electrical, Electronic, and Medical Equipment, with ratios ranging from 2.91 to 4.74.

On the other end of the spectrum, there is relatively less reliance on crowd-generated information for firms in the Textiles; Shipping Containers; Beer and Liquor; and Business Services industries with *Message Board Reliance* ratios of less than 0.80. These differences in reliance may reflect a number of factors that make traditional sources of information more or less relevant or reliable: high reliance firms tend to be in industries that could be considered to exhibit high uncertainty about future cash flows and valuation (pharmaceuticals, metals, and technology products), and where historical information may be of lower quality for predicting future cash flows. On the other hand, firms with low reliance tend to be in predictable and stable industries (shipping containers, textiles, and beer and liquor). In contrast to the wide variation in crowd reliance, which, depending on industry, ranges from 0.42 to 6.44 times the demand for other information, Panel B of Figure 4 indicates that the variation in financial information reliance is much smaller, ranging from 0.25 for Pharmaceutical Products to 0.50 for Candy and Soda. This finding indicates that there is a much more consistent, although a smaller magnitude, demand for financial information.

Message Board Reliance exhibits some persistence within firms as well, and it is interesting to examine how shocks to reliance for an individual firm decay over subsequent weeks. We first document the autocorrelation structures of *Message Board Reliance* and *Financial Reliance*. We find that the week-to-week autocorrelations for *Message Board Reliance* exhibit different behaviors compared to those for *Financial Reliance*, with the autocorrelations for *Message Board Reliance* significantly higher for the first two lags than for *Financial Reliance*. Figure 5, Panel A plots the coefficients for a pooled regression where *Message Board Reliance* or *Financial Reliance* in week $t+1$ is the dependent variable, and where lags for week $t-11$ through week t are the independent variables. We find that the autocorrelations for *Message Board Reliance* are quite strong for week t and $t-1$ with coefficients of 0.505 ($p < 0.01$) and 0.196 ($p < 0.01$), respectively. The autocorrelations for *Financial Reliance* are notably lower in week t and $t-1$, with coefficients of 0.230 ($p < 0.01$) and 0.142 ($p < 0.01$), respectively. In Panel B, we find that there is little industry variation in the autocorrelation structure of *Message Board Reliance*, when we separately estimate the autocorrelation coefficients for high reliance (above median) industries versus low reliance industries (below median) presented in Figure 4. The first (untabulated) lag coefficient is 0.521 ($p < 0.01$) for high reliance industries, and 0.428 ($p < 0.01$) for low reliance industries. For the second lag, the coefficients for high and low reliance industries are 0.190 ($p < 0.01$) and 0.202 ($p < 0.01$), respectively. This finding indicates that the autocorrelation structure for crowd reliance is a property that varies little across different industries.

We next perform a regression analysis using *Message Board Reliance* as the dependent variable, to investigate contemporaneous factors associated with higher reliance in a multivariate setting. The regression specification is as follows:

$$\begin{aligned}
\text{Message Board Reliance}_{it} = & \alpha + \beta_1 \text{Positive Abnormal Return}_{it} + & (1) \\
& \beta_2 \text{Negative Abnormal Return}_{it} + \\
& \beta_3 \text{Short Interest}_{it} + \beta_4 \text{Bid-Ask Spread}_{it} + \\
& \beta_5 \text{Volume}_{it} + \beta_6 \text{Log Media} + \beta_7 \text{Complexity}_{it} + \\
& \beta_8 \text{Log Market Capitalization}_{it} + \\
& \beta_9 \text{Log Analyst Following}_{it} + \\
& \beta_{10} \text{Price}_{it} + \beta_{11} \text{Earnings Announcement}_{it} + \\
& \beta_{12} \text{Market to Book}_{it} + \beta_{13} \text{Return on Assets}_{it} + \\
& \beta_{14} \text{Past Return Volatility}_{it} + \text{Week Fixed Effects} + e_{it} ,
\end{aligned}$$

for firm i in week t . See the Appendix for detailed variable definitions.

A higher level of reliance indicates firm-weeks where information obtained from crowd sources have relatively more importance, and conversely where investors place less relative value on traditional information sources, such as analyst information. Table 3 confirms inferences from the univariate correlations, with most factors remaining significant after controlling for the others. *Message Board Reliance* is positively associated with both *Positive Abnormal Return* and *Negative Abnormal Return*, with coefficients of 0.010 ($p < 0.05$) and -0.047 ($p < 0.01$), respectively, indicating that while extreme returns in either direction have some effects, the coefficient on negative abnormal returns is more than four times greater in magnitude in terms of its influence on reliance. This finding is consistent with Pleis (2009) who, in an experimental setting, finds that only negative message board posts influence returns. We also find that reliance is positively associated with *Short Interest* with a coefficient of 10.890 ($p < 0.01$), perhaps as investors seek discussion about concerns revealed by high levels of short interest. *Bid-Ask Spread* (coeff. = 40.567; $p < 0.01$) continues to positively explain reliance and

unlike in the univariate correlations, *Volume* is no longer significant ($p > 0.20$). We find that *Log Media* is positively associated with reliance ($coeff. = 0.303; p < 0.01$), indicating that high-media leads to investors turning to crowd-based interpretation of news, after controlling for other factors.

The coefficient on *Complexity* of 3.527 ($p < 0.01$) suggests that reliance is increasing in financial reporting complexity and that investors seek crowd discussions for stocks whose financial reports are harder to navigate. Moreover, the coefficients on *Log Analyst Following*, *Price*, and *Past Return Volatility* are -0.411 ($p < 0.01$), -0.011 ($p < 0.01$), and 0.233 ($p < 0.01$), respectively, and confirm the inferences in Table 2 that crowd reliance is more pronounced in small stocks with lower analyst following and higher return volatility. The slightly significant ($p < 0.10$) and positive coefficient of 0.092 on *Log Market Capitalization* likely reflects multicollinearity from several different size controls, given the strong negative correlation between reliance and *Log Market Capitalization* noted in Table 2.

Lastly, the coefficients on *Earnings Announcement*, *Market to Book*, and *Return on Assets* are -0.043 ($p > 0.20$), 0.026 ($p < 0.01$), and -7.238 ($p < 0.01$), respectively. The insignificant association between *Message Board Reliance* and *Earnings Announcement* indicates that there is no evidence of a reduction in crowd reliance when other sources of timely and reliable information are released. The positive coefficient on *Market to Book* supports the notion that crowd reliance is more pronounced for growth or glamour stocks, stocks with higher levels of uncertainty, and the negative coefficient on *Return on Assets* indicates that reliance is decreasing in profitability. Taken together, these findings support the inference that crowd reliance is most pronounced in firms with greater uncertainty and weaker information environments.

IV. IMPLICATIONS OF RELIANCE

Given that reliance on crowd-generated information is associated with firms that face a weaker information environment as well as greater uncertainty, reflected by higher levels of short interest, intuitively, significant increases in *Message Board Reliance* may reflect both a channel for the dissemination of bad news, and evidence that investors are uncertain in their holdings or the valuation of a potential investment. Additionally, the negative signal generated by message board activity could lead investors to sell stocks based on the assumption that others will also sell, a situation that may be exacerbated for firms in industries or stages of their lifecycle where accounting transparency does little to assist investors in the formation of fair value estimates (e.g., Morris and Shin 2002; Allen et al. 2006; Gao 2008).

As our remaining analyses focus on changes in *Message Board Reliance*, in Table 4, Panel A we provide descriptives on the mean values, by decile, of Δ *Message Board Reliance*. Column (1) gives the mean value of Δ *Message Board Reliance* in week t , which ranges from -2.218 in decile 1 and by construction, is monotonically increasing to 2.308 in decile 10. In Column (2), the mean value of Δ *Message Board Reliance* in week $t-1$ is monotonically decreasing from 1.248 in decile 1 to -0.481 in decile 10, indicating mean reversion of changes in *Message Board Reliance*. In Panel B, we tabulate a ten-by-ten transition matrix to illustrate how firms move between deciles from week $t-1$ to week t . Rows indicate the decile of change in *Message Board Reliance* in the prior week ($t-1$) and columns indicate the decile of change in *Message Board Reliance* in the current week (t). Panel B confirms the notion of significant reversals in changes in *Message Board Reliance*. As an illustrative example, a firm in the tenth (highest) decile of change in *Message Board Reliance* in the previous week has a 54.0 percent chance of recording the biggest decline in *Message Board Reliance* in the current week and only

a 13.2 percent chance of a continued tenth decile increase in *Message Board Reliance* in the current week. In turn, Table 4 highlights that firms with the largest increases and decreases in reliance are typically the same firms, as significant increases or decreases in reliance often reverse in subsequent weeks, resulting in a pattern of significant decreases (increases) followed significant increases (decreases).

Figure 6 plots both the contemporaneous and subsequent week values of *Abnormal Returns* in Panel A, *Abnormal Volume* in Panel B, and *Abnormal Bid-Ask Spread* in Panel C, by decile of Δ *Message Board Reliance*. Panel D illustrates *Abnormal Media*, Panel E illustrates *Analyst Forecast Dispersion*, and Panel F illustrates analysts' *Change in Ratings*. Panel A plots *Abnormal Return*, illustrating that abnormal returns are slightly positive in the contemporaneous week (week t) for the deciles 1 to 6 and are increasingly negative in the highest deciles of Δ *Message Board Reliance* ranging from -0.177 percent for decile 8 to -0.582 percent for decile 10. Considering *Abnormal Return* in week $t+1$, Panel A illustrates returns of approximately zero for the first 9 deciles, with the trend becoming negative at the 10th decile with a return of -0.162 percent. These inferences support the notion that while abnormal returns may lead changes in message board reliance, changes in reliance also appear to lead future returns for the firms with the largest increases in reliance.

In Panels B and C, we see that highest deciles of Δ *Message Board Reliance* are associated with higher levels of *Abnormal Volume* and *Abnormal Bid-Ask Spread*, which also continue in the subsequent week. Panel B illustrates that *Abnormal Volume* in week t is fairly close to zero for deciles 1 through 5, and then rises to peak at decile 9 with a value 0.135 and a similar 0.133 at decile 10. However, the variation in *Abnormal Volume* across the deciles in week $t+1$ is much less pronounced with deciles 9 and 10 being slightly higher than the rest of the

deciles. In Panel C, we see a U-shaped pattern for *Abnormal Bid-Ask Spread* in both weeks t and $t+1$, indicating that deciles 1, 9 and 10 have the highest bid-ask spreads and the middle deciles have the lowest spreads. Overall, the similar patterns in both weeks t and $t+1$ across *Abnormal Return* and *Abnormal Bid-Ask Spread* suggest that changes in *Message Board Reliance* appear to influence contemporaneous and future abnormal returns and bid-ask spreads.

Panel D illustrates the relation between *Abnormal Media* and changes in reliance, and for the contemporaneous week, greater changes in reliance are associated with greater *Abnormal Media*, with a peak abnormal media of 0.274 at decile 10 for the change in reliance. Reliance does not appear to be related to *Abnormal Media* in week $t+1$, as *Abnormal Media* is relatively constant across all deciles. *Analyst Forecast Dispersion* is illustrated in Panel E, with a U-shaped pattern for deciles of change in reliance both in week t and in week $t+1$, indicating that companies with more uncertainty have greater increases and decreases in reliance, but as dispersion is relatively constant from week to week, we do not see variation between weeks t and $t+1$. Panel F illustrates the mean change in analyst ratings, which are relatively constant and are nearly zero from deciles 1 to 6, but become increasingly negative at decile 10, with a value of -0.0025. The trend is similar for week $t+1$, indicating that increases in reliance are associated both with contemporaneous analyst downgrades as well as future analyst downgrades.

We next perform a series of regressions using changes in *Message Board Reliance* to predict the subsequent week's value of our dependent variables of interest, using the following regression specification:

$$\begin{aligned} \text{Dependent Variable}_{i,t+1} = & \alpha + \beta_1 \Delta \text{Message Board Reliance}_{i,t} + \beta_2 \text{Market Variable}_{i,t} + \quad (2) \\ & \beta \text{Controls}_{i,t} + \text{Week Fixed Effects} + e_{i,t}, \end{aligned}$$

where *Dependent Variable* is either a set of market variables: *Abnormal Return*, *Abnormal Volume*, or *Abnormal Bid-Ask Spread*; or a set of media and analyst variables: *Abnormal Media*, *Analyst Forecast Dispersion*, or *Change in Ratings*. See the Appendix for detailed variable definitions.

We first consider the market variables, and consistent with the univariate inferences from Figure 6 Panels A to C, in Table 5 we find that changes in *Message Board Reliance* are significantly associated with the subsequent week's returns and bid-ask spreads. Given the findings in Table 4 and Figure 6, we separate out positive and negative changes in *Message Board Reliance*, finding that the predominant effect is for increases in reliance, which are associated with negative returns and higher bid-ask spreads. Columns (1) and (2) provide the results when regressing the subsequent week's *Abnormal Return* (week $t+1$) on the contemporaneous values (week t) of Δ *Message Board Reliance* and *Abnormal Return* while including controls for market capitalization (*Log Market Capitalization*), the market-to-book ratio (*Market to Book*), an indicator for weeks with *Earnings Announcements*, the last quarter's *Earnings Surprise*, the past quarter's abnormal return (*Past Abnormal Return*), and the past quarter's standard deviation of returns (*Past Return Volatility*). Columns (3) and (4) repeat the analyses using *Abnormal Volume* as the dependent variable and Columns (5) and (6) repeat the analyses using *Abnormal Bid-Ask Spread* as the dependent variable.

In Columns (1), (3), and (5) we utilize the continuous variable Δ *Message Board Reliance* as the key predictor variable. In Columns (2), (4), and (6) we replace Δ *Message Board Reliance* with *Positive Δ Message Board Reliance*, the continuous change in reliance if positive, but zero otherwise, and *Negative Δ Message Board Reliance*, the continuous change in reliance if negative, but zero otherwise. We find that contemporaneous changes in reliance is indeed a

predictor of negative abnormal returns in the subsequent week with a coefficient of -0.015 ($p < 0.01$) on Δ Message Board Reliance in Column (1), and that it is the positive Δ Message Board Reliance that is a stronger and more significant predictor of the subsequent week's returns in Column (2), as the coefficient for *Positive* Δ Message Board Reliance is -0.065 ($p < 0.01$) while the coefficient for *Negative* Δ Message Board Reliance is 0.039 ($p < 0.01$). Economically, a one standard deviation increase in *Message Board Reliance* indicates a -0.285 percent abnormal return (4.386×-0.065) the following week.

Moving to Columns (3) and (4), we find no evidence that increases in reliance is a significant predictor of *Abnormal Volume* in the subsequent week. The coefficient on Δ Message Board Reliance in Column (3) is insignificant ($p > 0.10$), and in Column (4) both *Positive* Δ Message Board Reliance and *Negative* Δ Message Board Reliance are insignificant at conventional levels ($p > 0.10$). In Column (5), where the dependent variable is *Abnormal Bid-Ask Spread*, the coefficient on Δ Message Board Reliance is 0.001 and significant ($p < 0.01$). In Column (6) the coefficients on *Positive* Δ Message Board Reliance and *Negative* Δ Message Board Reliance are 0.003 ($p < 0.01$) and -0.001 ($p < 0.01$), respectively, indicating that both increases and decreases in reliance are associated with significant increases in the *Abnormal Bid-Ask Spread*.

In Table 6 we consider the media and analyst variables: *Abnormal Media*, *Analyst Forecast Dispersion*, or *Change in Ratings*. Consistent with the univariate inferences from Figure 6 Panels D to F, we find that changes in Message Board Reliance are marginally associated with lower *Abnormal Media* in the subsequent week, as well as higher *Analyst Forecast Dispersion*, and a decrease in analyst ratings. As in Table 6, we separate out positive and negative changes in Message Board Reliance, finding that the predominant effect is for

decreases in reliance for *Abnormal Media*, but for increases in reliance for *Analyst Forecast Dispersion* and *Change in Ratings*. Columns (1) and (2) provide the results when regressing the subsequent week's *Abnormal Media* (week $t+1$) on the contemporaneous values (week t) of Δ *Message Board Reliance*, while including the same controls as in Table 5. Columns (3) and (4) repeat the analyses using *Analyst Forecast Dispersion* as the dependent variable and Columns (5) and (6) repeat the analyses using *Change in Ratings* as the dependent variable.

We find that contemporaneous changes in reliance is a marginal predictor of *Abnormal Media* in the subsequent week with a coefficient of -0.003 ($p < 0.10$) on Δ *Message Board Reliance* in Column (1), and that it is the *Negative Δ Message Board Reliance* that is the significant predictor of the subsequent week's abnormal media in Column (2), with a coefficient of -0.006 ($p < 0.05$) while the coefficient for *Positive Δ Message Board Reliance* is 0.000 and insignificant. Moving to Columns (3) and (4), we find some evidence that increases in reliance is a predictor of higher *Analyst Forecast Dispersion* in the subsequent week as the coefficient on Δ *Message Board Reliance* in Column (3) is 0.001 ($p < 0.01$). Column (4) shows that *Positive Δ Message Board Reliance* supports the overall effect given a coefficient 0.002 ($p < 0.01$), with a lesser contribution from *Negative Δ Message Board Reliance*, with a coefficient of -0.001 ($p < 0.05$). In Column (5), where the dependent variable is *Change in Ratings*, the coefficient on Δ *Message Board Reliance* is -0.013 ($p < 0.01$). In Column (6) the coefficients on *Positive Δ Message Board Reliance* is -0.017 ($p < 0.05$), but the coefficient on *Negative Δ Message Board Reliance* is insignificant, indicating that the overall effect is driven by increases in reliance.

Our next analyses consider the quarterly patterns of abnormal returns, volume, bid-ask spreads, media, and analyst forecast dispersion and ratings both before and after the event of a tenth decile Δ *Message Board Reliance* occurrence. Because some firms tend to have large

increases in message board reliance multiple times during our sample period, our primary analysis considers a high reliance event to be the first week in our sample for which a firm is recorded in the tenth (highest) decile of $\Delta Message Board Reliance$ to avoid potential overlapping observations in the event study.

In Figure 7, Panel A we show the cumulative abnormal returns for the 12 weeks before and 36 weeks after the event of experiencing a highest-decile $\Delta Message Board Reliance$. Week t is the week where a firm first generates a tenth-decile increase in *Message Board Reliance*. The cumulative abnormal returns in the 12 week prior to week t are fairly stable, alternating between slightly negative and positive returns, but week t presents a -1.2 percent abnormal return, coinciding with the large increase in *Message Board Reliance*. Mean abnormal returns continue to decline over the following 19 weeks, and the cumulative abnormal return is -3.6 percent by the end of the 19th week following the event. The negative returns appear to reverse in subsequent weeks, ending at week $t+36$ with a cumulative abnormal return of only -1.6 percent. Figure 7, Panel B presents abnormal volume in the 12 weeks surrounding the highest-decile *Message Board Reliance* event, and it is notable for illustrating significantly higher volume right at the event week (*Abnormal Volume* of 0.230), with abnormal volume falling to 0.057 in week $t+1$ and returns to zero by week $t+6$. Figure 7, Panel C presents abnormal bid-ask spread surrounding the highest-decile changes in *Message Board Reliance* event, with modestly negative abnormal bid-ask spreads in the preceding eight weeks, though higher bid-ask spreads occur at prior to week $t-8$. In week t , *Abnormal Bid-Ask Spread* jumps to 0.013, and then generally rises through week $t+12$ with an average abnormal bid-ask spreads of 0.018 per week for the subsequent 12 weeks, reflecting up to a 42.2 percent (0.01796/0.01263) increases in abnormal bid-ask spreads. In

untabulated analyses, we find that inferences are robust to using overlapping return windows instead of just using one observation per firm.

In Panel D, we find that *Abnormal Media* increases by up to 39.6 percent in the high increase in reliance week, but then drops to normal levels with a decrease of 77.9 percent in the subsequent 12 weeks. Panel E illustrates that analyst forecast dispersion continues to increase throughout the twelve weeks following the high change in reliance event, reflecting increases of up to 5.2 percent per week. However, while analyst dispersion continues to increase, the average change in ratings returns to zero after the high change in reliance week, illustrated in Panel F, with negligible changes in ratings after week t .

V. CHANGES IN RELIANCE AND FUTURE PERFORMANCE

The generally pessimistic pattern of results following a significant increase in reliance suggests that it is either a channel for the dissemination of negative news about a firm, realized in subsequent periods, or it is a mechanism by which investors try to gauge the investment decisions of other investors, in which case unwarranted price declines should not be significantly related to longer term future returns or operating performance. We first investigate potential indicators of the relation between reliance and future performance by considering the usefulness of changes in *Message Board Reliance* to predict the next quarter's earnings surprise. Table 7 presents the results of this analysis where we employ the following regression:

$$\begin{aligned}
 \text{Earnings Surprise}_{i,t+1} = & \alpha + \beta_1 \Delta \text{Message Board Reliance}_{i,t} + \beta \text{Controls}_{i,t} + \\
 & \text{Week Fixed Effects} + e_{i,t},
 \end{aligned} \tag{3}$$

where $Earnings\ Surprise_{i,t+1}$ is earnings surprise at the next quarterly earnings announcement. We use both the signed and absolute value of $Earnings\ Surprise$ as the dependent variables. Control variables are similar to those used in Equation (2).

If the signed $Earnings\ Surprise$ is positively associated with increases in reliance, this finding can be interpreted as evidence that the increase in reliance creates undue pessimism that is not subsequently realized, and consequently, that the observed price declines are transitory and possibly reflect higher order beliefs. On the other hand, if the signed $Earnings\ Surprise$ is negatively associated with reliance, then the increase in reliance may be an effective source of information about a decline in fundamental firm performance. Moreover, if the absolute value of the $Earnings\ Surprise$ is positively associated with reliance then the increase in reliance may signal increases in uncertainty (i.e., more volatile performance). Lastly, if analysts are fully engaged with the crowd-generated information, and incorporate that information to accurately adjust expectations, then the subsequent period $Earnings\ Surprise$ would be unrelated to changes in reliance.

As in Tables 5 and 6, we use the continuous variable $\Delta Message\ Board\ Reliance$ in Columns (1) and (3), and in Columns (2) and (4) we replace $\Delta Message\ Board\ Reliance$ with $Positive\ \Delta Message\ Board\ Reliance$, and $Negative\ \Delta Message\ Board\ Reliance$. Columns (1) and (2) report the regressions that use signed $Earnings\ Surprise$ as the dependent variable and Columns (3) and (4) report the regressions that use unsigned $Absolute\ Earnings\ Surprise$ as the dependent variable. The coefficients on all the $Message\ Board\ Reliance$ variables in Columns (1) and (2) are insignificant. However, while the coefficient on $\Delta Message\ Board\ Reliance$ in Column (3) is also insignificant, the coefficients on $Positive\ \Delta Message\ Board\ Reliance$ and $Negative\ \Delta Message\ Board\ Reliance$ in Columns (4) are 0.014 ($p < 0.01$) and -0.015 ($p < 0.01$),

respectively. The economic magnitude of this result is such that a one standard deviation increase in *Message Board Reliance* corresponds to a 4 basis point effect on *Earnings Surprise*, or 4 cents for a \$100 stock price ($4.386 \times 0.0001 \times \100). While the magnitude is not large, it may be sufficient to beat or miss expectations in some cases, while in others it may prove relatively insignificant. These results provide an indication that significant increases and decreases in *Message Board Reliance* are associated with greater absolute *Earnings Surprises* at the subsequent earnings announcement. As highlighted above, these findings are consistent with the notion that increases in reliance may signal increases in uncertainty, and given that signed *Earnings Surprise* is unrelated to changes in reliance, analysts appear to adjust their expectations accordingly.

VI. CONCLUSION

This study documents the importance of investors' reliance on crowd-sourced information. The results indicate that there is considerable variation in reliance across industries, and that reliance is most pronounced in firms with greater uncertainty and weaker information environments. Moreover, we find that significant increases in the reliance on message boards consistently predict negative returns and increases in information asymmetry, suggesting that investors' increasing reliance on crowds provides insights into expectations of future firm performance and potential sell-offs.

Using investors' relative reliance on various information sources, our study provides direct evidence of the importance of crowd information to investors. This evidence suggests that significant increases in crowd reliance indicate settings where investors are not fully confident in their own abilities or the traditional information set, and consequently turn to the crowds for potential insights. Moreover, we find some evidence suggesting that crowd reliance introduces

detectible bias into prices and transitory price movements. Overall, the findings highlight that traditional information sources do not adequately appease investors' informational needs, and that investors' use of crowd information dominates all of these sources of information combined.

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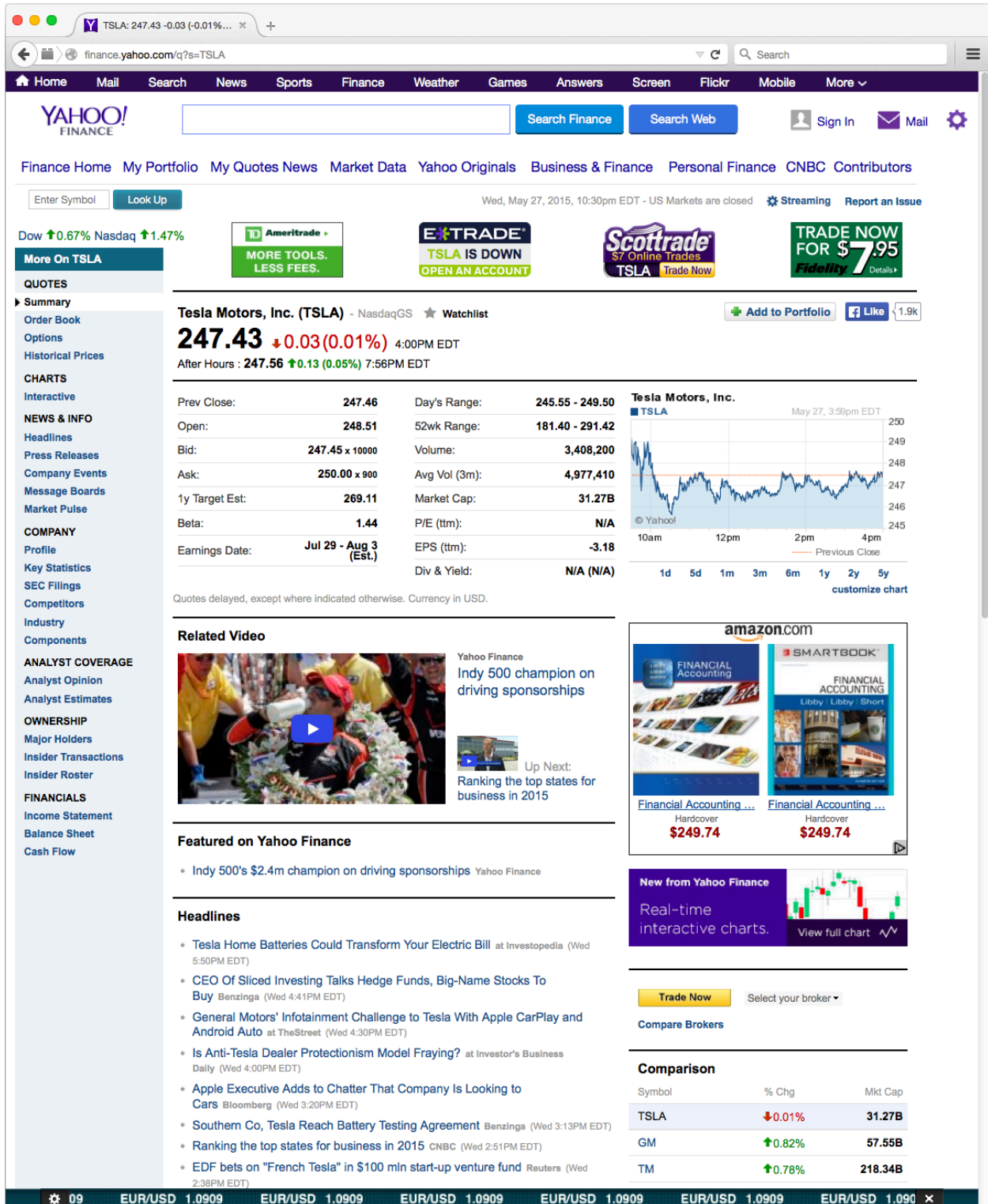
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APPENDIX
Variable Definitions

Variable	Definition
Abnormal Media _{<i>i t</i>}	Firm <i>i</i> 's total media count on week <i>t</i> minus the average media count over the prior 12 weeks, scaled by the average media count over the prior 12 weeks, winsorized at the one-percent level;
Abnormal Return _{<i>i t</i>}	Firm <i>i</i> 's cumulative market-adjusted returns on week <i>t</i> , where market-adjusted return is defined as the daily raw return minus the daily S&P 500 equal-weighted index return, winsorized at the one-percent level ($\pm 1,000\%$);
Analyst Forecast Dispersion _{<i>i t</i>}	Firm <i>i</i> 's average analyst forecast dispersion on week <i>t</i> . Analyst forecast dispersion is calculated as the standard deviation in analyst estimates of the current quarters' earnings per share, divided by the current stock price, winsorized at the one-percent level;
Positive Abnormal Return _{<i>i t</i>}	Firm <i>i</i> 's Abnormal Return _{<i>i t</i>} on week <i>t</i> if the abnormal returns is positive, else it is set to "0";
Negative Abnormal Return _{<i>i t</i>}	Firm <i>i</i> 's Abnormal Return _{<i>i t</i>} on week <i>t</i> if the abnormal returns is negative, else it is set to "0";
Abnormal Volume _{<i>i t</i>}	Firm <i>i</i> 's total trading volume on week <i>t</i> minus the average total trading volume over the prior 12 weeks, scaled by the average total trading volume over the prior 12 weeks, winsorized at the one-percent level;
Abnormal Bid – Ask Spread _{<i>i t</i>}	Firm <i>i</i> 's mean bid-ask spread on week <i>t</i> minus the average mean bid-ask spread over the prior 12 weeks, scaled by the average mean bid-ask spread over the prior 12 weeks. Bid-ask spread is calculated as daily ask price minus daily bid price, scaled the mid-point price of the spread, winsorized at the one-percent level;
Absolute Earnings Surprise _{<i>i t</i>}	The absolute value of Earnings Surprise _{<i>i t</i>} for firm <i>i</i> on week <i>t</i> , winsorized at the one-percent level;
Bid – Ask Spread _{<i>i t</i>}	Firm <i>i</i> 's average bid-ask spread on week <i>t</i> . Bid-ask spread is calculated as daily ask price minus daily bid price, scaled the mid-point price of the spread, winsorized at the one-percent level;
Change in Ratings _{<i>i t</i>}	Firm <i>i</i> 's average analyst consensus ratings on week <i>t</i> minus its average consensus ratings on week <i>t-1</i> . Ratings are given values 1- sell, 2-hold, and 3-buy, and thus a negative change in ratings represents the magnitude of weekly downgrades;
Complexity _{<i>i t</i>}	The ratio of the number of non-missing financial items in Compustat to the number of total financial items in Compustat for firm <i>i</i> on week <i>t</i> , winsorized at the one-percent level;
Earnings Announcement _{<i>i t</i>}	"1" if firm <i>i</i> announces earnings on week <i>t</i> , "0" otherwise;
Earnings Surprise _{<i>i t</i>}	Firm <i>i</i> 's actual earnings per share minus the most recent consensus analysts' earnings per share forecast, scaled by the price per share two days before the earnings announcement day, winsorized at the one-percent level;

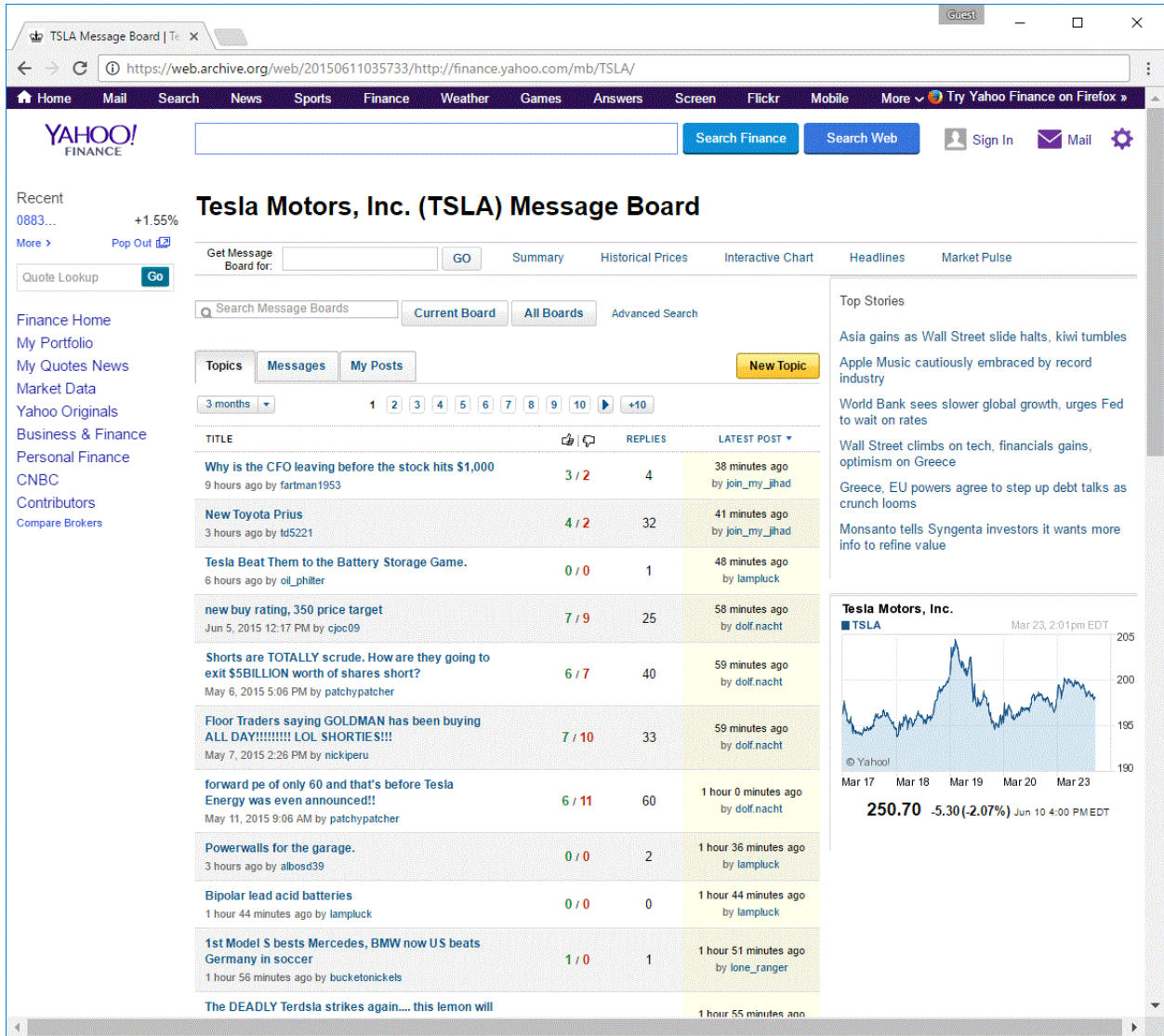
Variable	Definition
Financial Reliance _{<i>i t</i>}	The average ratio of total number of financial page views to the number of other page views for firm <i>i</i> on week <i>t</i> . Other page views is defined as the number of total Yahoo Finance page views (a total of 24 pages) minus the number of views on the Summary page, Message Board page, and Financial pages (including the Income Statement, Balance Sheet, Cash Flow Statement, Key Statistics, and SEC Filing pages);
ΔFinancial Reliance _{<i>i t</i>}	Firm <i>i</i> 's Financial Reliance _{<i>i t</i>} on week <i>t</i> minus its Financial Reliance _{<i>i t</i>} on week <i>t</i> -1;
Log Analyst Following _{<i>i t</i>}	The average natural log of one plus the number of analyst following for firm <i>i</i> on week <i>t</i> , winsorized at the one-percent level;
Log Media _{<i>i t</i>}	The average natural log of one plus the number of media articles for firm <i>i</i> on week <i>t</i> , winsorized at the one-percent level;
Log Market Capitalization _{<i>i t</i>}	The average natural log of market capitalization for firm <i>i</i> on week <i>t</i> , winsorized at the one-percent level;
Message Board Reliance _{<i>i t</i>}	The average ratio of total number of message board page views to the number of other page views for firm <i>i</i> on week <i>t</i> . Other page views is defined as the number of total Yahoo Finance page views (a total of 24 pages) minus the number of views on the Summary page, Message Board page, and Financial pages (including the Income Statement, Balance Sheet, Cash Flow Statement, Key Statistics, and SEC Filing pages);
ΔMessage Board Reliance _{<i>i t</i>}	Firm <i>i</i> 's Message Board Reliance _{<i>i t</i>} on week <i>t</i> minus its Message Board Reliance _{<i>i t</i>} on week <i>t</i> -1;
Positive ΔMessage Board Reliance _{<i>i t</i>}	Firm <i>i</i> 's ΔMessage Board Reliance _{<i>i t</i>} on week <i>t</i> if the change in reliance is positive, else it is set to "0";
Negative ΔMessage Board Reliance _{<i>i t</i>}	Firm <i>i</i> 's ΔMessage Board Reliance _{<i>i t</i>} on week <i>t</i> if the change in reliance is negative, else it is set to "0";
High ΔMessage Board Reliance _{<i>i t</i>}	"1" if firm <i>i</i> 's ΔMessage Board Reliance _{<i>i t</i>} on week <i>t</i> is in the top decile, else it is set to "0";
Market to Book _{<i>i t</i>}	The average ratio of market capitalization to book value of equity for firm <i>i</i> on week <i>t</i> , winsorized at the one-percent level;
Past Abnormal Return _{<i>i t</i>}	Firm <i>i</i> 's cumulative market-adjusted returns over the past 11 weeks ending on week <i>t</i> -1;
Past Return Volatility _{<i>i t</i>}	The standard deviation of firm <i>i</i> 's weekly returns over the past 12 weeks ending on week <i>t</i> , winsorized at the one-percent level;
Price _{<i>i t</i>}	The average stock price for firm <i>i</i> on week <i>t</i> , winsorized at the one-percent level;
Return on Assets _{<i>i t</i>}	The average ratio of net income to total assets for firm <i>i</i> on week <i>t</i> , winsorized at the one-percent level;
Short Interest _{<i>i t</i>}	The average ratio of short interests to shares outstanding for firm <i>i</i> on week <i>t</i> , winsorized at the one-percent level; and,
Volume _{<i>i t</i>}	The average ratio of trading volume to shares outstanding for firm <i>i</i> on week <i>t</i> , winsorized at the one-percent level.

FIGURE 1
Example of a Yahoo Finance Company Summary Page



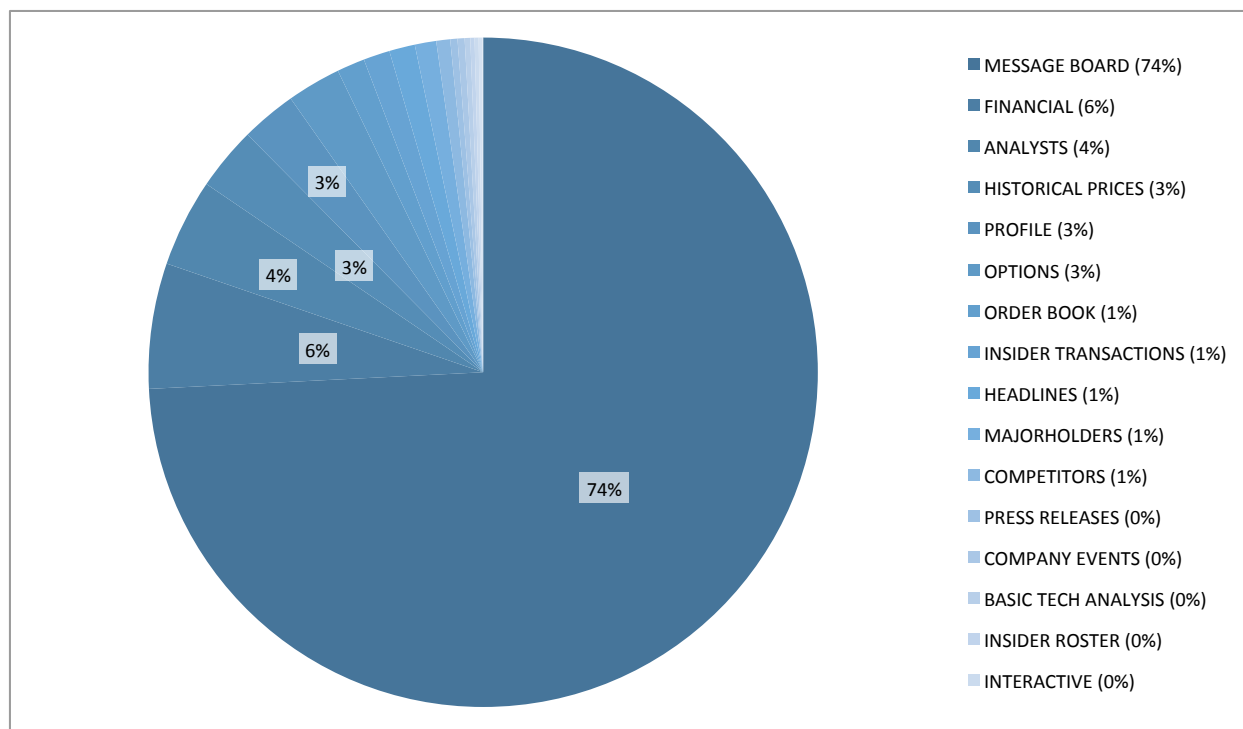
This figure illustrates an example of a Yahoo Finance (*finance.yahoo.com*) company Summary page.

FIGURE 2
Example of a Yahoo Finance Message Board Page



This figure illustrates an example of a Yahoo Finance (*finance.yahoo.com*) message board page.

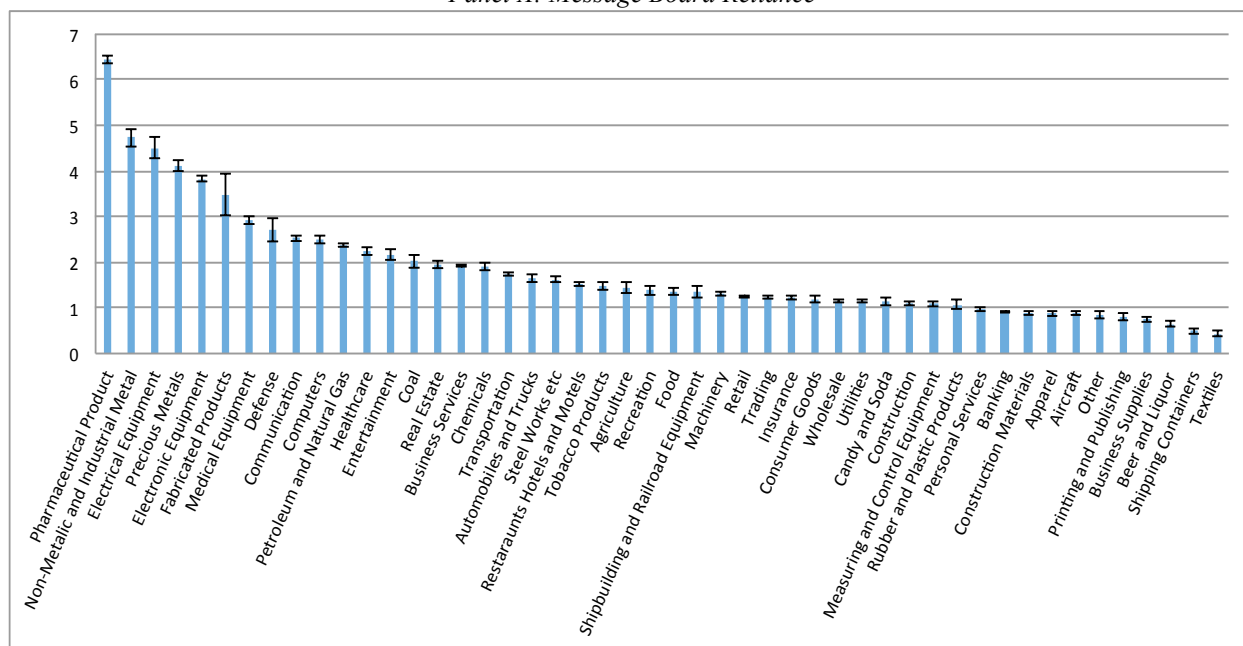
FIGURE 3
Category Distribution of Detail Page Views on Yahoo Finance



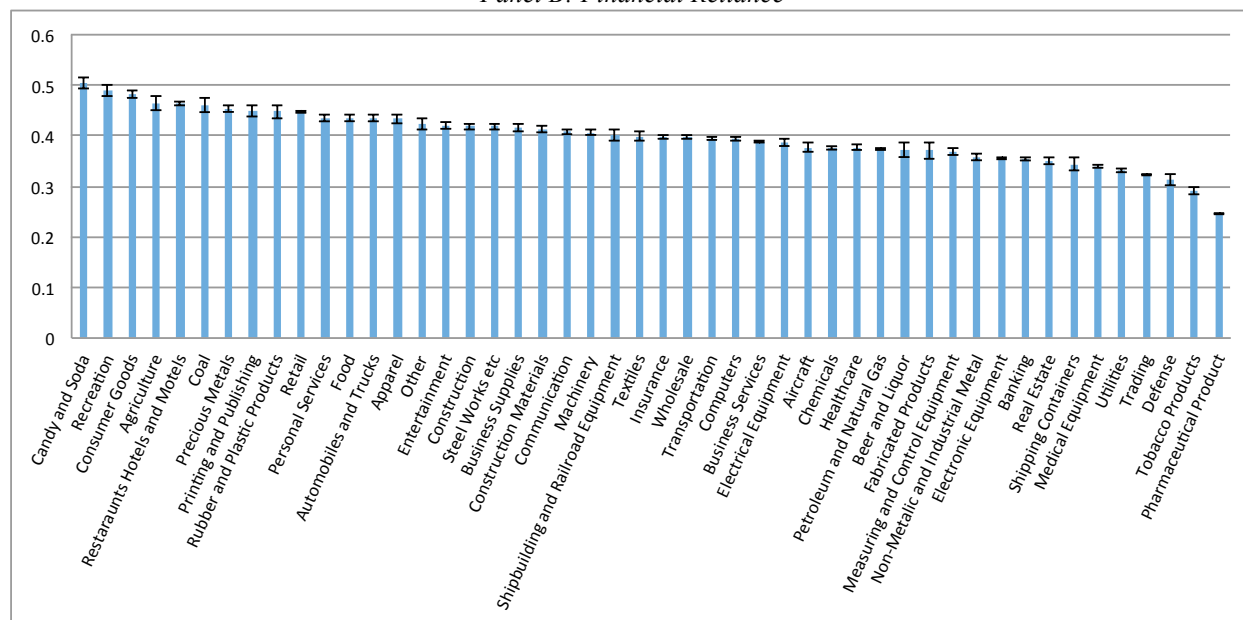
This figure illustrates the relative popularity of detail firm information pages on Yahoo Finance, which include all firm-specific information pages, other than the firm's Summary page. Pages representing less than 2 percent of total page views do not have the fraction labeled on the figure. Page view data is collected from July 2014 to July 2016.

FIGURE 4
The Distribution of Message Board Reliance and Financial Reliance by Industry

Panel A: Message Board Reliance



Panel B: Financial Reliance

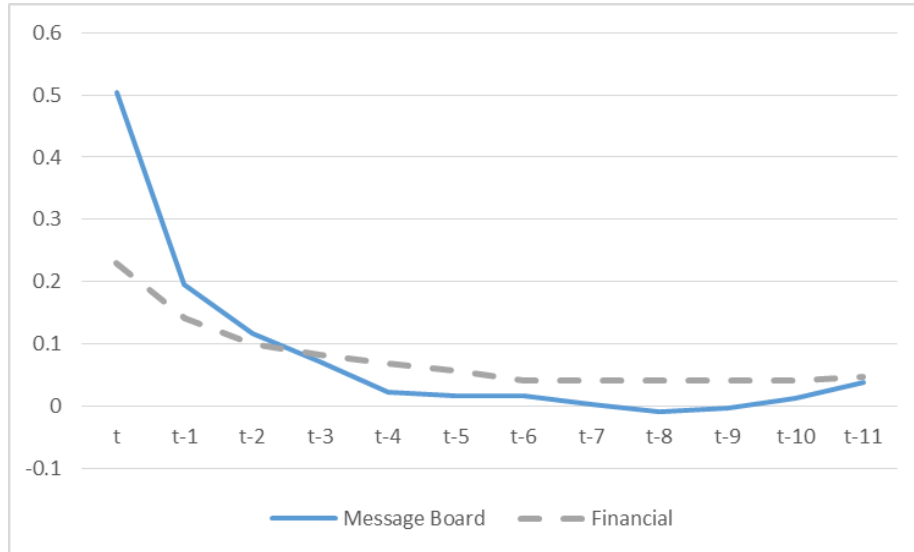


This figure plots the distribution of *Message Board Reliance* and *Financial Reliance* by industry. *Message Board Reliance* is defined as the number of Message Board page views relative to the number of other page views. *Financial Reliance* is defined as the number of Financial page views relative to the number of other page views. Other page views is defined as the number of total Yahoo Finance page views (a total of 24 pages) minus the number of views on the Summary, Message Board, and Financial pages (including the Income Statement, Balance Sheet, Cash Flow Statement, Key Statistics, and SEC Filing pages). The error bar shows the 95% confidence interval range.

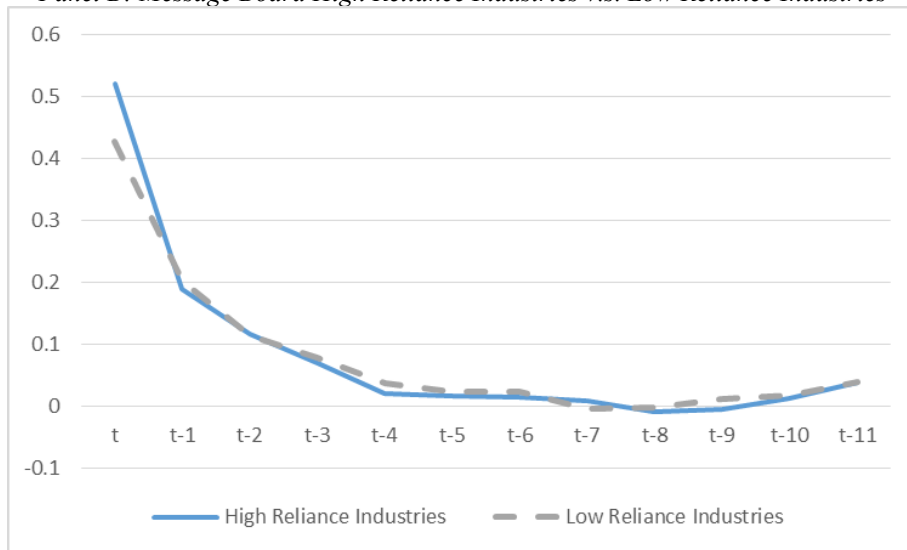
FIGURE 5

Weekly Autoregressive Coefficients for Message Board Reliance and Financial Reliance

Panel A: Message Board Reliance vs. Financial Reliance



Panel B: Message Board High Reliance Industries v.s. Low Reliance Industries

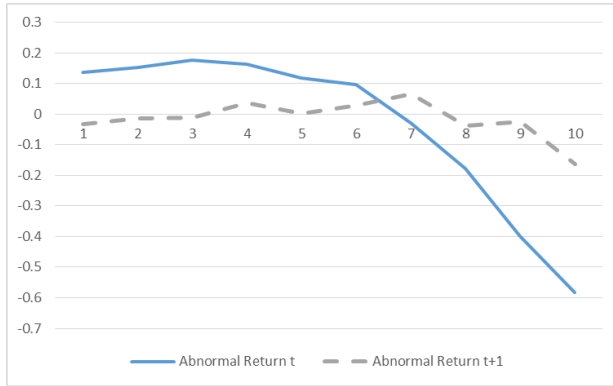


This figure plots weekly autoregressive regression coefficients for *Message Board Reliance* and *Financial Reliance* (i.e., the coefficients of regressing Message Board/Financial reliance on week $t+1$ on values on week t , week $t-1$, $t-2$, to week $t-11$). Panel A compares the autoregressive coefficients between *Message Board Reliance* and *Financial Reliance*. *Message Board Reliance* is defined as the number of Message Board page views to the number of other page views. *Financial Reliance* is defined as the number of Financial page views to the number of other page views. Other page views is defined as the number of total Yahoo Finance page views (a total of 24 pages) minus the number of views on the Summary, Message Board, and Financial pages (including the Income Statement, Balance Sheet, Cash Flow Statement, Key Statistics, and SEC Filing pages). Panel B compares the autoregressive coefficients between high reliance industries (24 Fama French industries greater than the median industry reliance) and low reliance industries (24 Fama French industries less than the median industry reliance).

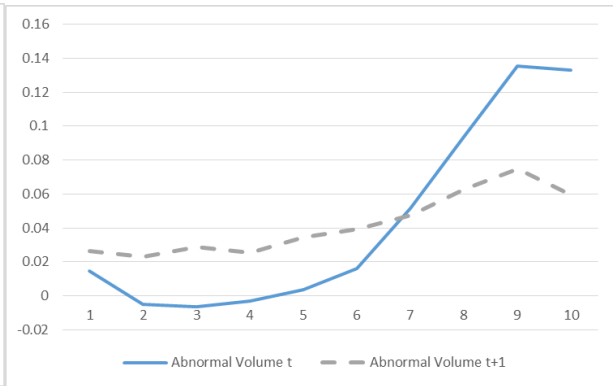
FIGURE 6

Market Response, Media, and Analyst Response by Changes in Message Board Reliance Deciles

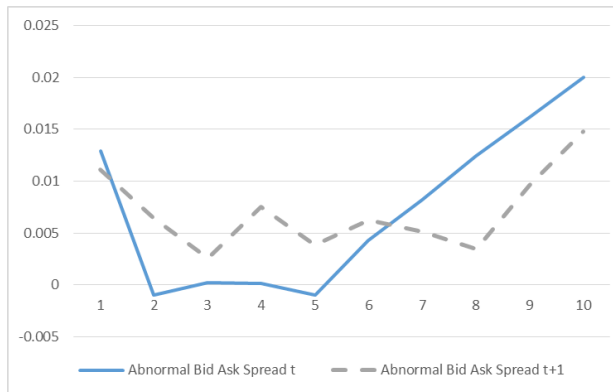
Panel A: The Mean Abnormal Return



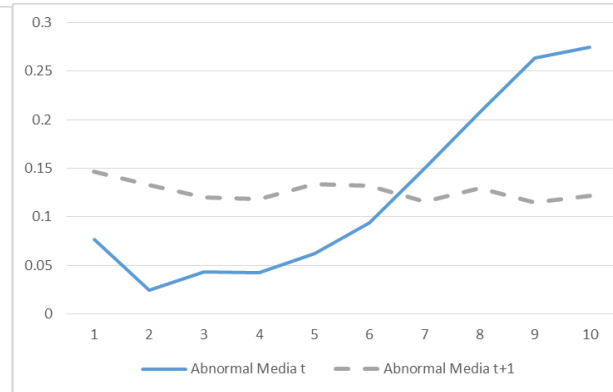
Panel B: The Mean Abnormal Volume



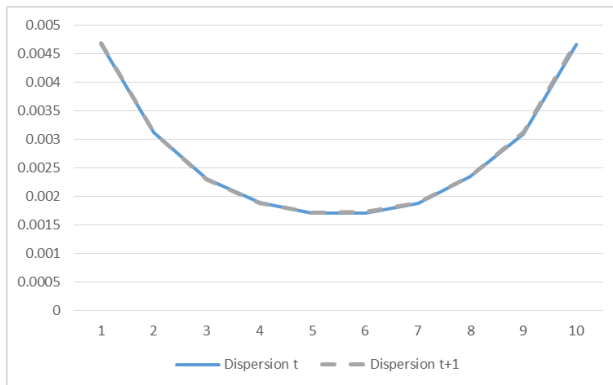
Panel C: The Mean Abnormal Bid-Ask Spread



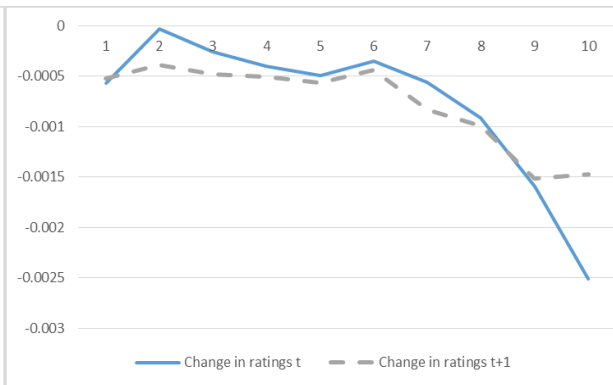
Panel D: The Mean Abnormal Media



Panel E: The Mean Analyst Forecast Dispersion



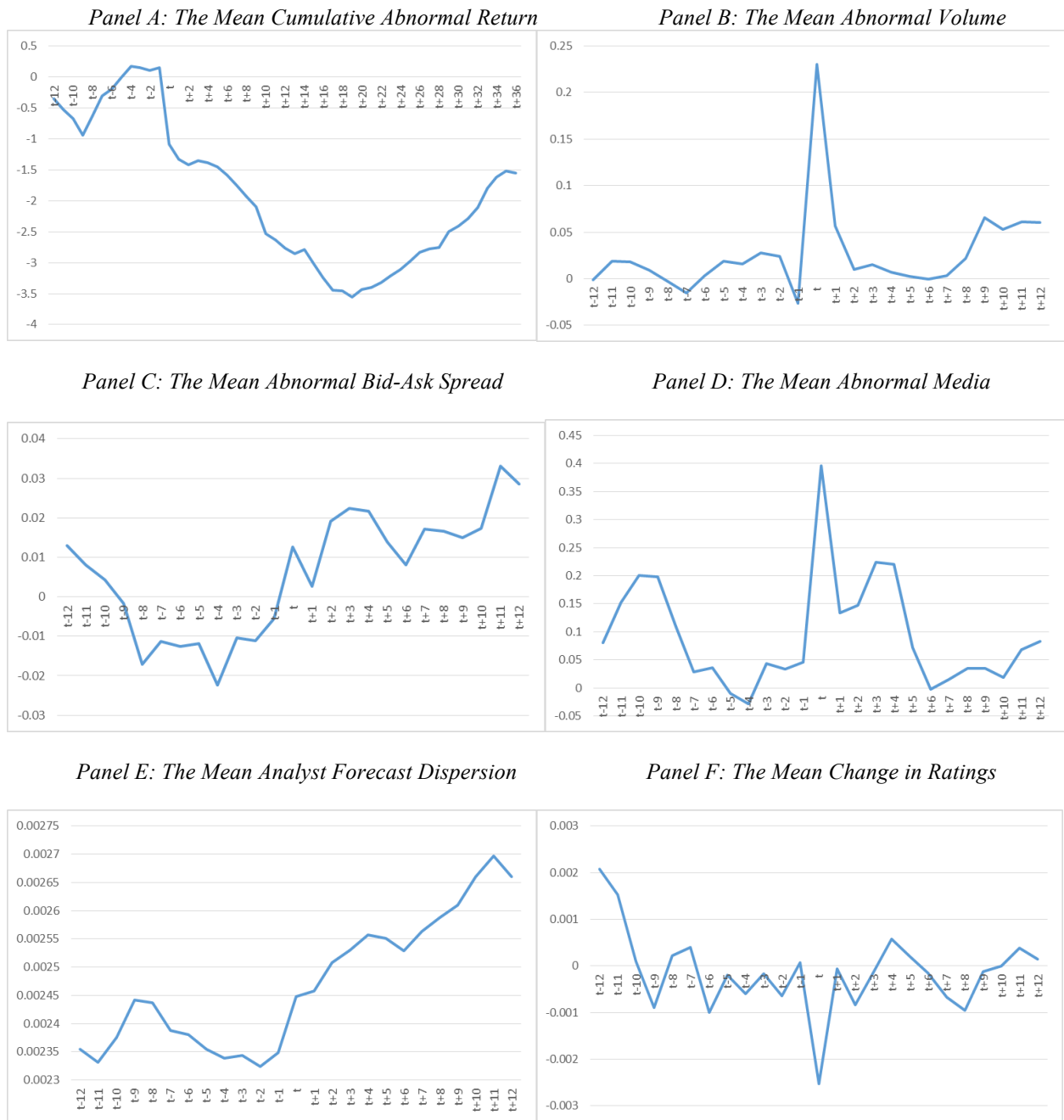
Panel F: The Mean Change in Ratings



This figure plots the mean *Abnormal Return*, *Abnormal Volume*, *Abnormal Bid - Ask Spread*, *Abnormal Media*, *Analyst Forecast Dispersion*, and *Change in Ratings* by changes in *Message Board Reliance* deciles. Decile 1 is the lowest decile and decile 10 is the highest. Changes in *Message Board Reliance* is defined as the difference in message board reliance between week t and week $t-1$.

FIGURE 7

Market Response, Media, and Analyst Response from 12 Weeks before to 12 Weeks after for Observations in the Highest Changes in Message Board Reliance Decile



This figure plots the mean cumulative *Abnormal Return* from 12 weeks before to 36 weeks after for observations in the highest changes in *Message Board Reliance* decile sorted each week, and *Abnormal Volume*, *Abnormal Bid - Ask Spread*, *Abnormal Media*, *Analyst Forecast Dispersion*, and *Change in Ratings* from 12 weeks before to 12 weeks after for observations in the highest changes in *Message Board Reliance* decile sorted each week. While a firm can be included in the highest decile multiple times, we only use the firm’s first highest decile appearance for this figure to avoid overlapping return windows. Changes in *Message Board Reliance* is defined as the difference in *Message Board Reliance* between week t and week $t-1$.

TABLE 1
Descriptive Statistics

Variables	N	Mean	Std Dev	Min	P25	P50	P75	Max
<i>Message Board Reliance_t</i>	385,665	2.116	4.386	0.000	0.289	0.666	1.796	34.444
<i>Financial Reliance_t</i>	385,665	0.396	0.162	0.000	0.286	0.370	0.479	1.694
Δ <i>Message Board Reliance_t</i>	385,665	0.013	1.483	-22.414	-0.200	-0.001	0.203	24.256
Δ <i>Financial Reliance_t</i>	385,665	0.000	0.147	-1.263	-0.069	0.000	0.070	1.121
<i>Abnormal Return_t</i>	385,665	-0.035	4.734	-42.051	-2.195	-0.034	2.124	45.037
<i>Positive Abnormal Return_t</i>	385,665	1.600	2.925	0.000	0.000	0.000	2.124	45.037
<i>Negative Abnormal Return_t</i>	385,665	-1.635	2.937	-42.051	-2.195	-0.034	0.000	0.000
<i>Short Interest_t</i>	385,665	0.044	0.052	0.000	0.012	0.026	0.057	0.272
<i>Bid – Ask Spread_t</i>	385,665	0.003	0.005	0.000	0.000	0.001	0.002	0.039
<i>Volume_t</i>	385,665	0.008	0.008	0.000	0.003	0.005	0.010	0.052
<i>Log Media_t</i>	385,665	0.309	0.285	0.000	0.099	0.256	0.454	2.372
<i>Media_t</i>	385,665	0.699	0.855	0.000	0.143	0.429	1.000	11.833
<i>Complexity_t</i>	385,665	0.332	0.046	0.009	0.318	0.345	0.361	0.428
<i>Log Market Capitalization_t</i>	385,665	21.101	1.757	18.060	19.728	20.961	22.242	25.612
<i>Market Capitalization_t</i> (in millions)	385,665	7,419	19,091	69	369	1,268	4,566	132,780
<i>Log Analyst Following_t</i>	385,665	1.945	0.925	0.000	1.386	2.026	2.639	3.611
<i>Analyst Following_t</i>	385,665	9.080	8.213	0.000	3.000	6.600	13.000	36.000
<i>Price_t</i>	385,665	35.155	35.953	1.530	12.050	23.703	45.412	212.630
<i>Earnings Announcements_t</i>	385,665	0.077	0.266	0.000	0.000	0.000	0.000	1.000
<i>Earnings Surprise_t</i>	385,665	0.000	0.009	-0.060	-0.001	0.000	0.002	0.037
<i>Market to Book_t</i>	385,665	3.824	5.905	0.357	1.245	2.102	3.904	44.535
<i>Return on Assets_t</i>	385,665	0.002	0.146	-0.787	0.001	0.024	0.063	0.295
<i>Abnormal Volume_{t+1}</i>	385,665	0.042	0.646	-1.000	-0.325	-0.098	0.213	4.247
<i>Abnormal Bid – Ask Spread_{t+1}</i>	385,665	0.007	0.300	-0.679	-0.168	-0.022	0.138	1.264
<i>Abnormal Media_{t+1}</i>	385,665	0.126	1.424	-1.000	-0.765	-0.324	0.469	8.000
<i>Analyst Forecast Dispersion_{t+1}</i>	322,324	0.003	0.005	0.000	0.000	0.001	0.003	0.057
<i>Change in Ratings_{t+1}</i>	355,132	-0.001	0.038	-1.000	0.000	0.000	0.000	1.333
<i>Past Abnormal Return_t</i>	385,665	0.159	15.825	-49.961	-7.454	0.464	8.175	51.775
<i>Past Return Volatility_t</i>	385,665	4.833	2.926	0.866	2.800	4.049	6.022	16.947

This table presents the descriptive statistics for the variables used in the main analyses. See the Appendix for variable definitions.

TABLE 2
Correlations Among Key Variables

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
(1) <i>Message Board Reliance_t</i>	-																						
(2) <i>Financial Reliance_t</i>	-0.11	-																					
(3) Δ <i>Message Board Reliance_t</i>	0.18	0.03	-																				
(4) Δ <i>Financial Reliance_t</i>	0.01	0.45	0.06	-																			
(5) <i>Abnormal Return_t</i>	-0.03	-0.04	-0.04	-0.05	-																		
(6) <i>Short Interest_t</i>	0.22	-0.09	0.00	0.00	-0.01	-																	
(7) <i>Bid – Ask Spread_t</i>	0.08	0.11	0.00	0.00	0.00	-0.23	-																
(8) <i>Volume_t</i>	0.15	-0.17	0.02	-0.01	0.00	0.59	-0.27	-															
(9) <i>Log Media_t</i>	-0.02	-0.10	0.02	-0.01	0.02	0.07	-0.21	0.26	-														
(10) <i>Complexity_t</i>	0.05	0.04	0.00	0.00	-0.01	0.22	-0.25	0.24	0.09	-													
(11) <i>Log Market Capitalization_t</i>	-0.20	-0.12	0.00	0.00	0.01	-0.04	-0.49	0.11	0.41	0.15	-												
(12) <i>Log Analyst Following_t</i>	-0.10	-0.11	0.00	0.00	-0.01	0.18	-0.51	0.31	0.38	0.23	0.73	-											
(13) <i>Price_t</i>	-0.20	-0.07	0.00	0.00	0.02	-0.02	-0.20	0.06	0.18	0.15	0.56	0.32	-										
(14) <i>Earnings Announcements_t</i>	0.01	-0.07	0.04	-0.05	0.01	0.00	0.01	0.12	0.34	0.00	0.00	0.00	0.00	-									
(15) <i>Earnings Surprise_t</i>	-0.04	-0.01	0.00	0.00	0.03	0.00	-0.03	0.01	0.00	0.02	0.04	0.02	0.04	0.00	-								
(16) <i>Market to Book_t</i>	0.05	-0.10	0.00	0.00	0.02	0.11	-0.08	0.10	0.05	0.16	0.14	0.10	0.20	0.00	0.02	-							
(17) <i>Return on Assets_t</i>	-0.36	0.16	-0.01	0.00	0.01	-0.17	-0.12	-0.08	0.03	-0.03	0.27	0.10	0.26	0.00	0.07	-0.06	-						
(18) <i>Abnormal Volume_{t+1}</i>	-0.01	-0.01	0.01	-0.02	-0.01	-0.01	0.01	0.07	0.03	-0.01	0.00	0.00	0.00	0.05	0.01	0.00	0.00	-					
(19) <i>Abnormal Bid – Ask Spread_{t+1}</i>	0.04	0.04	0.01	0.00	-0.10	0.02	0.06	-0.01	-0.03	0.01	0.00	0.02	-0.01	-0.03	-0.03	-0.02	0.01	-0.04	-				
(20) <i>Abnormal Media_{t+1}</i>	0.00	-0.02	-0.01	-0.02	0.00	-0.01	0.02	-0.01	0.01	-0.01	-0.02	-0.02	-0.01	0.03	0.00	-0.01	0.00	0.23	0.05	-			
(21) <i>Analyst Forecast Dispersion_{t+1}</i>	0.25	0.03	0.00	0.00	-0.06	0.08	0.27	0.08	-0.03	-0.03	-0.25	-0.11	-0.26	0.00	-0.17	-0.08	-0.30	0.01	0.07	0.01	-		
(22) <i>Change in Ratings_{t+1}</i>	-0.01	0.01	0.00	0.00	0.02	0.00	0.00	-0.02	-0.01	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	-0.05	0.00	-0.03	-0.01	-	
(23) <i>Past Abnormal Return_t</i>	-0.05	-0.11	0.01	0.00	-0.01	-0.05	-0.01	-0.04	0.01	-0.02	0.05	-0.04	0.10	0.00	0.11	0.10	0.01	-0.02	-0.19	-0.01	-0.16	-0.01	-
(24) <i>Past Return Volatility_t</i>	0.35	-0.05	0.00	0.00	-0.01	0.30	0.06	0.36	0.01	0.16	-0.27	-0.03	-0.26	0.01	-0.09	0.05	-0.40	-0.04	-0.01	-0.01	0.40	-0.02	-0.04

This table presents Pearson correlation coefficients for all firm-week observations. The insignificant correlation coefficients are bolded. See the Appendix for variable definitions.

TABLE 3
Determinants of Message Board Reliance

Dependent Variable	<i>Message Board Reliance_t</i>	
	Coeff.	t-stat
Intercept	-1.385	-1.42
<i>Positive Abnormal Return_t</i>	0.010**	2.45
<i>Negative Abnormal Return_t</i>	-0.047***	-9.79
<i>Short Interest_t</i>	10.890***	7.00
<i>Bid – Ask Spread_t</i>	40.567***	3.95
<i>Volume_t</i>	6.663	0.91
<i>Log Media_t</i>	0.303***	3.44
<i>Complexity_t</i>	3.527***	4.31
<i>Log Market Capitalization_t</i>	0.092*	1.85
<i>Log Analyst Following_t</i>	-0.411***	-4.33
<i>Price_t</i>	-0.011***	-8.06
<i>Earnings Announcements_t</i>	-0.043	-1.35
<i>Market to Book_t</i>	0.026***	3.28
<i>Return on Assets_t</i>	-7.238***	-9.85
<i>Past Return Volatility_t</i>	0.233***	13.07
Firm clustering	Yes	
Week FE	Yes	
Adjusted R ²	0.2499	
N	385,665	

This table presents the regression results showing the determinants of *Message Board Reliance*, described by Equation (1). *Message Board Reliance* is defined as the number of Message Board page views to the number of other page views. Other page views is defined as the number of total Yahoo Finance page views (a total of 24 pages) minus the number of views on the Summary, Message Board, and Financial pages (including the Income Statement, Balance Sheet, Cash Flow Statement, Key Statistics, and SEC Filing pages). *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. T-statistics and *p*-values are calculated using clustered standard errors by firm. Week fixed effects are included in the regressions. See the Appendix for variable definitions.

TABLE 4
The Relation between Changes in Message Board Reliance between Week t and Week t-1

Panel A: Mean Value of Changes in Message Board by Decile							
<i>ΔMessage Board Reliance</i> decile	N	(1)			(2)		
		Mean value of <i>ΔMessage Board Reliance</i> in week <i>t</i>			Mean value of <i>ΔMessage Board Reliance</i> in week <i>t-1</i>		
1-Lowest	38,525	-2.218		1.248			
2	38,571	-0.579		0.170			
3	38,581	-0.265		0.003			
4	38,568	-0.125		-0.056			
5	38,559	-0.037		-0.090			
6	38,605	0.038		-0.114			
7	38,572	0.127		-0.139			
8	38,574	0.275		-0.185			
9	38,578	0.610		-0.235			
10-Highest	38,532	2.308		-0.481			

Panel B: 10x10 Matrix Showing the Movements across Deciles between Week t and Week t-1										
Deciles in Week <i>t</i> (Horizontal)										
Deciles in week <i>t-1</i> (Vertical)										
	1- Lowest	2	3	4	5	6	7	8	9	10 - Highest
1-Lowest	0.129	0.093	0.066	0.051	0.044	0.045	0.056	0.085	0.139	0.292
2	0.049	0.075	0.081	0.082	0.083	0.089	0.107	0.134	0.162	0.138
3	0.025	0.056	0.076	0.093	0.109	0.129	0.143	0.149	0.137	0.083
4	0.018	0.043	0.073	0.103	0.135	0.159	0.159	0.143	0.109	0.058
5	0.014	0.038	0.075	0.119	0.154	0.171	0.161	0.131	0.091	0.045
6	0.014	0.049	0.093	0.142	0.168	0.162	0.137	0.110	0.082	0.045
7	0.023	0.075	0.141	0.165	0.146	0.119	0.108	0.096	0.077	0.049
8	0.043	0.151	0.198	0.146	0.097	0.075	0.070	0.074	0.079	0.066
9	0.144	0.281	0.154	0.077	0.048	0.037	0.041	0.051	0.075	0.091
10-Highest	0.540	0.140	0.042	0.022	0.016	0.015	0.016	0.027	0.050	0.132

This table presents the relation between changes in *Message Board Reliance* between week *t* and week *t-1*. Panel A presents the mean value of changes in *Message Board Reliance* in week *t* (*ΔMessage Board Reliance_t*) and week *t-1* (*ΔMessage Board Reliance_{t-1}*) by decile of the changes in *Message Board Reliance* in week *t*. Panel B presents the percentage of observations in each decile of changes in *Message Board Reliance* between week *t* and week *t-1*. We first sort changes in *Message Board Reliance* in week *t* into deciles, and then report the distribution for each decile by the deciles formed in week *t-1*.

TABLE 5
Market Response to Changes in Message Board Reliance

Dependent Variable	(1)		(2)		(3)		(4)		(5)		(6)	
	<i>Abnormal Return_{t+1}</i>		<i>Abnormal Return_{t+1}</i>		<i>Abnormal Volume_{t+1}</i>		<i>Abnormal Volume_{t+1}</i>		<i>Abnormal Bid – Ask Spread_{t+1}</i>		<i>Abnormal Bid – Ask Spread_{t+1}</i>	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept	0.908***	9.10	1.061***	10.48	-0.108***	-8.63	-0.110***	-8.63	-0.072***	-9.89	-0.079***	-10.76
Δ Message Board Reliance _t	-0.015**	-2.20			0.001	1.29			0.001***	2.98		
Positive Δ Message Board Reliance _t			-0.065***	-6.31			0.002	1.40			0.003***	6.69
Negative Δ Message Board Reliance _t			0.039***	3.55			0.000	0.32			-0.001***	-2.85
Dependent Variable _t	-0.007**	-2.49	-0.007**	-2.57	0.302***	95.99	0.302***	95.97	0.284***	79.58	0.283***	79.55
Log Market Capitalization _t	-0.033***	-8.78	-0.039***	-10.20	-0.006***	-11.90	-0.005***	-11.57	0.001***	5.50	0.002***	6.55
Market to Book _t	0.002*	1.76	0.003*	1.94	0.001***	4.44	0.001***	4.42	0.000**	-2.06	0.000**	-2.19
Earnings Announcement _t	0.194***	6.19	0.195***	6.25	-0.066***	-13.55	-0.066***	-13.55	-0.073***	-36.83	-0.073***	-36.85
Earnings Surprise _t	2.011	1.52	1.974	1.50	0.136	1.05	0.137	1.06	-0.296***	-4.45	-0.294***	-4.41
Past Abnormal Return _t	-0.001	-1.21	-0.001	-1.30	-0.001***	-8.09	-0.001***	-8.08	-0.002***	-53.79	-0.002***	-53.77
Past Return Volatility _t	-0.028***	-7.28	-0.024***	-6.15	-0.012***	-28.90	-0.012***	-28.33	0.000	0.06	0.000	-0.73
Firm clustering	Yes		Yes		Yes		Yes		Yes		Yes	
Week FE	Yes		Yes		Yes		Yes		Yes		Yes	
Adjusted R ²	0.0251		0.0253		0.1611		0.1611		0.1407		0.1408	
N	385,665		385,665		385,665		385,665		385,665		385,665	

This table presents the relation between changes in *Message Board Reliance* and the following week's *Abnormal Return*, *Abnormal Volume*, and *Abnormal Bid - Ask Spread*, described in Equation (2). Columns (1), (3), and (5) present the results for the relation between changes in *Message Board Reliance* (Δ Message Board Reliance_t) and the following week's *Abnormal Return_{t+1}*, *Abnormal Volume_{t+1}*, and *Abnormal Bid – Ask Spread_{t+1}*. Columns (2), (4), and (6) partition changes in message board reliance into increases in reliance (*Positive Δ Message Board Reliance_t*) and decreases in reliance (*Negative Δ Message Board Reliance_t*), and present the results for the relation between increases and decreases in reliance and the following week's *Abnormal Return_{t+1}*, *Abnormal Volume_{t+1}*, and *Abnormal Bid – Ask Spread_{t+1}*, respectively. The independent variable, *Dependent Variable_t* indicates that the lagged dependent variable is used as a control in the regression. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. T-statistics and *p*-values are calculated using clustered standard errors by firm. Week fixed effects are included in the regressions. See the Appendix for variable definitions.

TABLE 6
Media and Analyst Responses to Changes in Message Board Reliance

Dependent Variable	(1)		(2)		(3)		(4)		(5)		(6)	
	<i>Abnormal Media_{t+1}</i>		<i>Abnormal Media_{t+1}</i>		<i>Analyst Forecast Dispersion_{t+1}</i>		<i>Analyst Forecast Dispersion_{t+1}</i>		<i>Change in Ratings_{t+1}</i>		<i>Change in Ratings_{t+1}</i>	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept	0.401***	17.62	0.393***	16.89	0.016***	4.45	0.013***	3.60	-0.044	-0.47	-0.033	-0.35
Δ Message Board Reliance _t	-0.003*	-1.88			0.001***	2.81			-0.013***	-2.57		
Positive Δ Message Board Reliance _t			0.000	-0.17			0.002***	5.19			-0.017**	-2.10
Negative Δ Message Board Reliance _t			-0.006**	-2.36			-0.001**	-2.24			-0.008	-1.36
Dependent Variable _t	0.049***	14.06	0.049***	14.06	97.038***	469.54	97.016***	467.24	20.586***	37.30	20.585***	37.29
Log Market Capitalization _t	-0.022***	-33.79	-0.022***	-32.19	-0.001***	-6.57	-0.001***	-5.83	-0.003	-1.16	-0.004	-1.29
Market to Book _t	0.000**	2.07	0.000**	2.01	0.000***	-4.01	0.000***	-4.16	0.000	-0.13	0.000	-0.11
Earnings Announcement _t	-0.447***	-27.70	-0.447***	-27.70	0.004***	2.95	0.004***	2.92	-0.141***	-4.40	-0.141***	-4.39
Earnings Surprise _t	-0.300**	-2.19	-0.298**	-2.18	-0.245***	-3.65	-0.246***	-3.66	0.925	1.36	0.922	1.36
Past Abnormal Return _t	0.000	-0.88	0.000	-0.86	0.000***	-3.92	0.000***	-3.90	-0.003***	-6.61	-0.003***	-6.62
Past Return Volatility _t	-0.015***	-26.70	-0.015***	-26.18	0.002***	12.88	0.002***	12.39	-0.016***	-6.37	-0.016***	-6.19
Firm clustering	Yes		Yes		Yes		Yes		Yes		Yes	
Week FE	Yes		Yes		Yes		Yes		Yes		Yes	
Adjusted R ²	0.1267		0.1267		0.9444		0.9444		0.0445		0.0445	
N	385,665		385,665		321,375		321,375		355,132		355,132	

This table presents the relation between changes in *Message Board Reliance* and the following week's *Abnormal Media*, *Analyst Forecast Dispersion*, and *Change in Ratings*, described in Equation (2). Columns (1), (3), and (5) present the results for the relation between changes in *Message Board Reliance* (Δ Message Board Reliance_t) and the following week's *Abnormal Media_{t+1}*, *Analyst Forecast Dispersion_{t+1}*, and *Change in Ratings_{t+1}*. Columns (2), (4), and (6) partition changes in message board reliance into increases in reliance (*Positive Δ Message Board Reliance_t*) and decreases in reliance (*Negative Δ Message Board Reliance_t*), and present the results for the relation between increases and decreases in reliance and the following week's *Abnormal Media_{t+1}*, *Analyst Forecast Dispersion_{t+1}*, and *Change in Ratings_{t+1}*, respectively. The coefficients in *Analyst Forecast Dispersion_{t+1}* and *Change in Ratings_{t+1}* regressions are multiplied by 100. The independent variable, *Dependent Variable_t*, indicates that the lagged dependent variable is used as a control in the regression. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. T-statistics and p-values are calculated using clustered standard errors by firm. Week fixed effects are included in the regressions. See the Appendix for variable definitions.

TABLE 7
The Relation between Changes in Message Board Reliance and Next Quarter's Earnings Surprise

Dependent Variable	(1)		(2)		(3)		(4)	
	<i>Earnings Surprise_{t+1}</i>				<i>Absolute Earnings Surprise_{t+1}</i>			
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept	0.174**	1.96	0.176**	2.00	0.626***	7.81	0.583***	7.35
Δ Message Board Reliance _t	0.001	0.53			0.000	0.09		
Positive Δ Message Board Reliance _t			0.000	0.00			0.014***	4.20
Negative Δ Message Board Reliance _t			0.001	0.24			-0.015***	-4.44
Abnormal Return _t	0.003***	4.77	0.003***	4.76	-0.008***	-16.51	-0.008***	-16.39
Log Market Capitalization _t	-0.005	-1.22	-0.005	-1.25	-0.027***	-7.64	-0.025***	-7.24
Market to Book _t	0.003***	2.63	0.003***	2.63	-0.005***	-5.40	-0.005***	-5.48
Volume _t	3.442***	2.63	3.444***	2.63	-1.326	-1.33	-1.368	-1.37
Dependent Variable _t	19.323***	9.05	19.323***	9.05	44.707***	24.76	44.610***	24.70
Past Abnormal Return _t	0.002***	4.18	0.002***	4.18	-0.006***	-15.00	-0.006***	-14.96
Past Return Volatility _t	-0.023***	-5.27	-0.023***	-5.27	0.053***	17.41	0.052***	17.07
Firm clustering	Yes		Yes		Yes		Yes	
Week FE	Yes		Yes		Yes		Yes	
Adjusted R ²	0.0623		0.0623		0.2356		0.2357	
N	386,454		386,454		386,454		386,454	

This table presents the relation between changes in *Message Board Reliance* and the earnings surprise for the next quarter, described in Equation (3). We remove the weeks with earnings announcements due to the existence of two earnings surprise values in those weeks (i.e., the past quarter's and the new quarter's earnings surprise). Our results are qualitatively unchanged when we include those weeks with earnings announcements. Column (1) presents the results for the relation between changes in *Message Board Reliance* (Δ Message Board Reliance_t) and the signed earnings surprise for the next quarter (*Earnings Surprise_{t+1}*). Column (2) partitions changes in message board reliance into increases in reliance (*Positive Δ Message Board Reliance_t*) and decreases in reliance (*Negative Δ Message Board Reliance_t*), and presents the results for the relation between increases and decreases in reliance and the subsequent *Earnings Surprise_{t+1}*. Columns (3) and (4) repeat Columns (1) and (2) but use the unsigned earnings surprise as the dependent variable (*Absolute Earnings Surprise_{t+1}*). The regression coefficients are multiplied by 100. The independent variable, *Dependent Variable_t*, indicates that the lagged dependent variable is used as a control in the regression. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. T-statistics and *p*-values are calculated using clustered standard errors by firm. Week fixed effects are included in the regressions. See the Appendix for variable definitions.