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Earnings Announcement Promotions:
A Yahoo Finance Field Experiment

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ABSTRACT: This study presents a field experiment in which media articles for a random sample of firms with earnings announcements are promoted to a one percent subset of Yahoo Finance users. Promoted firms have higher abnormal returns and some evidence of lower bid-ask spreads on the day of the earnings announcement. These results are more pronounced for less visible firms, negative earnings news, and on days with fewer promoted firms. These findings suggest that investor attention affects the pricing of earnings and that retail investors buy stocks that catch their attention, in a setting where attention is randomly assigned.

KEYWORDS: Investor attention; earnings response; capital markets field experiment; event study; retail investors; earnings announcement premium.

JEL CLASSIFICATION: M41, G12, and G14.

1. INTRODUCTION

The literature on investor attention and the effects of media in financial markets generally rely on observational studies to investigate the links between media and investor activities. We conduct a field experiment where randomly selected earnings announcements are promoted to users of Yahoo Finance, and observe the aggregate market response, in an attempt to provide evidence of the effects of investor attention at earnings announcements.[1] Our results in theory can be considered causal, as the treatment is randomly assigned, and both help to confirm prior studies that find effects of media attention on individual investors or individual stocks, and extend the literature on aggregate market effects of investor attention and the media. We build upon prior observational studies that generally use proxies such as media attention, extreme returns, trading volume, investor composition, and the salience of earnings announcements to study the effects of investor attention on financial markets (e.g., Chen, Hong, and Stein 2002; Barber and Odean 2008; Lehavy and Sloan 2008; DellaVigna and Pollet 2009; Hirshleifer, Lim, and Teoh 2009; Aboody, Lehavy, and Trueman 2010; Engelberg and Parsons 2011).

Media has been shown to be associated with financial markets and other economic activity (e.g., Tetlock 2007; Core, Guay, and Larcker 2008; Dyck, Volchkova, and Zingales 2008; Solomon, Soltes, and Sosyura 2014; Kaniel and Parham 2017). Firms can also manage the media to influence stock prices (e.g., Ahern and Sosyura 2014). The role of the media in price formation occurs through the dissemination of new information to market participants, and it may also occur by increasing investor attention; for example, by promoting stale information that should not otherwise have an effect on prices. In observational studies, it is inherently difficult to disentangle

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[1] Our experiment occurs in the environment where subjects are naturally undertaking their usual tasks, as opposed to in a laboratory, and the conditions in which they operate are subject to randomized treatment without the subjects' awareness of the treatment. Floyd and List (2016) use the term "natural field experiment" to describe this setting, and they discuss the complete spectrum of experimental techniques used in the accounting and finance literatures.

the effects of investor attention from market-based and media-based measures, because these measures both reflect and generate investor attention.

It is clear that the media cannot promote all news with equal emphasis.[2] Instead, consumers of news prefer their media providers to help them filter news to focus on the most important items (e.g., Hamilton 2004; Gentzkow and Shapiro 2010). Thus, editorial choices determine which information is made more salient, either through a more prominent position such as on the front page of the Wall Street Journal, or through more channels, as in the decision by local media outlets to cover a story (Engelberg and Parsons 2011). Consequently, studies that use media measures as a proxy for investor attention need to diligently control for the information content of the news itself, because media coverage is by definition responding to events and the information content of those events, as well as to the demand of media consumers, which can endogenously determine the selection and prominence of disseminated information.

Prior literature examining the effects of media and investor attention at earnings announcements suggests that media does affect market participants' responses to earnings announcements. Engelberg and Parsons (2011) study retail brokerage accounts and show that local media coverage of earnings announcements appears to spur local retail trading volume, though their setting does not examine the market-wide effects of media on returns or volumes. Drake, Guest, and Twedt (2014) find that media coverage appears to mitigate cash flow mispricing but not accrual mispricing. Related research examines the effects of investor attention on earnings announcement responses, without specifically considering the media. DellaVigna and Pollet (2009) suggest that inattention to Friday earnings announcements versus those on other weekdays

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[2] Even if the New York Times could literally publish "All the News That's Fit to Print", it still makes editorial decisions about which are the most important articles to print on the front page, or towards the front of each section.

is related to a lower immediate response to earnings announcements coupled with a greater delayed response. Consistent with DellaVigna and Pollet (2009), Drake, Roulstone, and Thornock (2015) and Lawrence, Ryans, Sun, and Laptev (2017a) provide evidence that responses to earnings are associated with increased investor attention. However, in these observational settings, it is difficult to draw causal inferences between the investor attention measures and the observed market response, because the underlying properties of the news will likely affect both the market response and the investor attention measures.

Barber and Odean (2008) infer that individual investors reduce the complexity of their portfolio decisions by trading based on salience, proxied by firms that are in the news, that have unusual trading volume, and that recently experienced extreme returns. Since individual investors have small portfolios, they are neither likely to already own any particular stock, which they would then be able to sell, nor are they likely to take short positions. Observing greater buy-sell imbalances by individual investors on high-attention days leads them to conclude that retail investors are net buyers of firms that grab attention. Huberman and Regev (2001) is closely related to our study in that it attempts to show the effects of an exogenous shock to investor attention. Their case study on EntreMed, a firm promoted in a front-page article in the New York Times, shows a significant and sustained stock price increase following this coverage, even though the substantive information in the New York Times article was published in the scientific literature several months prior. Tetlock (2011) finds that individual investors trade on stale news, when new articles are published even when these new articles are textually similar to prior articles. In these settings it is difficult to control for other information that may have entered into the editorial decision to report on apparently stale news or to publish such an article on the front page of the New York Times. Hence, there remains the possibility that such publication decisions reflect

unobserved additional information and confer additional reputational benefits on the firm despite the stale nature of the news. Additionally, Da, Engelberg, and Gao (2011) study the Google Trends search index to identify positive returns to investor attention and reversals of these positive returns in subsequent periods.

We extend this literature by examining whether random increases in investor attention, through promotion of firm-specific earnings announcement news on the front page of Yahoo Finance, result in increases in abnormal returns and volumes, decreases in bid-ask spreads as well as increases in the information acquisition of financial data by users subject to the promotion. In this way, we ensure that there is no other underlying information that entered into the publication or promotional decision, instead selecting firms and their articles at random for promotion to Yahoo Finance users. Given that the majority of firm-days have zero media coverage (e.g., Lawrence, Ryans, and Sun 2017b), we use the earnings announcement setting because our experimental design requires that a firm has at least one timely news article available to be shown to our sample of users. Our decision to focus on earnings announcements provides a setting where even if all of the major publications do not produce an article on an earnings announcement, a robot-generated article summarizing the earnings announcement such as one from the Associated Press (e.g., Blankespoor, deHaan, and Zhu 2017) should be available for Yahoo Finance to promote.

Yahoo Finance is the most popular financial web site in the U.S. with over 78 million unique monthly visits (CNBC 2016), an audience that is more than 3 times that of the web sites belonging to The Wall Street Journal and Bloomberg News, each with approximately 20 million unique monthly visits (Bloomberg 2015). The field experiment was run on Yahoo Finance from May 12 to July 28, 2016, to an audience comprised of a one percent sample of Yahoo Finance

users, which would equate to roughly The Wall Street Journal's entire web-traffic for Massachusetts including Boston. The one percent sample was calibrated by Yahoo Finance such that the target users and their activities were representative of the Yahoo Finance user population. Thus, news articles on a random sample of earnings announcements were promoted to a significant audience in an attempt to separate the effects of the media promotion from the various factors that cause both media promotion and investor attention. In turn, any resulting effects should only be due to the additional investor attention generated from viewing an existing article, and unrelated to any editorial decision to write or promote a particular article or company. Given the restricted sample size of the experiment, our power to detect an effect of promotion is much higher for returns and bid-ask spread and is much lower for volume and information acquisition.

Every day during the experiment period, the lesser of five or 50 percent of companies with earnings announcements on that day were randomly selected for promotion and paired with an equal number of size matched control firms who also report earnings on that day. For example, if there were six firms reporting earnings on a given day, three would be randomly selected as treatment firms and the remaining three firms would be designated as control firms. If more than ten stocks announce earnings on a day, we randomly select five for treatment and choose the five control firms with the closest market capitalizations to the treatment firms, without replacement. Treatment stocks were promoted for 24 hours, during which time the most recently available news articles relating to the treatment stocks were posted at the top of the article list on the Yahoo Finance home page for the experiment user sample. Section 2 provides more specific details concerning the experimental design.

We find that promoted firms have similar fundamental and earnings-news characteristics as the control firms, indicating that the covariates are balanced across the two groups. We

document that promoted firms have a significant increase in abnormal returns on the day of the earnings announcement (i.e., the news promotion day) of approximately 160 basis points relative to control firms. These findings are more pronounced for smaller and thus less visible firms, for firms that missed analysts' earnings expectations, and on days when fewer firms were promoted. Our analysis confirms that outliers are not responsible for our return findings as there is a clear shift in the distribution of abnormal returns for treatment firms, suggesting that the media promotion resulted in some of the experiment users purchasing these stocks on the day the stock was promoted. Abnormal bid-ask spreads were lower for promoted firms, but with marginal statistical significance, indicating the potential for a reduction of information asymmetry when earnings news is more widely disseminated.

We did not find corresponding increases in trading volume or information acquisition activities on Yahoo Finance by the users subject to the promotion, which is likely a result of the sample size. Moreover, we do find some evidence indicating that the pricing of the earnings news is less pronounced for promoted firms than for control firms given the positive price pressure resulting from the promotion. Taken together, the findings suggest that retail investors buy stocks that catch their attention and such purchases can affect the pricing of earnings, in a setting where attention is randomly assigned.

Our study makes the following main contributions to the existing literature. First, it provides a clean experimental setting confirming observational studies documenting the effects of the business press and attention on stock prices. Second, it highlights that the market response on the day of the earnings announcement appears to depend not only on the earnings news but also on the extent of investor attention. Third, the lack of information acquisition activities by Yahoo Finance users subject to the promotion suggests that media promotion may not increase

information acquisition by individual investors, and therefore it appears that attention-generated trading is less informed. Lastly, the study provides an important extension to the earnings announcements return premium literature (e.g., Frazzini and Lamont 2007, Barber, De George, Lehavy, and Trueman 2013, Johnson and So 2014, Savor and Wilson 2016), by providing evidence suggesting that investor attention may be one of the key underlying mechanisms driving earnings announcement premiums.

A potential concern is whether individuals who were shown the promotion and consequently buy shares are worse off in that they may acquire a stock that they do not want and incur transactions costs. It is important to note that such individuals would have been equally likely to make other random purchases based on the normal algorithms used for selecting news articles on Yahoo Finance. Additionally, we carefully structured our experiment so that no positive or negative bias was introduced into the promotion decision that would systematically mislead users, and we obtained reviews for our study from Boston University's Institutional Review Board, London Business School's Ethics Committee, and the University of California at Berkeley's Office for Protection of Human Subjects. Moreover, the SEC was receptive of our study and encouraged the pursuit of additional field studies of this nature, with suitable institutional review oversight. Overall, we hope that this study spurs more capital market field experiments in accounting and finance.

2. EXPERIMENTAL DESIGN AND DATA

In this study, we are primarily concerned with the effects of investor attention to media articles reporting on firms' earnings announcements. From May 12 to July 28, 2016, Yahoo Finance promoted news articles for a randomly selected set of firms with earnings announcements occurring on each trading day, or which occurred after the market close on the previous trading

day, to a one percent subsample of Yahoo Finance users. The one percent subsample was calibrated by Yahoo to be representative of the entire Yahoo Finance user population. The term "promoted" means that the most recent news items relating to the treatment stocks were placed among the top five positions in sample users' home page news stream. Treated stocks were promoted for 24 hours, after which time the next day's treatment stocks were activated.

Yahoo Finance allocated the top five positions on experiment users' home pages for news article promotion over the course of this study. On days when five companies were selected for promotion and all had available articles, the most recent article for each firm is shown. For days when fewer than five firms were promoted, or when each firm did not have an available article, more than one article may be shown for each treatment firm with available articles. If fewer than five articles are available among all treatment firms, Yahoo Finance inserted other articles into the news feed based on default algorithms. Figure 1 illustrates a Yahoo Finance home page for a treatment sample user on May 18, 2016, and on this day, Hormel, Steris, and Booz Allen reported earnings and were randomly selected for promotion. Articles relating to these firms are visible among the five positions in the user's news feed. Figure 2 includes the content of a Hormel article that was selected for promotion.

Yahoo Finance is the most popular source of financial information in the U.S. (Lawrence, et al. 2017b), providing financial news as well as firm-specific financial and market-related information. When a user arrives at the Yahoo Finance home page (*finance.yahoo.com*), depicted in Figure 1, the main body section of the page is dedicated to news articles. In addition, users may search for firm specific financial information by entering a name or ticker symbol in the search field at the top of the page, or they may select a stock from their portfolio list or a list of recently viewed stocks, which are positioned along the right column. As Yahoo generates revenue from

display advertising (i.e., when impressions are delivered to users and when users click on an advertisement), news articles are strategically selected to maximize the number of times users click on the news articles during each visit to the web site.[3]

In order to have a balanced panel of treatment and control firms, up to five earnings announcements were randomly selected from among those scheduled to be released each trading day, or after the close on the previous trading day. To schedule the promotion in Yahoo Finance's systems, the random selection of stocks was generated each Tuesday from all firms expected to announce earnings during the subsequent week, for stocks listed on the NYSE, NASDAQ, and AMEX exchanges and with confirmed earnings announcements on FactSet's earnings calendar. Each treatment firm's announcement date was manually validated by checking the company's press releases or investor relations web site. Firms reporting earnings before and during market hours were scheduled for promotion on the report day, whereas firms reporting after hours were scheduled for promotion on the following trading day. To illustrate how the random selection process operated in practice, consider an example that fifteen companies were scheduled to report either on a given trading day or after the close on the previous trading day. Five firms would be randomly selected as treatment firms, and the remaining 10 firms would serve as the pool of control firms, to be size-matched one-to-one for our analysis. If only six firms were scheduled to report, three would be randomly selected as the treatment firms, and the remaining three would be designated as the control firms. Firms without scheduled earnings announcements do not appear in either our treatment or control samples.[4] During the experiment period, 169 firms were sampled

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[3] Yahoo Inc. 10-K for the period ending December 31, 2015. Available at https://www.sec.gov.
[4] As we select firms for treatment after their earnings announcements are scheduled and verified, we are confident that our methodology balances the propensity, across treatment and control firms, to opportunistically alter the timing of the earnings announcements. Consistent with this notion, in untabulated analyses, we find the days between scheduled earnings announcements are indifferent across both treatment and control firms, and that the fraction of firms reporting bad news on busy days is indifferent from the faction of firms reporting bad news on non-busy days.

as treatment firms, and 1,134 firms were available control firms, with 169 being selected when size-matched to the closest treatment firm. Although we also document market effects using the complete unmatched pool of control firms, this method is less preferable as time-variant factors will not be equally balanced between the treatment and control firms, as in the one-to-one match approach.[5]

Total page views is our measure of information acquisition by our sample Yahoo Finance users, and it comprises the normalized number of page views of our experiment users for all the firm-specific pages on the Yahoo Finance web site. Yahoo Finance records page views for each firm when a user views any of the firm-specific information pages. Views are generated from three main sources: (1) a user clicks on an active hyperlink to a firm's stock ticker symbol, (2) a user types a firm's name or ticker symbol into the Yahoo Finance search field, or (3) a user clicks through to a firm-specific information page from general search engine such as Google. Yahoo logs every firm-specific page view, and we sum all such firm specific page views on a given day for our experiment users. Because the level of Yahoo Finance page view traffic is provided on a confidential basis, we normalize the total page view count, dividing each firm-day count of page views by the average firm-day value over our sample period, giving our variable of interest, *total page views,* which has a mean value equal to one over all firm-days in our sample period. For our analysis, we then take the natural logarithm of one plus the normalized page views as *log total page views*, to be our measure of Yahoo Finance firm-specific information acquisition. We obtain our remaining financial and market data from FactSet, except for bid-ask spread, which is obtained from CRSP. Please refer to Appendix A for detailed definitions of all variables.

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[5] A greater number of firms report earnings towards the latter part of the sample period, and as a result there are a relatively even number of treatment firms throughout the experiment period, but a significantly larger number of control firms in the latter part. If the panel is not balanced, results relating to the control firms would be skewed towards the latter part of the experiment period.

Table 1 shows the extent to which the treatment and control firms are balanced on observable characteristics, including *market capitalization*, the number of *analyst following*, the number of media articles (*media count*), *return on assets*, *market to book*, *earnings surprise*, *sales surprise*, and the incidence of a management guidance update (*guidance issuance*). None of the control variables are significantly different at conventional levels between the treatment and control firms. To verify that there are no differences between the matched control sample and all available control firms, we also consider the entire available pool of control firms instead of the matched sample, and again find in unreported analyses that there is no statistical difference in the control variables of any of the mean and median values between treatment and control firms, indicating that the random selection is effective at balancing covariates.

We perform regression analyses to control for the potential effects of residual differences between the two groups. *Treatment* is a dummy variable equal to 1 for firms that are randomly selected for promotion on Yahoo Finance, and 0 for control firms. First, we perform a pooled regression analysis of our treatment and matched control firms on their earnings announcement day ($t = 0$).

$$y_{it} = \alpha + \beta_1 \, treatment_{it} + \beta_2 \, treatment_{it} \times earnings \; surprise_{it} + \boldsymbol{\beta \, controls}_{it} + e_{it} \qquad (1)$$

Equation 1 presents the general regression equation where y_{it} is one of the outcome variables of interest: *total page views, abnormal volume, abnormal returns*, and *abnormal bid-ask spread* for firm i on day t. These abnormal outcome measures follow Bushee, Core, Guay, and Hamm (2010) and Blankespoor, Miller, and White (2014), and are used to observe differences between treatment and control firms. We use *total page views* and not abnormal page views (e.g., page views relative to the views on the same day of the week for the prior 10 weeks) for the treatment group because we are unable to obtain the search data for the treatment group prior to

the start of the experiment. There is one observation per firm (day $t = 0$, the earnings announcement day), and the primary coefficient of interest is β_1, which indicates the marginal effect of *treatment* on the outcome variable. We include a number of control variables which may account for differences in the outcome variables: *earnings surprise, log market capitalization*, *log media count, return on assets, market to book,* and *guidance issuance*. For the returns regressions, we only include *earnings surprise* as a control variable, as it is the only variable expected to affect returns.[6] We include industry fixed effects in all regressions to alleviate potential concerns that results are driven by industry differences between treatment and control firms. To understand whether the treatment effect varies based on the amount of the *earnings surprise*, we also include *treatment* $\times$ *earnings surprise* as a predictor variable, and are interested in β_2, which indicates the marginal effect of *treatment* and *earnings surprise* on the outcome variable. Standard errors are clustered by day.

$$y_{it} = \alpha + \beta_1\, treatment_{it} + \beta_2\, post_{it} + \beta_3\, treatment_{it} \times post_{it} + \boldsymbol{\beta\, controls}_{it} + e_{it} \qquad (2)$$

We also perform a difference-in-differences regression, specified by Equation 2. Again, y_{it} is an outcome variable of interest: *total page views, abnormal volume, abnormal returns*, and *abnormal bid-ask spread* for firm i on day t. There are two observations per firm, one for the day prior to the earnings announcement ($t = -1$) where *post* is a dummy variable equal to 0, and one for the day of the earnings announcement ($t = 0$), where *post* equals 1. The coefficient of interest is β_3, which corresponds to the difference-in-differences effect of treatment on the outcome variable for the control group compared to the treatment group, from day $t = -1$ to day $t = 0$.

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[6] All main inferences hold when all control variables are included in the return regressions.

3. RESULTS

Figure 3, Panels A to D graphically illustrate the effects of the Yahoo Finance promotion on four key measures: *total page views*, *abnormal volume*, *abnormal returns*, and *abnormal bid-ask spread* from the fifth day prior to the earnings announcement ($t = -5$) to the fifth day after the earnings announcement ($t = 5$). In Panels E and F, we also illustrate how the effect of promotion on *abnormal returns* and *abnormal bid-ask spread* varies according to the level of earnings surprise. In Panel A, we find that the Yahoo Finance *total page views* are similar between the treatment and control groups, with only day $t = -3$'s difference being significant ($p < 0.10$). In Panel B, we compare *abnormal volume* for the treatment and control groups and find that differences in *abnormal volume* are statistically insignificant, except for days $t = 2$ and $t = 3$, when the control group *abnormal volume* is slightly greater ($p < 0.10$) than that of the treatment group.

Panel C illustrates the abnormal daily returns. The largest daily difference in *abnormal returns* is on day $t = 0$, where treatment firms have abnormal returns 1.6 percent greater than control firms. This spread results from positive returns of 0.9 percent for the treatment firms and negative returns of -0.7 percent for the control firms. Returns for treatment firms are lower on days $t = -1$ and $t = 3$, though these differences are smaller at -0.6 percent and -0.5 percent, respectively. Panel D illustrates the mean *abnormal bid-ask spread* is fairly similar between the treatment and control groups, though treatment firms have a negative *abnormal bid-ask spread* on day $t = 0$, whereas control firms have a positive *abnormal bid-ask spread* on day $t = 0$.

Panel E illustrates the mean *abnormal returns* for treatment and control firms, by quintile of *earnings surprise*. We find that the returns for treatment firms are greater than for control firms across the range of *earnings surprise*, but the effect is strongest for the lowest three quintiles of *earnings surprise*. Panel F illustrates the mean *abnormal bid-ask spread* for treatment and control

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firms, by quintile of *earnings surprise*. We find that the reduction in *abnormal bid-ask spread* is greatest for firms in the lowest two quintiles of earnings surprise. Together, these findings indicate that stocks subject to promotion have higher returns on the promotion day, especially for firms with more negative earnings surprises—suggesting that retail investors thought it was a good opportunity to buy the promoted firms after the earnings news caused stock price declines. This finding is consistent with Lee (1992) who documents buying activity in small trades for both positive and negative earnings news.

Table 2 reports the univariate differences between the treatment and control groups on the earnings announcement day. There are no significant differences for *log total page views* or *abnormal volume* ($p > 0.10$). This finding may be somewhat surprising given that the increased media promotion does not result in an increase in *log total page views*, which we might expect if users search for further financial information on promoted stocks after reading related news articles. Due to architecture constraints, Yahoo Finance news articles do not contain links to mentioned companies or ticker symbols. This chosen structure means that users who click on news articles cannot easily click through to related Yahoo Finance company pages, and instead must search for the company by name or ticker to view additional information. This limitation also means that our traffic statistics cannot associate news article views with a particular firm, and as a result we do not directly observe news article clicks. Figure 2, which illustrates an article that would have been seen by a user, shows that there are no active hyperlinks within the article to the stock of interest. Without such links, it requires effort on the part of users to access Yahoo Finance's firm-specific information pages to acquire additional information, as they must enter the firm's name or ticker symbol in the search function to access the detailed information pages. The lack of a ticker symbol linking reflects several factors: the difficulty in highlighting appropriate

ticker symbols from news text, that articles originate from many different sources, the fact that articles may relate to multiple ticker symbols, and that Yahoo likely has a revenue-related interest in encouraging users to continue reading down the page, leading to more news article views as opposed to engaging in further analysis of individual stocks. Combined, these factors may contribute to our finding that there is no evidence of additional information acquisition by sample users regarding treatment firms.

We also find no *abnormal volume* differences between treatment and control firms ($p > 0.10$). While past empirical studies of attention and volume (e.g., Antweiler and Frank 2004; Tetlock, Saar-Tsechansky, and Macskassy 2008) find that the frequency and tone of message board activity and news articles relate to increased trading volumes, and that media strikes are associated with a reduction in trading volume (Peress 2014), in our setting, we are not varying the content or amount of news, instead we are simply increasing the salience of such content to a sample of users.[7]

While we do not find a detectible effect on volume or Yahoo Finance page views, we do find that treatment firms have higher abnormal returns on the earnings announcement day compared to control firms. Mean *abnormal returns* on the day of the promotion are 0.009 for treatment firms, compared to -0.007 for control firms (the difference is significant at the $p < 0.05$ level), indicating that treatment firms have higher returns when their news articles are selected for promotion. The negative returns for control firms is consistent with negative earnings announcement returns (untabulated) for the median Compustat firm reporting earnings from May 12 to July 28, 2016. We also find a lower mean *abnormal bid-ask spread* for treatment firms, at -0.001, versus control firms, at 0.001, a difference of 0.002, though the statistical significance is

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[7] The volume inferences are robust to calculating abnormal volume following Lerman and Livnat (2010).

near marginal for the entire sample ($p = 0.11$), providing some initial indications that there may be a reduction in information asymmetry for firms subject to media promotion.[8]

To test whether the return findings are a spurious artifact of the treatment firms having larger earnings announcement returns, we conduct a placebo test whereby we examine the earnings announcement returns for treatment and control firms for the four earnings announcements preceding our treatment. In untabulated results, we find that the mean and median *abnormal returns* of treatment firms are not significantly different at conventional levels from those of control firms over any of the prior four earnings announcements. This analysis provides reassurance that the difference in returns during the treatment window is due to the treatment and not to an unobserved property of the randomly selected treatment firms.

Table 3 reports Pearson correlation coefficients for all main variables for the pooled treatment and control firms. At the $p < 0.05$ level, *abnormal volume* is significantly correlated with *abnormal bid-ask spread* (*corr.* = 0.18), and *guidance issuance* (*corr.* = 0.26), while abnormal returns are significantly correlated *earnings surprise* (*corr.* = 0.31) and *treatment*, a dummy variable for firms with promoted news (*corr.* = 0.11). Abnormal bid-ask spread is significantly negatively correlated with *earnings surprise* (*corr.* = -0.11). Yahoo Finance *log total page views* is significantly correlated with *abnormal volume* (*corr.* = 0.17), *log market capitalization* (*corr.* = 0.63), *log media count*, the number of media articles published on the earnings announcement day (*corr.* = 0.41), *return on assets* (*corr.* = 0.14), *market to book* (*corr.* = 0.21), and *guidance issuance* (*corr.* = 0.15).

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[8] We also tried to examine the percentage of firms in each user's Yahoo Finance portfolio but these data are only available in real-time and hence, there is no historical summary of the user's portfolio holdings.

In Table 4, we perform a pooled regression of treatment and control firms on the earnings announcement day ($t = 0$), including a dummy variable, *treatment,* for firms with promoted news on day $t = 0$. Considering *log total page views* in Column (1), we find no significant relationship to *treatment*, however we do find that page views are significantly associated with *log market capitalization* (*coeff.* = 0.452, $p < 0.01$) and *log media count* (*coeff.* = 0.259, $p < 0.05$), which is consistent with the prior literature, but also clarifies that using media articles as a measure of attention may be confounded with the fact that more media articles are associated with underlying phenomena relating to the firm, increasing both information acquisition by investors as well as the amount of media coverage. *Abnormal volume* is the dependent variable in Column (2), and it is most strongly related to *guidance issuance* (*coeff.* = 1.083, $p < 0.01$).

Turning to *abnormal returns* in Column (3), we find that *treatment* is associated with higher *abnormal returns* on day t, (*coeff.* = 0.015, $p < 0.05$), or a 1.5 percentage point abnormal return on day t. This treatment effect on *abnormal returns* confirms the inferences obtained in Figure 4, which shows a shift in the distribution of abnormal returns to the right for treatment firms compared to control firms. The most important determinant of *abnormal returns* on day t is *earnings surprise* (*coeff.* = 2.352, $p < 0.01$). We also test whether the effect on the dependent variable of interest is affected by the level of earnings surprise by including *treatment × earnings surprise* as a predictor variable. The coefficient on *treatment × earnings surprise* is -1.477 ($p < 0.10$), providing some evidence that investor attention increases abnormal returns to a greater extent for firms with negative earnings surprises, consistent with the results illustrated in Figure 3, Panel E. This result is also consistent with findings in Barber and Odean (2008), who find that individuals are net buyers subsequent to bad news.

Column (4) provides results where *abnormal bid-ask spread* is the dependent variable, and the coefficient on *treatment* is -0.001 ($p > 0.10$), indicating that *abnormal bid-ask spread* may decline for treatment firms, but not at conventional significance levels. The coefficient on *treatment × earnings surprise* is 0.173 ($p > 0.10$), positive but not significant at conventional levels. Following Da et al. (2011), we investigate the possibility that the abnormal positive returns on the day of the promotion reverse in subsequent days. In untabulated analyses, we only find evidence of positive abnormal returns for the treatment firms on the earnings announcement day, and there are no positive or negative abnormal returns on any other day in the ten days following the earnings announcement. Thus, we do not find any evidence of return reversals for treatment firms in this ten day period.

Given the lack of a significant observed effect of treatment on *log total page views* and *abnormal volume*, a discussion on the statistical power of our sample size is warranted (e.g., Barber and Lyon 1996). The sample size for the experiment in this study was restricted by Yahoo's internal prioritization of resources and was not under the control of the authors. In a typical experimental setting, the researcher can estimate the required sample size of an experiment, using as inputs the population mean and standard distribution of the dependent variable, required test power, required statistical significance, and the researcher's expected impact of treatment on the dependent variable. In our setting, *ex ante*, it was not possible to reliably estimate the impact of treatment on our variables of interest, because such an experiment has never before been conducted. We therefore conduct an *ex post* power analysis using the population distribution of the dependent variables and the Yahoo-determined sample size as inputs to estimate the required effect of treatment that would expected to be observable for our variables of interest. We set a

required significance of α = 0.05 (p-value), and a power of 1-β = 0.2 for this analysis.[9] We find in untabulated results that the treatment effect required for observability is an effect of (1) 0.398 on *log total page views*, corresponding to an increase of 36.9 percent over the population mean; (2) 0.655 on *|abnormal volume|*, an increase of 34.2 percent over the population mean; (3) 0.015 on *|abnormal returns|*, a 33 percent increase over the population mean; and (4) 0.0017 on *|abnormal bid-ask spread|*, or 143.1 percent of the population mean. The fact that we find significant results for *abnormal returns* and *abnormal bid-ask spread* is intuitively reasonable if the promotion treatment is associated with these users becoming marginal price setters, who can have a relatively large impact on prices and price-related variables, such as bid-ask spread. On the other hand, page views and *abnormal volume* and *log total page views* are aggregate measures, where the impact of marginal traders is much smaller. Consequently, our experiment has a lower power to detect an effect of promotion on volumes and page views, compared to returns and bid-ask spread.

To isolate the effect of news article promotion, Table 5 presents a difference-in-differences research design, which compares the difference in Yahoo Finance page views and market responses from the day before the promotion ($t = -1$, *post* = 0) with the earnings announcement and promotion day ($t = 0$, *post* = 1). Columns (1) and (2) report on the effect of *treatment* on *abnormal volume* and *log total page views*, respectively, and the effect is not statistically significant, similar to the inferences drawn from the earlier analyses. Column (3) reports the difference-in-differences effect of *treatment* on *abnormal returns*. Consistent with the earlier analyses, treatment has a positive effect on returns in the post period (*treatment × post coeff.* = 0.021, $p < 0.01$), compared to the control firms. As for the control variables, *earnings surprise* is positive as expected (*coeff.* = 1.086, $p < 0.01$). Column (4) provides results for the difference-in-

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[9] We use absolute values for *abnormal volume, abnormal returns,* and *abnormal bid-ask spread* because the mean value of these variables is expected to be zero.

differences effect on *abnormal bid-ask spread*, finding some evidence that treatment has a negative effect on bid-ask spread (*treatment × post coeff.* = -0.002) but this effect is not significant at traditional levels ($p = 0.14$).

Together, these results indicate some interesting ramifications for investor attention, in a setting where investor attention is varied and other factors are held constant. We do not see an increase in information acquisition by the investors subject to the promotion of randomly selected earnings announcement articles, indicating either: (1) we lack the power to detect the effect in this relatively small sample; (2) investors are making purchase decisions based upon minimal additional research; or (3) they may be conducting research on another platform which we cannot observe, such as their broker's web site. We also do not observe increases in trading volume, indicating that the increased attention among a sample of users appears to displace trading by other market participants. We do, however, observe higher returns to stocks that receive the additional investor attention, and that the higher returns are more pronounced for firms with negative earnings surprises. We also find weak evidence suggesting that the level of information asymmetry decreases for promoted firms, with a near significant reduction in bid-ask spreads for promoted firms. These results differ somewhat from the existing investor attention literature, where these outcome variables are often used as proxies for investor attention, and with the media literature, where media can also be influenced by such factors as trading volume, market returns, and information demand by investors.

In Table 6, we investigate the effect of media promotion for less visible firms, predicting that the additional media promotion will have a greater effect on less visible firms. Panel A reports regression results similar to Table 5, but for firms with below-median market capitalization, and Panel B reports for above-median market capitalization. Inferences in Panel A are similar to the

prior results, though they are somewhat stronger for less-visible firms. There are no significant results for *log total page views* or *abnormal volume* in Columns (1) and (2). In Column (3) the difference-in-differences effect of treatment on *abnormal returns* is more pronounced for less-visible firms (*treatment × post coeff.* = 0.026, *p* < 0.05). In Column (4), the difference-in-differences effect of *treatment* on *abnormal bid-ask spread* is also more pronounced for less-visible firms but insignificant at conventional levels (*treatment × post coeff.* = -0.003, *p* > 0.10). These results contrast with Panel B, which illustrates that for more visible firms, there is no difference-in-differences effects for any of the outcome variables. In Column (3), the difference-in-differences effect of *treatment* on *abnormal returns* is positive but is not significant at conventional levels (*treatment × post coeff.* = 0.017, *p* > 0.10).

In Table 7, we investigate the effect of media promotion separately for firms with positive and negative earnings surprises, as Table 4 and Figure 3 provide some insights that the market response to earnings announcements may be different for positive and negative earnings surprises. Panel A reports regression results similar to Table 5, but for firms with positive earnings surprises, and Panel B reports for negative earnings surprises. Inferences in Panel A are similar to the prior results, though they are somewhat weaker for positive earnings announcement firms. There are no significant results for *log total page views*, *abnormal volume,* or *abnormal bid-ask spread* in Columns (1), (2), and (4). In Column (3) the difference-in-differences effect of *treatment* on *abnormal returns* is less pronounced for positive earnings surprise firms and does not reach significance at conventional levels (*treatment × post coeff.* = 0.014, *p* = 0.12). These results contrast with Panel B, which illustrates that for negative earnings surprise firms, there is a significantly larger effect of *treatment × post* on *abnormal returns* (*coeff.* = 0.033, *p* < 0.05) compared to Panel A and the overall results from Table 5. Column (4) reports a slightly significant

negative coefficient for the difference-in-differences effect of treatment on *abnormal bid-ask spread* (*treatment × post coeff.* = -0.006, *p* < 0.10). These results indicate that while the effect of attention is similar in direction for both positive and negative earnings news firms, the effect is stronger for firms with negative earnings surprises.

In our final table, Table 8, we examine the promotion effects on days when fewer than five stocks were promoted, predicting that the effects of promotion will be more pronounced when concentrated on a few firms. Panel A, presents the analyses in Table 5 but only on days when fewer than five firms were promoted. Consistent with earlier findings, the coefficients on *log total page views* or *abnormal volume* in Columns (1) and (2) are insignificant. However, in Column (3) the difference-in-differences effect of treatment on *abnormal returns* is more pronounced on days with less than five promoted firms (*treatment × post coeff.* = 0.032, *p* < 0.05). In Column (4), the difference-in-differences effect of *treatment* on *abnormal bid-ask spread* is also more pronounced and weakly significant (*treatment × post coeff.* = -0.003, *p* < 0.10). These results sharply contrast with Panel B, where the analyses in Table 5 are run only on days when five firms were promoted and all of the outcome variables are insignificant at conventional levels. We caveat these findings as days with less than five promoted firms also have less than 10 firms with schedule earnings announcements; however, days with five promoted firms could have hundreds of firms reporting earnings on those days. Hence, the effects could be driven by the concentrated promotion or the more focused attention given that there are less earnings announcements to distract experiment users. Nonetheless, the findings in Table 8 highlight that the effects of promotion are far more pronounced when the attention is more concentrated.

In untabulated analyses, we run the analyses separately for the first half and second half of our sample periods in order to examine whether investors may become desensitized to the news

promotions over time. While we do find that our results are more pronounced for the first half of the sample period, it is also difficult to attribute this difference to desensitization as there are many more firms reporting in the second half of the sample. Hence, the weaker results that we observe in the second half could be due to user desensitization or to the more limited attention given the greater number of reporting firms in the latter part of the sample period.

4. CONCLUSION

This study uses a field experiment to examine the effects of promoting earnings announcement articles on the equity markets. On the day of earnings announcements, media articles for a random sample of firms are given prominent positioning on the front page of Yahoo Finance to a one percent sample of Yahoo Finance users. We confirm that promoted and control firms are balanced across earnings news and fundamental characteristics, and we find that promoted firms experience an increase in abnormal returns on the day of the earnings announcement relative to control firms. Perhaps surprisingly, we do not find evidence of significant increases in trading volume or information acquisition by users subject to the promotion.

Our findings reinforce the powerful and important role of online media, and how it can significantly shape individual behavior (e.g., Wu 2016). Furthermore, the study provides evidence that the market pricing of earnings not only depends on the earnings news but also on the extent of investor attention, and that investor attention may be a key mechanism driving the earnings announcement premium. Overall, we hope that this research encourages future capital markets field experiments.

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Variable	Definition
Abnormal Returns$_{it}$	Firm i's market-adjusted return on day t, where market-adjusted return is defined as the raw return minus the S&P 500 equal-weighted index return;
Abnormal Volume$_{it}$	Firm i's trading volume on day t minus the average trading volume on the same day of the week over the prior 10 weeks, scaled by the average trading volume on the same day of the week over the prior 10 weeks; winsorized at the one-percent level;
Abnormal Bid − Ask Spread$_{it}$	Firm i's bid-ask spread on day t minus the average bid-ask spread on the same day of the week over the prior 10 weeks, scaled by the average bid-ask spread on the same day of the week over the prior 10 weeks. Bid-ask spread is calculated as ask price minus bid price, scaled by the mid-point price of the spread;
Guidance Issuance$_{it}$	"1" if management issues an EPS or sales guidance for firm i on day t, "0" otherwise;
Log Analyst Following$_{it}$	The natural log of one plus the number of analyst following for firm i on day t; winsorized at the one-percent level;
Log Media Count$_{it}$	The natural log of one plus the number of media count for firm i on day t; winsorized at the one-percent level;
Market Capitalization$_{it}$	The natural log of market capitalization for firm i on day t; winsorized at the one-percent level;
Log Total Page Views$_{it}$	The natural log of one plus the total number of normalized Yahoo Finance page views of experiment users for firm i on day t. Page views are normalized by the mean daily page view count for all treatment and control firms during our sample period. Total Yahoo Finance page views is the sum of page views from nine Yahoo Finance pages including Summary page, Conversations page, Statistics page, Profile page, Financials page, Options page, Holders page, Historical Data page, and Analysts page;
Market to Book$_{it}$	The ratio of market capitalization to book value of equity for firm i on day t, and winsorized at the one-percent level and trimmed at 0 for firms with negative book value of equity;
Post$_{it}$	"1" if firm i announces its earnings announcement on day $t = 0$, "0" for the trading day before the earnings announcement day ($t = -1$);
Return on Assets$_{it}$	The ratio of net income to total assets for firm i on day t; winsorized at the one-percent level;
Earnings Surprise$_{it}$	Firm 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. For firms without analyst forecasts, the consensus is replaced with four quarters' prior earnings as the benchmark (Bradshaw, Drake, Myers, and Myers 2012);
Sales Surprise$_{it}$	Firm i's sales on day t minus its consensus analysts' sales forecast on day $t = -1$, scaled by its consensus analysts' sales forecast on day $t = -1$, winsorized at the one-percent level. For firms without analyst sales forecasts, the consensus is replaced with four quarters' prior sales; and,
Treatment$_{it}$	"1" if firm i is a treatment firm, "0" for a matched control firm. A control firm is selected for each treatment firm per day based on the closest market capitalization match.

FIGURE 1

Example of a Yahoo Finance Home Page for a Promotion Sample User

This figure illustrates an example of a Yahoo Finance (finance.yahoo.com) home page for a user in the promotion sample, from May 18, 2016. On this day, Hormel, Steris, and Booz Allen reported earnings and were randomly selected from promotion. The effect of their promotion was to present news articles related to their earnings announcements among the top five positions in a random one percent sample of users' home page news stream.

FIGURE 2
Example of a Yahoo Finance News Article Page
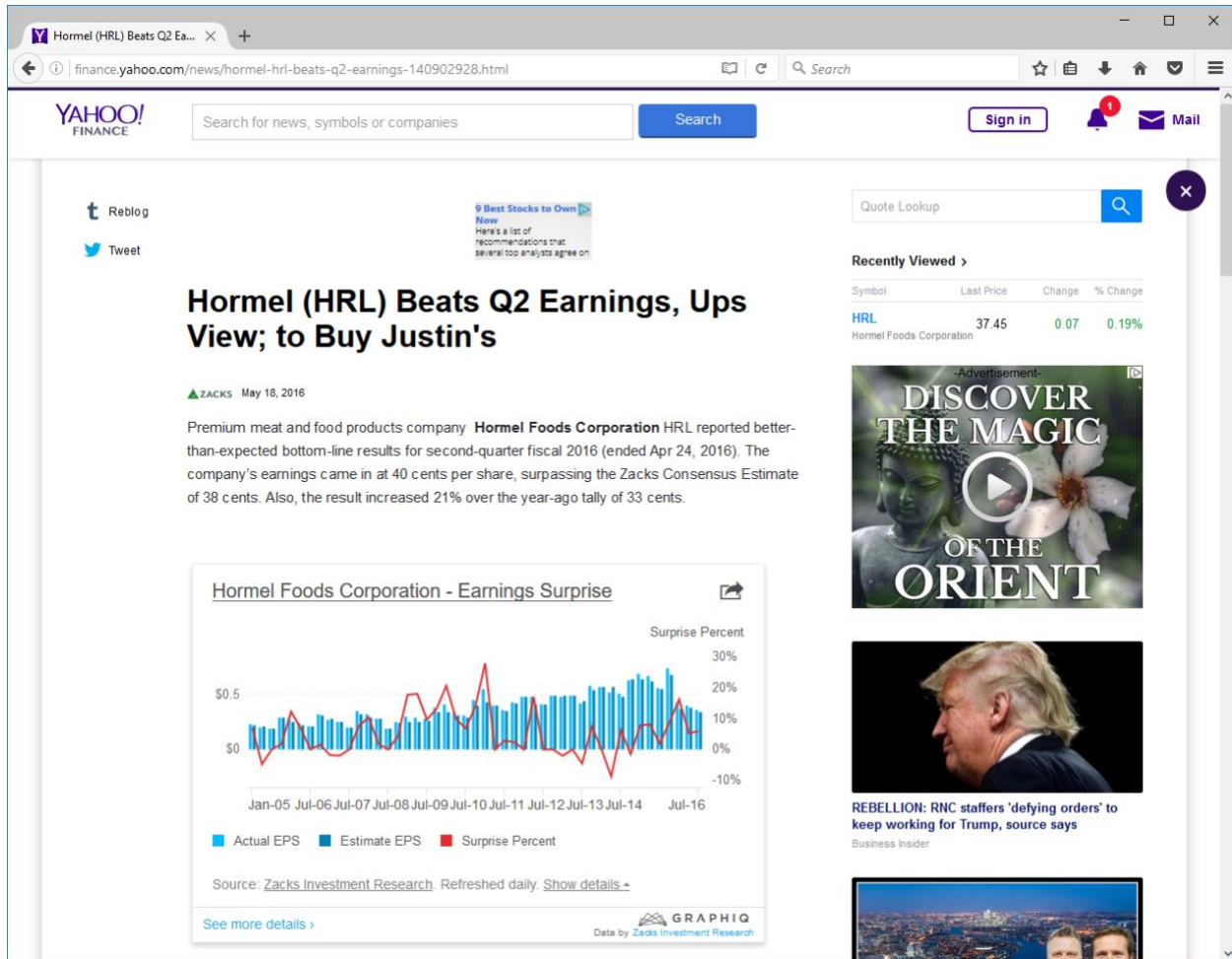
This figure illustrates an example of a Yahoo Finance (*finance.yahoo.com*) news page. This is the article presented to a user who clicked on the topmost article in the news stream presented in Figure 2. While the article clearly identifies Hormel's ticker symbol, there are no active hyperlinks in the article headline or the body text to allow the user to easily jump to the Yahoo Finance financial information pages for Hormel.

FIGURE 3

Yahoo Finance Search, Abnormal Volume, Abnormal Returns, and Abnormal Spread around the Earnings Announcement Day

Panel A: Mean Log Yahoo Finance Total Page Views
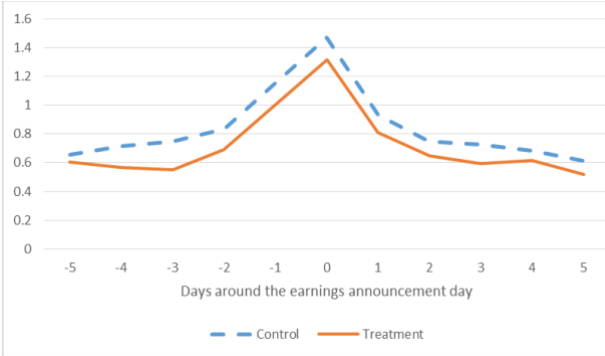
Panel B: Mean Abnormal Volume
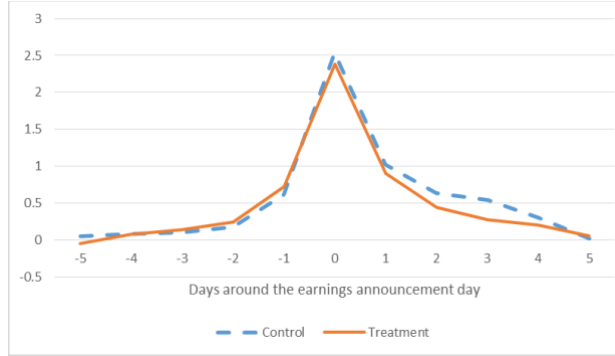
Panel C: Mean Abnormal Returns
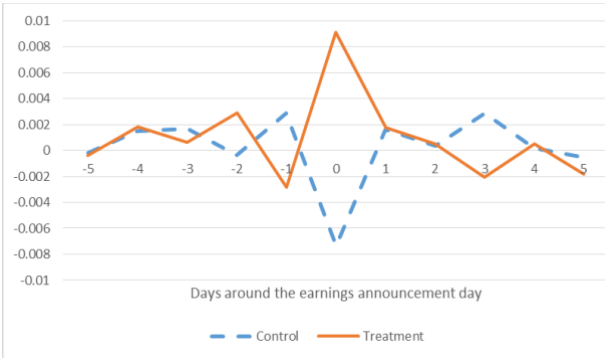
Panel D: Mean Abnormal Bid-Ask Spread
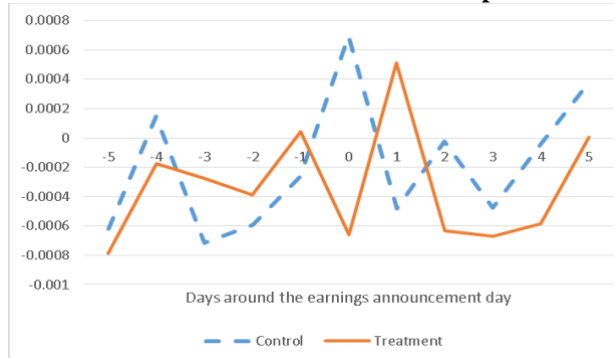
Panel E: Mean Abnormal Returns by Earnings Surprise Quintile

Panel F: Mean Abnormal Bid-Ask Spread by Earnings Surprise Quintile
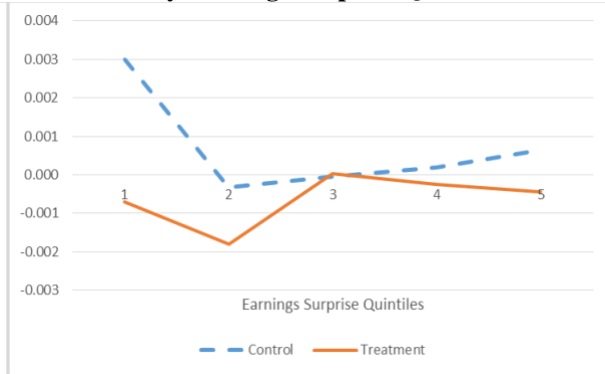
This figure plots mean Yahoo Finance search, abnormal volume, abnormal returns, and abnormal bid-ask spread on and around the earnings announcement day. Panels A-D plot the log value of total Yahoo Finance search, abnormal volume, abnormal returns, and abnormal bid-ask spread from five trading days before the earnings announcement day to five trading days after the earnings announcement day, respectively. Panels E-F plot the mean value of abnormal returns and abnormal bid-ask spread by earnings surprise quintile, respectively, with quintile 1 being the lowest quintile and quintile 5 being the highest quintile.

FIGURE 4
Kernel Density Estimation of Abnormal Returns for Treatment and Control Firms
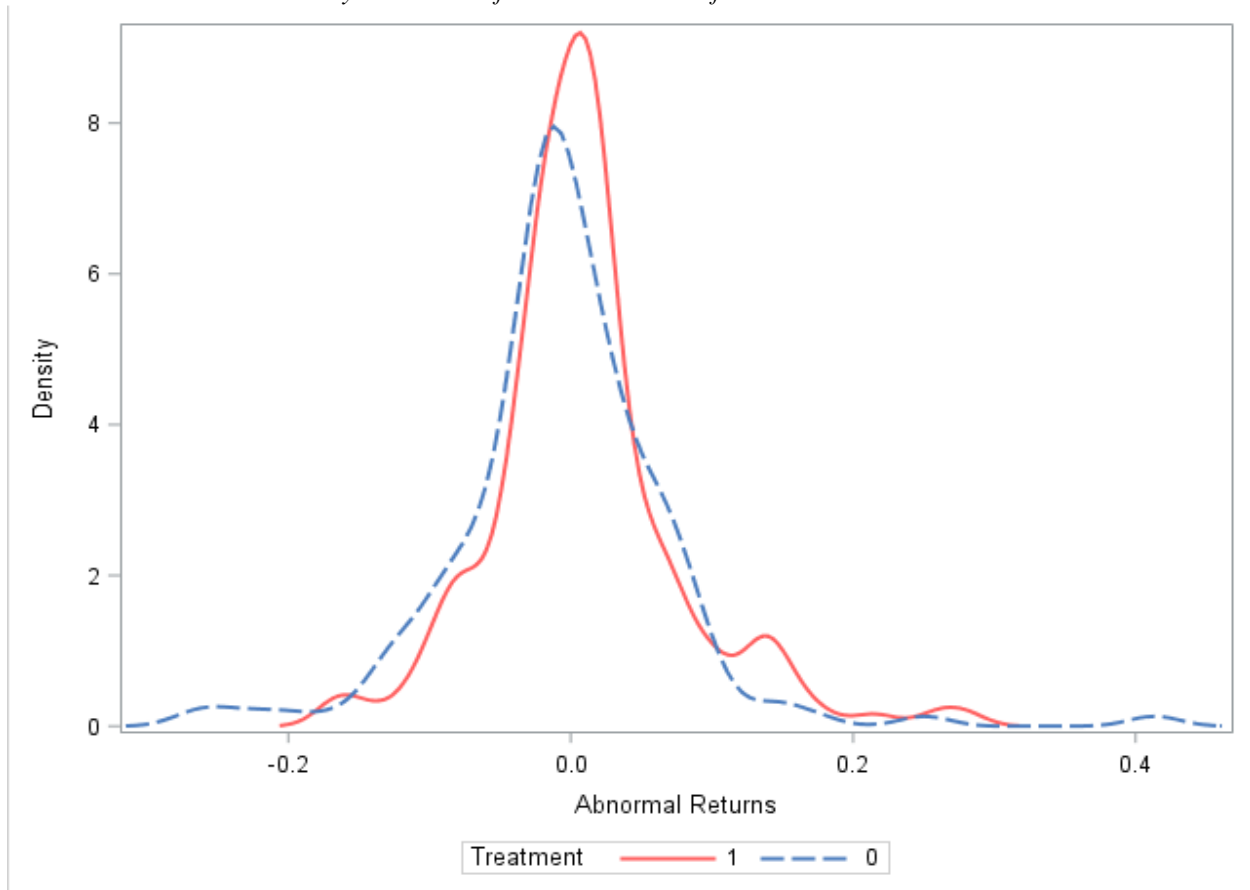
This figure presents a kernel density plot of abnormal returns for treatment firms (solid line) and control firms (dashed line). The density plot illustrates that there is a shift in the distribution towards more positive returns for the treatment group.

TABLE 1

Firm Characteristics between Treatment and Matched Control Firms

| | **Panel A: Mean Comparisons** | | | | **Panel B: Median Comparisons** | | | |
| | Treatment | Control | | | Treatment | Control | | |
	Mean	Mean	Diff.	Sig.	Median	Median	Diff.	Sig.
N	169	169			169	169		
Market Capitalization (in millions)	14,099	15,304	-1,206	0.747	1,946	2,224	-278	0.447
Log Market Capitalization	21.376	21.535	-0.159	0.505	21.389	21.523	-0.133	0.447
Analyst Following	11.763	12.657	-0.893	0.403	10.000	10.000	0.000	0.530
Log Analyst Following	2.225	2.287	-0.061	0.522	2.398	2.398	0.000	0.530
Media Count	7.118	7.231	-0.112	0.853	6.000	6.000	0.000	0.994
Log Media Count	1.885	1.849	0.037	0.646	1.946	1.946	0.000	0.995
Return on Assets	0.026	0.004	0.022	0.109	0.039	0.029	0.010	0.357
Market to Book	3.437	3.863	-0.426	0.379	2.284	2.350	-0.065	0.585
Earnings Surprise	0.000	-0.001	0.001	0.691	0.000	0.000	0.000	0.572
Sales Surprise	-0.337	-0.684	0.346	0.678	0.134	0.052	0.082	0.559
Guidance Issuance	0.467	0.485	-0.018	0.745	0.000	0.000	0.000	0.745

This table presents the descriptive statistics for firm characteristics between treatment and matched control firms. Panel A presents the mean comparisons. Diff. refers to the mean difference between treatment and matched control firms. Sig. refers to the p-value obtained from two-sided tests of differences in means. Panel B presents the median comparisons. Diff. refers to the median difference between treatment and matched control firms. Sig. refers to the p-value obtained from the Mann-Whitney tests of differences in medians.

TABLE 2

Univariate Analysis of Yahoo Finance Search, Abnormal Volume, Abnormal Returns, and Abnormal Bid-Ask Spread between Treatment and Matched Control Firms

	Panel A: Mean Comparisons				Panel B: Median Comparisons			
	Treatment	Control			Treatment	Control		
	Mean	Mean	Diff.	Sig.	Median	Median	Diff.	Sig.
N	169	169			169	169		
Log Total Page Views	1.315	1.468	-0.153	0.308	0.917	0.945	-0.028	0.344
Abnormal Volume	2.389	2.539	-0.150	0.589	1.781	1.676	0.105	0.910
Abnormal Returns	0.009	-0.007	0.016	0.037	0.006	-0.011	0.017	0.037
Abnormal Bid-Ask Spread	-0.001	0.001	-0.002	0.110	0.000	0.000	0.000	0.140

This table presents the descriptive statistics for Yahoo Finance search, abnormal volume, abnormal returns, and abnormal bid-ask spread between treatment and matched control firms. Panel A presents the mean comparisons. Diff. refers to the mean difference between treatment and matched control firms. Sig. refers to the p-value obtained from two-sided tests of differences in means. Panel B presents the median comparisons. Diff. refers to the median difference between treatment and matched control firms. Sig. refers to the p-value obtained from the Mann-Whitney tests of differences in medians.

TABLE 3

Pearson Correlation

	Variable	1	2	3	4	5	6	7	8	9	10	11
1	Log Total Page Views	-										
2	Abnormal Volume	**0.17**	-									
3	Abnormal Returns	0.00	-0.09	-								
4	Abnormal Bid-Ask Spread	-0.02	**0.18**	-0.07	-							
5	Treatment	-0.06	-0.03	**0.11**	-0.09	-						
6	Earnings Surprise	0.06	-0.05	**0.31**	**-0.11**	0.02	-					
7	Log Market Capitalization	**0.63**	-0.10	0.06	0.00	-0.04	0.08	-				
8	Log Media Count	**0.41**	-0.09	0.09	-0.02	0.03	0.02	**0.49**	-			
9	Return on Assets	**0.14**	0.09	-0.02	0.00	0.09	-0.10	**0.43**	**0.15**	-		
10	Market to Book	**0.21**	0.01	0.01	-0.01	-0.05	0.05	**0.33**	0.05	**0.27**	-	
11	Guidance Issuance	**0.15**	**0.26**	0.08	-0.04	-0.02	0.04	**0.22**	0.01	**0.22**	**0.18**	-

This table presents the Pearson correlation coefficients for the regression variables in Table 4. The significant correlation coefficients at a 0.05 level are bolded. See Appendix A for variable definitions.

TABLE 4

Regressions of Yahoo Finance Search, Abnormal Volume, Abnormal Returns, and Abnormal Bid-Ask Spread for Treatment and Matched Control Firms

Dep. Var.	(1) Log Total Page Views		(2) Abnormal Volume		(3) Abnormal Returns		(4) Abnormal Bid-Ask Spread	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept	-9.024***	-11.84	4.054**	2.28	0.001	0.14	-0.002	-0.34
Treatment	**-0.048**	**-0.48**	**-0.150**	**-0.66**	**0.015****	**2.29**	**-0.001**	**-1.46**
Earnings Surprise	-8.891**	-2.14	-16.905	-1.03	2.352***	5.58	-0.134	-1.16
Treatment × Earnings Surprise	**11.802**	**1.61**	**17.517**	**1.00**	**-1.477***	**-1.85**	**0.173**	**1.26**
Log Market Capitalization	0.452***	11.13	-0.123	-1.39			0.000	0.47
Log Media Count	0.259***	2.70	0.038	0.18			-0.000	-0.88
Return on Assets	-2.519***	-5.30	0.657	0.56			-0.002	-0.31
Market to Book	-0.001	-0.11	-0.021	-0.86			-0.000	-0.15
Guidance Issuance	-0.142	-1.17	1.083***	3.68			-0.001	-0.81
Date clustering	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
N	338		338		338		338	
Adjusted R^2	0.485		0.163		0.112		0.034	

This table presents regression results for Yahoo Finance Search, abnormal volume, abnormal returns, and abnormal bid-ask spread for treatment and matched control firms. Column (1) presents the results for the log value of total Yahoo Finance Search. Column (2) presents the results for abnormal volume. Column (3) presents the results for abnormal returns. Column (4) presents the results for abnormal bid-ask spread. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. T-statistics are calculated using clustered standard errors by date. Industry Fixed Effects are based upon Fama French 12 industry definitions. See Appendix A for variable definitions.

TABLE 5

Regressions of Yahoo Finance Search, Abnormal Volume, Abnormal Returns, and Abnormal Bid-Ask Spread for Earnings Announcement Day Relative to the Day before between Treatment and Matched Control Firms

Dep. Var.	(1) Log Total Page Views		(2) Abnormal Volume		(3) Abnormal Returns		(4) Abnormal Bid-Ask Spread	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept	-8.133***	-14.70	1.951**	2.06	0.007	1.24	-0.008	-1.39
Treatment	-0.026	-0.28	0.075	0.79	-0.006**	-2.38	0.000	0.84
Post	0.190	1.36	1.350***	5.88	-0.009*	-1.74	0.002	1.42
Treatment × Post	**-0.043**	**-0.30**	**-0.242**	**-0.90**	**0.021***	**2.96**	**-0.002**	**-1.50**
Earnings Surprise	0.833	0.33	-5.595	-0.79	1.086***	4.06	-0.006	-0.16
Log Market Capitalization	0.400***	15.53	-0.086*	-1.95			0.000	1.39
Log Media Count	0.316***	6.46	0.102	1.36			-0.000	-1.68
Return on Assets	-2.090***	-7.26	1.117*	1.68			-0.007	-1.35
Market to Book	0.000	0.02	-0.008	-0.65			-0.000	-0.45
Guidance Issuance	-0.055	-0.46	1.098***	4.31			-0.001	-0.98
Date clustering	Yes		Yes		Yes		Yes	
N	666		666		666		666	
Adjusted R^2	0.491		0.287		0.068		0.012	

This table presents regression results for Yahoo Finance Search, abnormal volume, abnormal returns, and abnormal bid-ask spread for earnings announcement day relative to the day before between treatment and matched control firms. Column (1) presents the results for the log value of total Yahoo Finance Search. Column (2) presents the results for abnormal volume. Column (3) presents the results for abnormal returns. Column (4) presents the results for abnormal bid-ask spread. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. Industry Fixed Effects are based upon Fama French 12 industry definitions. T-statistics are calculated using clustered standard errors by date. See Appendix A for variable definitions.

TABLE 6

Regressions of Yahoo Finance Search, Abnormal Volume, Abnormal Returns, and Abnormal Bid-Ask Spread for Earnings Announcement Day Relative to the Day before between Treatment and Matched Control Firms Partitioned by Firm Size

Panel A: Small Firms

Dep. Var.	(1) Log Total Page Views		(2) Abnormal Volume		(3) Abnormal Returns		(4) Abnormal Bid-Ask Spread	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept	-3.403***	-5.44	-1.239	-0.70	0.012	1.37	-0.029	-1.63
Treatment	0.071	0.60	0.133	0.74	-0.009*	-1.87	0.001	1.12
Post	0.090	0.90	1.577***	4.56	-0.017*	-1.79	0.003	1.53
Treatment × Post	**-0.046**	**-0.34**	**-0.360**	**-0.83**	**0.026****	**1.96**	**-0.003**	**-1.49**
Controls	Yes		Yes		Earnings Surprise		Yes	
Date clustering	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
N	335		335		335		335	
Adjusted R^2	0.211		0.280		0.105		0.028	

Panel B: Large Firms

Dep. Var.	(1) Log Total Page Views		(2) Abnormal Volume		(3) Abnormal Returns		(4) Abnormal Bid-Ask Spread	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept	-15.157***	-12.88	5.035***	2.71	-0.001	-0.29	0.000	0.97
Treatment	-0.045	-0.34	0.127	1.06	-0.001	-0.27	0.000	1.26
Post	0.174	0.82	1.124***	3.45	-0.001	-0.06	-0.000***	-3.05
Treatment × Post	**0.018**	**0.09**	**-0.159**	**-0.46**	**0.017**	**1.44**	**-0.000**	**-0.93**
Controls	Yes		Yes		Earnings Surprise		Yes	
Date clustering	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
N	331		331		331		331	
Adjusted R^2	0.532		0.317		0.011		0.057	

This table presents regression results for Yahoo Finance Search, abnormal volume, abnormal returns, and abnormal bid-ask spread for earnings announcement day relative to the day before between treatment and matched control firms partitioned by firm size. Panel A and Panel B present the results for small and large firms,

respectively. Small (large) firms are defined as the observations with market capitalization lower (higher) than the sample median. Column (1) presents the results for the log value of total Yahoo Finance Search. Column (2) presents the results for abnormal volume. Column (3) presents the results for abnormal returns. Column (4) presents the results for abnormal bid-ask spread. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. Industry Fixed Effects are based upon Fama French 12 industry definitions. T-statistics are calculated using clustered standard errors by date. See Appendix A for variable definitions.

TABLE 7

Regressions of Yahoo Finance Search, Abnormal Volume, Abnormal Returns, and Abnormal Bid-Ask Spread for Earnings Announcement Day Relative to the Day before between Treatment and Matched Control Firms Partitioned by Positive and Negative Earnings Surprises

Panel A: Positive Earnings Surprise

Dep. Var.	(1) Log Total Page Views		(2) Abnormal Volume		(3) Abnormal Returns		(4) Abnormal Bid-Ask Spread	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept	-10.111***	-15.37	2.013	1.61	0.003	0.61	-0.014*	-1.83
Treatment	0.052	0.41	0.106	1.13	-0.006**	-2.03	-0.001	-1.11
Post	0.098	0.53	1.023***	3.99	0.012*	1.88	0.000	0.12
Treatment × Post	**-0.043**	**-0.23**	**0.070**	**0.26**	**0.014**	**1.57**	**0.000**	**0.19**
Controls	Yes		Yes		Earnings Surprise		Yes	
Date clustering	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
N	444		444		444		444	
Adjusted R^2	0.545		0.317		0.070		0.035	

Panel B: Negative Earnings Surprise

Dep. Var.	(1) Log Total Page Views		(2) Abnormal Volume		(3) Abnormal Returns		(4) Abnormal Bid-Ask Spread	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Intercept	-6.852***	-7.40	2.293	0.97	0.015*	1.84	-0.004	-0.54
Treatment	-0.121	-0.78	-0.061	-0.23	-0.009	-1.39	0.004*	1.99
Post	0.172	0.96	1.673***	4.21	-0.046***	-5.84	0.004	1.41
Treatment × Post	**0.082**	**0.34**	**-0.468**	**-1.05**	**0.033****	**2.59**	**-0.006***	**-1.95**
Controls	Yes		Yes		Earnings Surprise		Yes	
Date clustering	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
N	222		222		222		222	
Adjusted R^2	0.380		0.256		0.120		0.001	

This table presents regression results for Yahoo Finance Search, abnormal volume, abnormal returns, and abnormal bid-ask spread for earnings announcement day relative to the day before between treatment and matched control firms partitioned by positive earnings surprises in Panel A and negative earnings surprises in Panel

B. Column (1) presents the results for the log value of total Yahoo Finance Search. Column (2) presents the results for abnormal volume. Column (3) presents the results for abnormal returns. Column (4) presents the results for abnormal bid-ask spread. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. Industry Fixed Effects are based upon Fama French 12 industry definitions. T-statistics are calculated using clustered standard errors by date. See Appendix A for variable definitions.

TABLE 8

Regressions of Yahoo Finance Search, Abnormal Volume, Abnormal Returns, and Abnormal Bid-Ask Spread for Earnings Announcement Day Relative to the Day before between Treatment and Matched Control Firms Partitioned by Five and Fewer Than Five Treatment Firms

Panel A: Fewer Than Five Treatment Firms

Dep. Var.	(1) Log Total Page Views Coeff.	t-stat	(2) Abnormal Volume Coeff.	t-stat	(3) Abnormal Returns Coeff.	t-stat	(4) Abnormal Bid-Ask Spread Coeff.	t-stat
Intercept	-8.355***	-10.32	0.814	0.59	0.009	1.01	-0.013	-1.61
Treatment	0.223*	1.74	0.048	0.33	-0.005	-1.15	0.001	1.59
Post	0.090	0.58	1.766***	5.11	-0.017**	-2.13	0.004	1.65
Treatment × Post	-0.052	-0.23	-0.388	-1.00	0.032**	2.62	-0.003*	-1.98
Controls	Yes		Yes		Earnings Surprise		Yes	
Date clustering	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
N	302		302		302		302	
Adjusted R^2	0.517		0.299		0.136		0.012	

Panel B: Five Treatment Firms

Dep. Var.	(1) Log Total Page Views Coeff.	t-stat	(2) Abnormal Volume Coeff.	t-stat	(3) Abnormal Returns Coeff.	t-stat	(4) Abnormal Bid-Ask Spread Coeff.	t-stat
Intercept	-8.459***	-12.50	1.868	1.16	0.005	0.86	-0.009	-0.86
Treatment	-0.236*	-1.84	0.138	1.02	-0.007**	-2.28	-0.001	-1.62
Post	0.284	1.25	1.112***	3.92	-0.003	-0.42	-0.000	-0.06
Treatment × Post	0.022	0.12	-0.134	-0.36	0.013	1.48	0.000	0.08
Controls	Yes		Yes		Earnings Surprise		Yes	
Date clustering	Yes		Yes		Yes		Yes	
Industry FE	Yes		Yes		Yes		Yes	
N	364		364		364		364	
Adjusted R^2	0.532		0.282		0.008		0.032	

This table presents regression results for Yahoo Finance Search, abnormal volume, abnormal returns, and abnormal bid-ask spread for the earnings announcement day relative to the day before between treatment and matched control firms partitioned by five and fewer than five treatment firms. Panel A and Panel B present

the results for days with less than five treatment firms and five treatment firms, respectively. Column (1) presents the results for the log value of total Yahoo Finance Search. Column (2) presents the results for abnormal volume. Column (3) presents the results for abnormal returns. Column (4) presents the results for abnormal bid-ask spread. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. Industry Fixed Effects are based upon Fama French 12 industry definitions. T-statistics are calculated using clustered standard errors by date. See Appendix A for variable definitions.