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Daniel Bradley<sup>a</sup>, Jan Hanousek<sup>b, c</sup>, Russell Jame<sup>d</sup>, and Zicheng Xiao<sup>e</sup>

<sup>a</sup>Department of Finance, University of South Florida, Tampa, FL 33620, [danbradley@usf.edu](mailto:danbradley@usf.edu)

<sup>b</sup>Department of Finance, University of South Florida, Tampa, FL 33620, [janhanousek@usf.edu](mailto:janhanousek@usf.edu)

<sup>c</sup>Faculty of Business and Economics, Department of Finance, Mendel University in Brno, Czech Republic

<sup>d</sup>Gatton College of Business, University of Kentucky, Lexington, KY 40515, 859.218.1793, [russell.jame@uky.edu](mailto:russell.jame@uky.edu)

<sup>e</sup>Department of Finance, University of South Florida, Tampa, FL 33620, [zicheng@usf.edu](mailto:zicheng@usf.edu)

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## *Abstract*

We examine the market consequences of due diligence (DD) reports on *Reddit's Wallstreetbets (WSB)* platform. We find average 'buy' recommendations result in two-day announcement returns of 1.1%. Further, the returns drift upwards by 2% over the subsequent month and nearly 5% over the subsequent quarter. Retail trading increases sharply in the intraday window following publication, and retail investors are more likely to be net buyers following reports that earn larger returns. Thus, in sharp contrast to regulators concerns that *WSB* investment advice is harming retail traders, our findings suggest that both *WSB* posters and users are skilled.

*Keywords:* Reddit, Wallstreetbets, retail trading, social media

*JEL classifications:* G20, G23

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# Place your bets? The market consequences of investment advice on Reddit's Wallstreetbets

## 1. Introduction

On February 18, 2021 the CEOs of Reddit and Robinhood along with a Reddit user testified before Congress for their role in the well-publicized Gamestop short squeeze that sent shares to almost \$500 before plummeting to around \$50 a few days later.<sup>1</sup> With the explosion of social media platforms devoted to investment advice in recent years, it is not surprising that regulators expressed concerns about market manipulation and retail investors becoming victim to fraud to information posted on social media.<sup>2</sup> While academic research on the impact of social media on retail trading behavior is limited, contrary to regulator concerns, some recent evidence suggests that retail investors benefit from social media (Farrell, Green, Jame and Markov, 2020). On the other hand, several recent studies suggest that social media advice induces cognitive biases that harm investors and can impede price discovery (Cookson, Engelberg, and Mullins, 2020; Jia, Redigolo, Shu, and Zhao, 2020).

In this paper, we focus on the investment advice provided on Reddit's *Wallstreetbets* (*WSB*), the forum targeted in the recent Congressional probe. *WSB* is a forum (called a subreddit) where users post investment advice and the community comments on the idea. *WSB* is known for its brash culture and its emphasis on highly speculative trading strategies. It is by far the most popular finance-related subreddit experiencing explosive growth with currently 9.5 million subscribers (9x increase year-over-year). On January 28<sup>th</sup>, 2021 *WSB* generated more than 271 million pageviews, ranking it as the third most visited cite on the day (behind only Google (#1) and Youtube (#2), and ahead of Facebook (#4).<sup>3</sup>

*WSB*'s tremendous growth, coupled with its emphasis on more speculative strategies has raised significant concern, particularly among regulators, that *WSB* induces uninformed trading that harms unsophisticated retail investors. For example, William Gavin, Secretary of the Commonwealth of Massachusetts proposed a trading halt in Gamestop, the most popular stock on *WSB*, to protect "small

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<sup>1</sup> Hedge funds Melvin Capital and Citadel also testified. For the transcript of the testimony, see <https://www.congress.gov/video/?508545-2/gamestop-hearing-part-2>

<sup>2</sup> While this may be the most publicized recent example, policy makers have long been concerned about social media and financial markets. For instance, see <https://www.nytimes.com/2013/04/29/business/media/social-medias-effects-on-markets-concern-regulators.html>.

<sup>3</sup> <https://mashable.com/article/reddit-wallstreetbets-subreddit-record-traffic-gamestop/> As a reference, other prominent social finance sites such as Seeking Alpha, Motley Fool, and Estimize generate roughly 1.1 million, 13,000, and 6,500 average daily pageviews.

and unsophisticated investors.”<sup>4</sup> On the other hand, many people more familiar with *WSB* suggest that the posters and users are actually quite sophisticated. For example, *WSB* moderators write that, “Moderating *WSB* has taught us that retail investors can be every bit as sophisticated as institutional investors, and, in some cases even more so. We have researchers, mathematicians, momentum traders, gamblers, and so much more.”<sup>5</sup>

Motivated by these competing views, our paper examines both the value of the investment advice provided on *WSB*, and the impact of this investment advice on retail trading. Our focus is exclusively on single firm ‘Due Diligence’ (DD) reports, which are reports identified by the poster (and verified by moderators) as containing some type of analysis and a clear buy or sell signal. Our sample includes 2,340 DD reports issued between 2018 and 2020. The number of DD reports increase exponentially through time coinciding with the exponential growth in the *WSB* user base. Consistent with the view that *WSB* emphasize speculative investments, we find that DD reports tilt towards unprofitable, volatile stocks with low institutional ownership.

After examining the determinants of *WSB* reports, we turn to the investment value of DD recommendations. We find ‘buy’ DD recommendations (~80% of all DD reports) earn two-day abnormal returns of roughly 1.12% percent. These returns are statistically significant and economically large, albeit smaller than the average returns to sell-side analyst recommendations (Womack 1996; Crane and Crotty, 2020), but substantially larger than the returns to *Seeking Alpha* recommendations (Farrell, Jame, and Qiu, 2020). We do not however, find significant abnormal returns to ‘sell’ recommendations.<sup>6</sup>

We next examine if this price movement is transitory (e.g., due to short-term uninformed price pressure) or permanent. We fail to find any evidence of reversals. In fact, the returns continue to drift in the same direction over the next month. For instance, we find Day (2,21) returns of 1.45%, which are highly statistically and economically significant. Further, the cumulative one-quarter return following buy DD recommendations exceeds 6%.

One possible explanation for the significant returns following *WSB* buy recommendations is that *WSB* users simply piggyback off other information events that tend to have considerable drift (Altinkilic and Hansen, 2009; Bradley, Clarke, Lee and Ornathanalai, 2014)). We repeat our analysis on the subsample of DD reports that do not coincide with major information events including earnings

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<sup>4</sup> <https://www.cnn.com/2021/01/27/gamestop-speculation-is-danger-to-whole-market-massachusetts-regulator.html>

<sup>5</sup> <https://www.bloomberg.com/news/articles/2021-01-29/wallstreetbets-mods-focus-on-growth-say-culture-misunderstood>

<sup>6</sup> However, we find that the returns to buy recommendations are significantly larger the returns to sell recommendations.

news, sell-side analyst research, abnormal media coverage, or a previous *WSB* DD report. The results for this subset of non-confounded DD reports remain highly significant and are of similar economic magnitude. In other words, *WSB* posters ability to forecast future stock returns is not limited to piggybacking off other information events.

Finally, we examine the impact of DD reports on retail trading activity, estimated using the method in Boehmer, Jones, Zhang, and Zhang (2020). Similar to Farrell et al. (2020), our identification strategy exploits changes in retail trading over short windows before and after the DD report. Among DD reports that are released during trading hours, we find an average 7% increase in retail trading in the five half-hours after the report is released relative to the five-half hours before the report is released. Our estimate is comparable to the increase in retail trading around *Seeking Alpha* reports in Farrell et al. (2020). We also find some modest evidence that retail order imbalances (i.e., net-buying) tend to be greater for DD reports that earn subsequently larger returns. This finding is consistent with retail investors perhaps having some ability to discern the quality of DD reports.

Collectively, our evidence suggests that 1) *WSB* DD posters have skill and 2) retail investors may have some ability to discern report quality. Our evidence is in sharp contrast to the conventional view that *WSB* only attracts uninformed investors and to regulators fears that following the advice of user reports on *WSB* results in significantly less informative retail trading.<sup>7</sup>

Our study contributes to two strands of literature. First, our study adds to the literature on the role of social media in financial markets. While some papers find a significant positive relation between investment opinions on social finance sites and future stock returns (e.g., Chen et al., 2014; Jame, Johnston, Markov, and Wolfe, 2016; and Crawford, Gray, Johnson, and Price, 2018), others do not (Tumarkin and Whitelaw, 2001; Kim and Kim, 2014; and Giannini, Irvine, and Shu, 2018). We contribute to this literature by providing a first look at the investment value of DD reports on *WSB*, which has recently become the most influential social finance site by many metrics.<sup>8</sup> Although *WSB* may be viewed as highly speculative and ripe for fraudulent activity, our findings suggest that DD report recommendations on *WSB* contain significant investment value.

This study also contributes to the literature on retail trading. Early work finds that retail traders are uninformed ‘dumb money’ (Hvidkjaer, 2008; Frazzini and Lamont, 2008). However, more recent

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<sup>7</sup> <https://medium.com/concoda/meet-the-reddit-community-where-members-gamble-their-life-savings-f3c3b7699627>

<sup>8</sup> To our knowledge, the only other paper that uses *WSB* data is Eaton, Green, Roseman, and Wu (2021) who use *Wallstreetbets* posts to proxy for stocks favored by Robinhood account holders. They do not, however, examine the market consequences of investment advice on the platform.

evidence suggests that retail trades are informed (Kelley and Tetlock, 2013; Boehmer, Jones, Zhang, and Zhang, 2020) and are skilled at processing public information (Farrell et al., 2020). Our evidence that retail traders have some ability to discern the quality of *WSB* report is consistent with this more recent evidence.

The rest of the paper proceeds as follows. Section 2 provides background details of Reddit's *WSB*, describes the sample, and provides an analysis on the determinants of *WSB* reports. Section 3 examines the abnormal returns associated with following DD report recommendations. . Section 4 proceeds with an examination of retail trading activity. Section 5 concludes.

## 2. Data and Descriptive Statistics

### 2.1 *Reddit and Wallstreet Bets – Background and Sample*

Reddit is a social media platform founded in June 2005. Like many other social media websites, contributors post content and other users can add comments in response to the original post. The Reddit community is a collection of forums, where each forum is dedicated to particular topic called a subreddit. Each subreddit is then organized in several pages based on users' ranking criteria. For instance, the default page is the 'Hot Page,' which lists the currently most viewed posts or posts with the most active commentators. 'New Posts' lists posts based on the listing timestamp and 'Top posts' lists the posts with the most likes (upvotes) and comments for a specified period. When a new post is written, it is only visible in the new post category. The post can then move up to the hot page if it reaches sufficient traffic.

Wallstreetbets (*WSB*) is one of many subreddits within the Reddit community. It was created on January 31, 2012 with a particular emphasis on highly speculative trading strategies. While this is not the only subreddit dedicated to investing strategies (i.e., *r/Investing*, *r/Personalfinance*, *r/Stocks*, etc.), we focus on this particular subreddit for two primary reasons. First, with over 9 million subscribers, it is by far larger than other finance related subreddits. Second, and perhaps most importantly, it is the subreddit that has recently attracted significant media and regulatory attention from its role in the Gamestop short squeeze.<sup>9</sup> The conventional view is that this forums' user base is predominantly unsophisticated retail investors who are more interested in gambling than investing.

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<sup>9</sup> <https://markets.businessinsider.com/news/stocks/sec-hunting-fraud-misinformation-social-media-reddit-driven-trading-frenzy-2021-2-1030042965>

There has also been significant concern that the “research” on *WSB* is at best uninformative, and at worse a force that destabilizes stock prices and contributes to significant retail trading losses.

Importantly, the view of *WSB* as having a niche clientele that prioritize speculative trading strategies over more traditional investment research, suggest that the impact of *WSB* on financial markets and retail investor trading may differ substantially relative to other social finance sites studied in the prior literature. For example, several studies on Seeking Alpha suggest that a large fraction of seeking alpha posts and contributors are skilled (see, e.g., Chen et al., 2014; Farrell, Jame, and Qiu, 2020), and Seeking Alpha research helps facilitate more informative retail trading (Farrell et al., 2020). However, apart from the fact that both *WSB* and Seeking Alpha have approximately the same number of subscribers (~9 million), the two social finance platforms have very little in common. For example, there is limited quality control on *WSB* with no barriers to entry, whereas Seeking Alpha employs an editorial team to review all research reports to ensure quality.<sup>10</sup> Further, *WSB* reports tend to be considerably less in-depth than the average Seeking Alpha article, and the user base of *WSB* is likely to have significantly less financial sophistication.<sup>11</sup>

\*\*\*Insert Figure 1\*\*\*

Figure 1 shows the explosive growth trajectory in the *WSB* forum, in terms of both the number of users and comments. For example, the forum has grown from roughly 500,000 users at the start of 2019 to more than 9 million users as of January 2021. Similarly, the average number of comments per day trended below 50,000 for all of 2019 but is now approaching 400,000. The huge spike in the beginning of 2021 corresponds to the timing of the Gamestop short squeeze.

We scrape all posts on *WSB* from 2018 to 2020. The API allows us to obtain all DD posts, including posts later deleted by users, and is thus free from selection biases.<sup>12</sup> We begin in 2018 because as Figure 1 shows, the number of users is sparse before then and unlikely to have any meaningful market impact. Our analysis focuses on Due Diligence (DD) reports. These reports are

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<sup>10</sup> One SA contributor describes the extensive editorial review process here (<https://walltsquirrel.com/first-article-on-seeking-alpha/>).

<sup>11</sup> With respect to article depth, we find that the average *WSB* post in our sample is 352 words, which is roughly half of the length of a typical SA report (675 words), as reported in Chen et al., 2014. With respect to investor sophistication, the average Seeking Alpha user has a household income of \$321,000 and roughly \$1.5 million in investable assets (see [https://static.seekingalpha.com/uploads/pdf\\_income/sa\\_media\\_kit\\_04\\_2020.pdf](https://static.seekingalpha.com/uploads/pdf_income/sa_media_kit_04_2020.pdf)). While these figures are unknown for *WSB* users, anecdotal evidence suggests that these estimates would be substantially smaller.

<sup>12</sup> There is, however, a period between April 2020 and July 2020 where all DD reports are missing. This is likely due to an issue with Reddit’s API.

vetted by the moderators as containing information where 1) at least some analysis has been performed and 2) the author provides a clear investment recommendation (long or short).<sup>13</sup> For each DD report, we manually review the report to identify the investment recommendation and ticker. Although the author's investment recommendation is clear to anyone reading the report, there is no standardized format for listing the recommendations which necessitates a manual review of each post. The manual review of tickers is also needed for two reasons. First, users may place special characters before or after a ticker symbol that a program would misclassify. Second, users may intentionally post a wrong ticker to misdirect hedge funds and other institutional investors that monitor message boards using algorithms.<sup>14</sup>

We limit the sample to DD reports focused on a single ticker (e.g., we eliminate DD reports that focus on market-wide or industry analysis), and we also limit the sample to common stocks (CRSP share codes 10 and 11) with available data in the CRSP-CompuStat merged database. Appendix A provides an example of a DD report in our sample. The header of the report includes the user, firm name and ticker. Although not visible in Appendix A, each DD report also includes the timestamp of the report (i.e. 3/20/2020 18:54:53 eastern time), which allows us to examine the market's reaction to the report over short windows. For each report, we also collect the total number of words in the report (*report length*), the total number of comments, the fraction of voters that "upvoted" the article, and the number of awards that the DD report received. Awards are given by other Reddit users when they find posts or comments useful. These awards are accompanied by virtual coins that users can purchase and then allocate as they wish.<sup>15</sup>

We use *Report length* as our measure of article quality. While other measures (e.g., awards, comments, etc.) are likely also correlated with article quality, they suffer from a potential look-ahead bias. In particular, users may choose to give an award only after the DD report has turned out to be correct. In untabulated analysis, we confirm that article length is significantly correlated with ( $p < 0.001$ ) with number of comments ( $\rho = 0.26$ ), number of upvotes ( $\rho = 0.26$ ), a dummy for whether

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<sup>13</sup> Examples of WSB posts that would not classify as DD posts include posting memes and bragging about trading gains (or trading losses).

<sup>14</sup> For example, Thinknum, an alternative data provider, scans WSB for discussed stocks and sells the analysis to hedge funds and other large institutional clients. (<https://research.tdameritrade.com/grid/public/markets/news/story.asp?docKey=1-SN20210206005479&cid=1-SN20210206005479-MIP>).

<sup>15</sup> For instance, the post in Appendix A received 2 silver awards. A silver award grants the writer of the post or comment 100 reward coins. There are other rewards such as gold (100 coins plus ad-free browsing for a week) and platinum (700 coins plus ad-free browsing). Currently, 500 coins can be purchased for \$1.99. Coins can be purchased in larger quantities with lower average purchase price per coin as quantity increases.

the post received any awards ( $\rho = 0.36$ ), and a continuous measure of the total number of awards ( $\rho = 0.19$ ). Thus, we believe that *Report length* is a plausible measure of ex-ante research quality.

\*\*\*Insert Table 1\*\*\*

Panel A of Table 1 provides summary statistics. The final sample includes 2,340 DD reports, of which roughly 80% (1,886) are buy recommendations. The 2,340 reports cover 612 unique firms. Thus, conditional on having at least one DD report, the average firm in the sample has 3.8 unique reports. The average report is roughly 352 words, although there is sizeable variation with the interquartile range spanning from 99 words to 418 words (unreported). We also observe the dramatic growth in the number of DD reports over time, with roughly 75% of total DD reports occurring in the last year of the sample.

As we discuss in greater detail in Section 3, to reduce the impact of potentially important confounding events, much of our analysis will rely on sub-samples of the data. The first sub-sample, *Non-Confounded* reports, excludes any reports that have a confounding information event, defined as an earnings announcement, I/B/E/S research report, abnormal media coverage, or a DD report by a different user, over the  $[-1,0]$  window, where day 0 is the day of the DD report. The second sample, *Intraday* reports, limits the sample to posts that occur during trading hours (i.e., between 9:30 am and 4:00 pm eastern on a day where the market is open for trading).

Panels B and C of Table 1 report the summary statistics for the *Non-Confounding* reports and *Intraday* reports, respectively. We find excluding DD reports that coincide with information events shrinks the sample from 2,340 to 578 reports, consistent with many DD reports being motivated by major information events (e.g., a recent earnings announcement or a previous DD report). We also find *Non-Confounded* reports tend to be longer than *Confounded* reports (404 words versus 335 words) consistent with *Non-Confounding* reports containing more in-depth analysis. Our sample also includes 869 *Intraday* reports which tend to be slightly shorter than after-hour posts.

## 2.2 Other Variable Construction

We obtain financial statement data, including book value of equity, book value of debt, book value of assets, earnings before interest taxes depreciation and amortization (EBITDA), and total common shareholders from Compustat. We obtain financial market data including daily data on share price, shares outstanding, stock returns, and volume from CRSP. We complement the daily return

data from CRSP with intraday trade and quote data from NYSE TAQ. Earnings announcement dates and sell-side analyst earnings forecast data are from the I/B/E/S unadjusted US detail history file and sell-side analyst recommendations from the I/B/E/S detail recommendation file. We collect the number of shares held by institutions from the Thomson Reuters Institutional Holdings database, and data on media coverage from Bloomberg.

We identify retail trading from TAQ data using the approach of Boehmer, Jones, Zhang, and Zhang (BJZZ, 2020). Specifically, we classify trades with TAQ exchange code “D” and prices just below a round penny (fraction of a cent between 0.6 and one) as retail purchases, while trades on exchange code “D” and prices just above a round penny (fraction of a cent between zero and 0.4) are classified as retail sales. This classification is conservative in the sense that it has a low type 1 error (i.e., trades classified as retail are very likely to be retail). However, this classification does omit retail trades that occur on exchanges as well as limit orders that are not immediately executable.

### 2.3 Determinants of *WSB* Coverage

We next examine the characteristics of firms with DD posts. We expect that many of the determinants of research coverage on other social finance sites (e.g., Seeking Alpha) are likely to be relevant on *WSB* as well. For example, we expect that *WSB* will also have a significant tilt towards stocks more heavily owned by retail investors. However, relative to Seeking Alpha, we expect that *WSB* users will tend to post on more speculative stocks, including stocks with greater volatility.

To facilitate a comparison with Farrell et al. (2020) [hereafter FGJM] who study the determinants of SA coverage, we use a similar set of firm characteristics studied in FGJM as potential determinants of *WSB* coverage. Specifically, we estimate the following panel regression:

$$WSB\ Coverage_{i,t} = \alpha + \beta_1 Chars_{i,t-1} + Month_t + \varepsilon_{i,t}. \quad (1)$$

The dependent variable, *WSB Coverage*, is the natural log of 1 plus the total number DD reports issued for firm  $i$  during month  $m$ . *Chars* is the vector of firm characteristics used in FGJM and includes the percentage of the firm’s shares held by institutional investors at the end of the prior year (*Inst. Ownership*), the number of common shareholders (*Breadth of Ownership*), market capitalization (*Size*), book to market (*BM*), return volatility (*Volatility*), share turnover (*Turnover*), past one-month returns (*Return<sub>m-1</sub>*), past returns over the prior two to twelve months (*Ret<sub>m-2, m-12</sub>*) past one-year profitability (*Profitability*), an indicator equal to one if past one-year profitability was negative (*Negative Prof*) the

number of unique media articles mentioning the firm in the prior year (*Media Coverage*), and the number of sell-side analysts issuing a forecast for the firm in the prior year (*IBES Coverage*). See Appendix B for detailed definitions. We winsorize all continuous variables at the 1<sup>st</sup> and 99<sup>th</sup> percentiles, we log all continuous variables other than *Profitability* and *Return*, and we standardize all variables to have zero mean and unit variance. We include month fixed effects and cluster standard errors by firm and month.

\*\*\*Insert Table 2\*\*\*

We find that the determinants of *WSB* coverage are frequently similar to those of SA coverage. For example, consistent with SA coverage, we find that *WSB* coverage is increasing in firm size, turnover, volatility, and decreasing with institutional ownership. In most cases, the magnitude of the estimates for *WSB* are amplified. For example, FGJM document that a one standard deviation increase in institutional ownership is associated with a 27% decline in SA coverage, whereas we estimate a decline of 49%. Further, consistent with *WSB* preference for more speculative stocks, we find that a one-standard deviation increase in past volatility is associated with a 50% increase in *WSB* coverage, which is more than double the corresponding estimate in FGJM or 21%. *WSB* preference for more speculative stocks is further reinforced by their tendency to cover stocks with negative profitability.

Specifications 2 and 3 also examine whether firm characteristics can help explain the direction of the investment recommendation. We repeat Equation (1) after replacing the total number of DD reports with either the number of DD reports issuing a buy recommendation (Specification 2), the number of DD reports issuing a sell recommendation (Specification 3), or the difference in the number of buy versus sell recommendations (Specification 4). Turning to Specification 4, we find that *WSB* users are more likely to issue buy recommendations (relative to sell recommendations) for stocks with less institutional ownership, greater volatility, and negative profitability. These findings are again consistent with *WSB* users preferring to take the long side of more speculative investments.

### **3. The Event-Period Market Reaction to DD Reports**

#### *3.1 The Returns following All DD Reports*

In this section, we examine event-time returns following DD reports. We estimate the abnormal return for each DD report ( $\alpha_{it}$ ) as:

$$\alpha_k = [\prod_{t=0}^x(1 + r_{kt}) - \prod_{t=0}^x(1 + r_{bt})], \quad (2)$$

where  $r_{kt}$  is the return on stock discussed in report  $k$  on day  $t$ , and  $r_{bt}$  is the return on a benchmark portfolio. We measure returns starting from day 0. For reports issued outside of trading hours, the day 0 return is the CRSP return for the trading day following the recommendation. For reports issued during trading hours, we obtain the prevailing midpoint quote from TAQ for the stock at the time the post is published on *WSB*, and we calculate the day 0 return from the quoted midpoint to the closing price. We measure the cumulative returns from day 0 through day  $x$ , where we set  $x$  equal to either zero, one, five, or 21 trading days.

The return analysis ends as of the end of December 2020, the last period for which we have CRSP return data. Thus, for many December 2020 posts, the 21-day holding period is cut short. Importantly, this cutoff also results in all our analysis pre-dating the frenzied returns of GameStop and other meme stocks frequently mentioned on *WSB*. Excluding these observations from our analysis will naturally attenuate the average returns associated with DD reports on *WSB*. Nevertheless, we are primarily interested in understanding the investment value of *WSB* prior to the unusual events of January 2021.

Following Crane and Crotty (2020), for the intraday return (i.e., the day 0 return for reports released during trading hours), the benchmark portfolio return is the return on the SPY index over the same horizon. For all other horizons, we consider two benchmark portfolio returns. The first is the return on the CRSP value-weighted market portfolio (i.e., market-adjusted return), and the second is the equally-weighted return on a portfolio of stocks matched on size, book-to-market, and momentum (i.e., DGTW-adjusted returns).<sup>16</sup>

\*\*\*Insert Table 3\*\*\*

Panel A of Table 3 reports the event-time returns following DD report buy recommendations. Row 1 reports the results using market-adjusted returns. Across the 1,878 DD reports with buy recommendations, we find that the average return from the DD post until the close of trading is 0.91%. The estimate grows to 1.20% over the [0,1] holding period and 1.76% over the [0,5] holding period. All three estimates are statistically significant at a 1% level based on standard errors double clustered

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<sup>16</sup> See Daniel, Grinblatt, Titman, and Wermers (1997) for a more detail discussion of the construction of the DGTW benchmark portfolio.

by firm and day. Further, the economic magnitudes are sizeable. As a benchmark, Womack (1996) find that the average 3-day size adjusted return following sell-side analysts' recommendations is 2.98%, and Farrell, Jame, and Tiu (2020) find that the five-day abnormal returns to *Seeking Alpha* recommendations is 0.38%.

We also find that the market adjusted returns continue to increase over longer horizons. For example, over the [0,21] period the abnormal return increases to 3.92%. The 21-day holding period return is also considerably larger than the two-day return [0,1], suggesting that there is a significant drift. We test this formally, by examining the return over the [2, 21] holding period. The estimate of 2.78% remains highly significant ( $p < 0.01$ ) consistent with a significant drift following *WSB* reports. This drift is consistent with prior work that also finds drifts following sell-side analyst recommendations (Womack, 1996) and *Seeking Alpha* reports (Chen et al., 2014).

Row 2 repeats the analysis with DGTW-adjusted returns. The DGTW-adjusted return estimates are slightly smaller than the market-adjusted returns. For example, the [0,1] and [0,21] holding period estimate falls from 1.20% to 1.12% and 3.92% to 3.17%, respectively. However, all the estimates remain positive and highly significant.

Panel B repeats the analysis for sell recommendations. The point estimates, particularly over longer horizons, are generally negative. For example, the 5-day market-adjusted (DGTW-adjusted) returns are -0.90% (-1.14%). While the estimates are not small, they are also very imprecisely estimated, and they are not reliably different from zero. The noisy estimates are likely a consequence of relatively small number of sell DD report in the sample. However, Panel C confirms that the returns following buy DD reports are always larger than the returns following sell DD reports, with nearly all of the estimates being significantly different from zero.

One concern is that the significant positive returns following buy DD reports reflect persistent, but uninformed, demand shocks that push prices beyond fundamentals. To disentangle price pressure from informed trading, we examine returns over longer horizons. The price pressure explanation would suggest that there are reversals over longer holding periods as prices revert back to fundamentals. In contrast, the informed trading explanation would not imply a reversal. Further, to the extent that *WSB* post contain information that is only gradually impounded into prices there may be continued evidence of a drift.

We repeat the analysis reported in Table 3 for holding periods of one week (i.e., [0,5], two weeks [0,10], all the way through 13 weeks [0,65]). We plot the average DGTW-adjusted return for each week for all buy and sell DD reports in Figure 2. We find that the returns following DD reports

continue to drift upwards over time. At the end of the 13-week holding, the average buy DD report has earned an abnormal return of 6.17%. We find that the abnormal returns to sell reports generally hover close to zero regardless of the holding period. In sum, the longer horizon returns provide no support for the price pressure explanation.

\*\*\*Insert Figure 2\*\*\*

### 3.2 Confounding Information Events

The significant returns following DD reports could simply be a consequence of DD reports piggybacking off other news events (see, e.g., Altinkilic and Hansen, 2009). Alternatively, it is possible that DD reports contain more novel information production. While both channels are potentially valuable to users who rely on *WSB* for investment advice, distinguishing these explanations provides insight into the source of the investment value.

We partition all DD reports into those that coincide with major information events (*Confounded Sample*) and those that do not (*Non-Confounded Sample*). The confounded sample includes any reports where an earnings announcement, I/B/E/S research report (recommendation or earnings forecast revision), or a DD report by a different user, was issued over the  $[-1,0]$  window, where day 0 is the day of the DD report. In addition, we collect media coverage intensity from Bloomberg. Bloomberg records the number of news articles released for a stock over the hour and then creates a number score each hour by comparing past 8-hour average count to all hourly counts over the previous 30 days for the same stock. A value of 0 indicates that the media coverage is in the lowest 80% of the hour counts relative to the previous 30 days. Similarly, Bloomberg assigns a score of 1, 2, 3, or 4 if the average is the value is in the 80% to 90%, 90% and 94%, 94 and 96%, or greater than the 96%. Bloomberg creates a daily score by taking the maximum of these hourly scores. To be conservative, we classify a firm as having a confounding event if the daily media score is greater than zero on either day [0] or day [-1].<sup>17</sup> All remaining reports are classified as *Non-Confounded Reports*.

\*\*\*Insert Table 4\*\*\*

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<sup>17</sup> Some prior work classifies an event as confounding if the firm has any media coverage on a day. However, larger firms (e.g., Apple and Telsa) have media coverage on every single day of the sample. We believe that focusing on a firm's abnormal media coverage is a better approach to capturing economically important confounding events.

Panel A of Table 4 reports the DGTW-adjusted returns following *Confounded* and *Non-Confounded* DD reports with a buy recommendation. The majority of all DD buy reports (~75%) are *Confounded*, consistent with most DD reports following significant information events. Further, the abnormal returns following *Confounded* DD buy reports are significantly positive. This could be consistent with *WSB* users forecasting drift following news events, or this may be a consequence of *WSB* users skillfully processing public information. Regardless of the specific mechanism, users following Buy DD reports following information events would earn abnormal returns.<sup>18</sup> We also find significant positive returns following *Non-Confounded* reports. In fact, the abnormal returns are typically larger for *Non-Confounded* reports than *Confounded* reports (although the estimates are not reliably different from each other). The significant positive returns following *Non-Confounded* reports are consistent with *WSB* having skill at information production.

Panel B presents analogous results for sell reports. We find no evidence that *Confounded* or *Non-Confounded* sell DD reports are associated with significant abnormal returns. This finding mirrors the results from Table 3 which finds no evidence of skill across all sell DD reports.

## 4. Retail Investor Trading following DD Reports

### 4.1. DD Reports and the Intensity of Retail Trading

In this section, we examine whether DD reports result in increased retail trading. An important caveat to this analysis is that the timing of DD reports is not random. In particular, DD reports are almost certainly more likely to be written when retail trading interest in the stock is greater. Thus, any cross-sectional test between DD report frequency and retail trading is likely to uncover a significantly positive relation even if the DD reports has no causal effect on retail trading.

To minimize this concern, we compare the intensity of retail trading over very short windows around the DD report. Specifically, we compare retail trading on the first trading day following the DD report relative to retail trading on the day immediately prior to the report. For example, if a report occurs at 6 pm on Thursday, we compare retail trading intensity on Friday (the post-period) to retail trading intensity on Thursday (the pre-period). The identifying assumption of this analysis is that retail trading interest in the stock is unlikely to change over this short window for any reason other than the DD post. This assumption may not be valid, particularly if a major information event occurred after trading hours.

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<sup>18</sup> One concern is that the returns are purely attributable to the news story itself which may not be fully realizable. We note however that we continue to find significant returns even after day 0, include the [2,21] holding period.

To minimize this concern, we also emphasize two sub-samples. The first is the subset of *Non-Confounded* reports, as described in Section 3.2. The second is the sub-sample of reports that are issued intraday (*Intraday* reports). For *Intraday* reports, we can compare retail trading on the same day, both before and after the report is released.<sup>19</sup> Even if an event is responsible for the DD post, the exact timing of the event and the DD post are likely to differ since it will take some time for a *WSB* poster to learn about the event, process the event, and then write a report. This timing differential should allow us to isolate the causal impact of DD reports on retail trading over short horizons. In particular, if retail investors are reacting to an earlier information events, we expect retail trading intensity estimated shortly before the posting of the DD report to be similar to retail trading intensity estimated shortly after the posting of the report. On the other hand, if retail investors are reacting to the DD post itself, rather than the underlying information event, we should observe a sharp increase in retail investor trading in the period immediately following the posting of the DD report.

We explore the impact of DD reports on retail investor trading intensity using the following regression:

$$Retail\ Trades_{i,t} = \alpha + \beta_1 Post_{i,t} + Ret_{i,t-1} + Report_i + HalfHour_t + \varepsilon_{i,t}. \quad (3)$$

*Retail Trades* is the number of retail trades, defined as  $\log(1 + \# \text{ of } Retail\ Trades)$  in the half-hour window  $t$  around the DD report  $i$ .<sup>20</sup> *Post* is an indicator equal to one if the trading is measured after the release of the DD report and zero otherwise. For an intraday report that occurs within the 30-minute window, the assigning of pre versus post is ambiguous, and thus we exclude the 30-minute interval from the test.<sup>21</sup> *Ret* is the DGTW-adjusted return on the previous trading day. *Report* denotes *DD Report* fixed effects. By including *Report* fixed effects, our identification comes exclusively from changes in retail trading in the same stock in the short window around the release of the report. Finally, *Half Hour* denotes half-hour fixed effects and controls for the fact that retail trading intensity varies systematically within the trading day.

\*\*\*Insert Table 5\*\*\*

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<sup>19</sup> Farrell et al. (2020) adopt a similar identification strategy when estimating the impact of Seeking Alpha posts on retail trading.

<sup>20</sup> We focus on retail trades, rather than retail trading volume to minimize the impact of a few very wealthy retail investors. Nevertheless, we find very similar results using retail trading volume (untabulated).

<sup>21</sup> For example, if a post occurs at 2:15, we would exclude the 2:00 pm -2:30 pm window.

Specification 1 of Table 5 reports the results for the full sample of DD reports and limits the event window to the [-1,0] interval. We find that the coefficient on *Post* is 0.12. The estimate is highly significant ( $t=6.23\%$ ) based on standard errors clustered by firm and day. The magnitude indicates that retail trading is 12% higher on the day after the DD report relative to the day before.

As discussed above, one concern with the analysis in Specification 1 is that some underlying information event (e.g., an overnight earnings announcement) is responsible for both the DD report and the elevated retail trading. To minimize this concern, in Specification 2, we limit the sample to *Non-Confounded Reports*. The estimate on *Post* falls to 0.07 but it remains reliably different from zero.

Next, we limit the sample to DD reports issued during trading hours and focus on the [0,0] event window. We again obtain an estimate of 0.07. In other words, holding the firm-day constant (and controlling for half-hour fixed effects), we find that retail trading is 7% higher in the period following the DD report than the period immediately prior to the DD report. The 7% estimate is economically sizeable. For reference, Farrell et al. (2020) estimate that the posting of a *Seeking Alpha* report increases retail trading by roughly 6-9% depending on the specification.

To better understand the dynamics of the retail trading increase following the DD report, we repeat Specification 3 after including retail trades in the half-hour of publication and replacing *Post* with ten separate indicators variable for each half-hour period ranging from -5 to 5 (DD[-5] to DD[+5], with period -1 being the omitted group).<sup>22</sup>

\*\*\*Insert Figure 3\*\*\*

Figure 3 reports the estimates from this regression as well as 90% confidence intervals based on standard errors double-clustered by firm and day. We find that the average estimates on all of the pre-event indicators (DD[-5] through DD[-2]) are economically small and statistically insignificant. This finding is consistent with no unusual retail trading activity in the period immediately prior to the DD report. We find that retail trading increase by more than 4% in the half-hour of the post ( $t=2.34$ )

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<sup>22</sup> For example, if a DD report was issued at 2:15 pm then DD[+1] = 2:30-3, DD[+2] = 3-3:30, DD[+3] = 3:30-4. In this example, DD[+4] and DD[+5] would always be zero since there were not five full half hours following the event. Similarly, DD[0] = 2:00-2:30, DD[-1] = 1:30-2, DD[-2] = 1:00-1:30, etc.

and the estimates remain elevated for the remaining post-event periods. The average post-event values are 7%, consistent with the findings in Specification 3 of Table 5.

#### 4.2. DD Reports and the Informativeness of Retail Trading

The results from the prior section indicate that *WSB* reports induce significant retail trading. A natural question is whether this increased trading is informative (i.e., predictive of future returns). There are at least two reasons to believe that *WSB* reports can induce more informed trading. First, *WSB* buy reports significantly outperform *WSB* sell reports (see Table 3). Thus, if retail investors simply follow the stated investment recommendation, this could increase their trade informativeness. Second, prior work finds that retail investors are skilled at processing public information, (e.g., Kelley and Tetlock, 2013, and Farrell et al., 2020) which points to the possibility that retail investors may be able to discern higher quality reports from lower quality reports. On the other hand, DD reports could reinforce behavioral biases including confirmation bias (Cookson, Engelberg, and Mullins, 2020) and attention-based trading (Barber and Odean, 2008; and Barber, Huang, Odean, and Zchwarz, 2020).

We investigate these issues by testing whether, following the DD report, retail investors are more likely to buy DD reports with buy recommendations (which tend to have higher returns) or are more likely to buy DD reports that have large subsequent returns. Specifically, we estimate the following regression:

$$\begin{aligned} Retail\_OIB_{i,t} = & \alpha + \beta_1 Post_{i,t} + \beta_2 Post_{i,t} \times Buy_{it} + \beta_2 Post_{i,t} \times Ret5_{i,t} \\ & + Ret_{i,t-1} + Report_i + HalfHour_t + \varepsilon_{i,t}. \end{aligned} \quad (4)$$

*Retail\_OIB* is the retail order imbalance for firm  $i$  during half-hour  $t$ , defined as the difference between the number of retail buys less the number of retail sales scaled by total number of retail trades. *Post*, *Ret*, *Report* and *Half Hour* are defined as in Equation (3). *Buy* is an indicator equal to one if the DD report is a buy recommendation and 0 if it is a sell recommendation, and *Ret5* is the five-day DGTW-adjusted return following the report, measured over days [1,5]. We exclude Day [0] in the return calculation to ensure that the returns are measured after retail trading is measured. Thus, our key variables of interest are  $\beta_2$  which measures whether retail order imbalances (i.e., net buying) increase

following a DD buy recommendation relative to immediately prior to the buy recommendation, and  $\beta_3$  which measures whether retail order imbalances increase following a DD recommendation that is associated with large ex-post returns.

Table 6 reports the estimates from Equation (4). As in Table 5, Specification 1 reports the results for the full sample, Specification 2 shrinks the sample to *Non-Confounded* reports, and Specification 3 focuses on intraday reports and shrinks the event window to  $[0,0]$ . The estimates on  $\beta_2$  are mixed across the three specifications. Thus, there is not very strong evidence that retail investors are more likely to increase their net buying activity following a DD report with a buy recommendation. In other words, although the direction of the DD report is informative about future returns (Table 3), retail investors do not react strongly to this signal. The estimates on  $\beta_3$  are consistently positive and statistically significant at either a 10% level (Specification 2) or 5% level (Specifications 1 and 3). The magnitudes are also economically meaningful. For example, the estimate in Specification 3 indicates that a 100% increase in five-day ahead returns is associated with roughly a 9.9 percentage point increase in retail order imbalances. This pattern is consistent with retail investors being able to discern DD report quality. It also casts doubt on regulators concerns that *WSB* is inducing retail investors to make uninformed trades.

## 5. Conclusion

Wallstreetbets (*WSB*) has become a household name after the intense media coverage following the Gamestop short sale squeeze and subsequent Congressional hearings seeking to determine its role in the event. Despite the conventional view that the platform primarily attracts uninformed investors, we find no systematic evidence of this. In fact, we find that due diligence reports – reports that are vetted by moderators as pertaining some analysis – contain investment value. Specifically, we find average ‘buy’ recommendation are associated with over 1% two-day returns that continue to drift upwards, exceeding 6% over the quarter. However, the abnormal returns for the considerable smaller sample of sell recommendations, while generally negative, are not reliably different from zero.

Examining retail trading in short windows around DD report, we find a 7% increase in retail trading in the period immediately following the posting of the due diligence reports. Moreover, our results suggest that retail investors may be able to discern the quality of the reports, as we find that

retail order imbalances become more correlated with future returns in the period immediately following the DD post. Thus, in stark contrast to regulators fears that *WSB* is ripe for market manipulation and harmful to retail investors, our results suggest that retail investors are likely to benefit from the recommendations on the site. Our analysis ends in 2020, which is before the Gamestop event in January 2021 that represented a huge shock to the site. Following our sample period, the site has experienced even more dramatic growth in the number of retail investors visiting the site, and the site is now attracting increased attention of commercial entities and hedge funds. How these changes impact both the content and value of the investment advice on *WSB* is an interesting and fruitful area for future research.

## Appendix A. Sample post



Posted by [u/swaggymedia](#) Today after the bell: DP 11 months ago 2

For anybody that followed ULTA today. Here is some DD on ULTA Beauty and some info from their conference calls/earnings reports.

### DD

Yesterday someone posted on how ULTA was a good short going into a possible recession, so I decided to dig deeper. In spring 2019 ULTA reached a 52-week high of \$368.83.. going into this February 21 and the first day of the beginning of the downtrend ULTA was sitting at \$300 per share. After today's close it is now at \$148. Is there more to squeeze to the downside on this one? I'm not sure, but my opinion is yes. Let's compare ULTA now to the 2008/2009 financial crisis. Keep in mind, ULTA has very strong brand loyalty and also has rights to the Kylie Jenner line, which they didn't have back in 2008. From peak to trough during the financial crisis ULTA went from \$15 to \$4.50, a 70% drop.



ULTA during 2008/2009 crisis.

From peak to trough during the current corona virus crisis, ULTA has gone from \$300 to \$148 what it closed at today. Let's say a 50% drop, already pretty hefty!



ULTA during Corona Virus Feb/Mar chart.

What makes me think there might be more to squeeze? Well I went through there financial reports and it looks like during all of fiscal year 2019 they spent almost ALL of their profits re-purchasing stock (at all time highs). Take a look at this, from there earnings release.

## Outlook

For fiscal 2020, the Company plans to:

- open approximately 75 net new stores, execute approximately 15 remodel or relocation projects, and complete approximately 42 store refreshes;
- increase total sales by approximately 7.0% to 8.0%;
- achieve comparable sales growth of approximately 3.0% to 4.0%;
- deleverage operating income margin rate in the range of 70 to 80 basis points;
- deliver diluted earnings per share in the range of \$12.55 to \$12.75, including the impact of approximately \$1.3 billion in share repurchases and assuming an effective tax rate of between 24% and 24.5%;
- incur capital expenditures between \$280 million and \$300 million;
- incur depreciation and amortization expense between \$310 million and \$320 million; and
- incur net interest expense of approximately \$9.0 million.

The Company's guidance does not include assumptions for any impact related to Coronavirus.

*ULTA outlook 2020 from financial report.*

Not only that, but the board had approved a new share authorization program of up to 1.6 billion. This is including the share re-purchase program already in place of \$875 million re-purchase program initiated in 2019. ULTA's new re-purchase program will be a total of \$725 million for fiscal year 2020. To put this into perspective, in 2019 ULTA did \$7.21 billion in sales at an approximate profit margin of 10% for a total profit of \$594 million.

### Share Repurchase Program

During the fourth quarter of 2019, the Company repurchased 681,458 shares of its common stock at a cost of \$174.1 million. During fiscal 2019, the Company repurchased 2,320,896 shares of its common stock at a cost of \$681.0 million. As of February 1, 2020, \$214.6 million remained available under the \$875.0 million share repurchase program announced in March 2019.

On March 10, 2020, the Company's board of directors approved a new share repurchase authorization of \$1.6 billion, which replaces the prior authorization implemented in March 2019. Under the new program, as under the previous program, the Company may repurchase outstanding shares of the Company's common stock from time to time through accelerated share repurchases, privately negotiated transactions, or open market transactions, including under plans complying with Rule 10b5-1 under the Securities Exchange Act of 1934. The new program has no expiration date but may be terminated by the Board at any time. Since 2014, Ulta Beauty has returned \$2.2 billion to shareholders through its share repurchase program, while continuing to make strategic growth investments.

*ULTA's announcement of adjusted re-purchase program for 2020.*

Now, something interesting happened to ULTA stock today March 20th. The stock opened up about +8% and remained there for most of the day. Until the final 10 minutes of trading hours it was sitting at +10% for the day. At 3:54pm there was a huge sell-off. Look at the volume of the sell-off compared to the volume for the entire day. Long red candles that were held up with some big buying power just to keep it afloat. What are my thoughts on this? It is my opinion that a big fish sold off a significant position of the stock, which was then propped up by market makers to keep the stock afloat. It ended up closing up only 0.71% for the day. Please note this is only speculation and my opinion.



*ULTA's daily chart from today Mar 20, 2020.*

**Disclaimer:** I have a short position on the stock.

Summary

1. ULTA has fairly strong balance sheet (with not much debt) sitting at \$208 million cash or roughly 2.47% of the value of their market cap.
2. ULTA has strong brand loyalty, including Kylie Jenner's line of cosmetics.
3. However, if recession is looming cosmetics generally don't fare well during these times.

4. In 2019 they spent nearly all their free cash flow after running operations and expansions on the re-purchase of stock.
5. In 2019 they did \$660 million worth of share re-purchases and logged \$594 million revenue for the year.
6. In 2020 they announced they've increased the buy-back program from \$875 million to \$1.6 billion, an increase of \$725 million.
7. In their March 2020 conference call they also stated that their current numbers have NOT taken any of the CoronaVirus factors into effect.
8. In 2008 their stock crashed nearly 70% from peak to trough.
9. Currently in 2020 during corona virus outbreak, they have had a 50% decline in stock price.

TLDR; they literally spent most of their money on share buy-backs last year when the stock was at ATH and this thing still has room to drop.

DISCLAIMER: NOT FINANCIAL ADVICE. MODS R GAY

[106 Comments](#)

**Report**

95% Upvoted

## Appendix B: Variable Definitions

### B.1 Outcome Variables

- *WSB Reports* (Table 2) – the total number of Wallstreetbets (*WSB*) due diligence (DD) reports written for a firm during the calendar month. (Source: *WSB*).
  - *Buy (Sell) Reports* - the total number of *WSB* due diligence (DD) reports that recommend buying (selling) the firm during the calendar month.
- *Ret [0,X]* (Tables 3 and 4) – the buy and hold abnormal return for the DD report recommendation starting on day [0] and ending on day [X]. . For reports issued outside of trading hours, the day 0 return is the CRSP return for the trading day following the recommendation. For reports issued during trading hours, we obtain the prevailing midpoint quote from TAQ for the stock at the time the report is published on *WSB*, and we calculate the day 0 return from the quoted midpoint to the closing price. We measure the cumulative returns from day 0 through day x. (Source: CRSP and TAQ).
  - *Market-Adjusted Returns* – *Ret [0,X]* less the return on the CRSP value-weighted market portfolio over the same holding period.
  - *DGTW-Adjusted Returns* – *Ret [0,X]* less the equally-weighted return on a portfolio matched on size, book-to-market, and momentum over the same holding period. See Daniel, Grinblatt, Titman, and Wermers (1997) for a more detailed discussion of the construction of the DGTW benchmark portfolio.
- *Retail Trading* (Table 5) – the total number of retail trades over a 30-minute window. Retail Trading is estimated using the approach outlined in Boehmer et al. (2019). (Source: TAQ).
- *Retail\_OIB* (Table 6) – retail buy trades less retail sell trades, scaled by total retail trades (Source: TAQ).

### B.2 Other Variable

- *Size* – the market capitalization computed as share prices times total shares outstanding at the end of the year. (Source: CRSP).
- *Book-to-Market (BM)* – the book-to-market ratio computed as the book value of equity during the calendar year scaled by the market capitalization at the end of the calendar year. Negative values are deleted, and positive values are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentile. (Source: CRSP/Compustat).
- *Volatility* – the standard deviation of daily returns during the month (Source: CRSP).
- *Turnover* – the average daily turnover (i.e., share volume scaled by shares outstanding) during the month.
- *Profitability* – EBITDA scaled by book value of assets. (Source: Compustat).
- *Negative Prof* – an indicator equal to one if *Profitability* is negative, and zero otherwise.
- *Return (d-1)* – the buy-and-hold return over the previous day. (Source: CRSP).
- *Return (m-1)* – the buy-and-hold return over the previous month. (Source: CRSP).
- *Return (m-2, m-12)* – the buy-and-hold return over the previous two to twelve months. (Source: CRSP).

- *Institutional Ownership* – the percentage of the firm’s shares held by institutions at year end. (Source: Thomson Reuters Institutional Holdings S34).
- *Breadth of Ownership* – the total number of common shareholders (Source: Compustat).
- *IBES Coverage* – the number of unique brokerage houses issuing earnings forecast for a firm during the calendar year. (Source: IBES).
- *Media Coverage* – the total number of media articles about a firm during the calendar year. (Source: Bloomberg).
- *Buy* – an indicator equal to one if the DD report recommends a buy recommendation and zero if the report recommends a sell recommendation (Source: *WSB*).
- *Ret5* - the DGTW-adjusted returns measured over the [1,5] period following the DD report. [Source: CRSP].
- *Intraday Report* – an indicator equal to one if the report is issued between 9:30 am and 4:00 pm during a trade day, and zero otherwise.
- *Confounded Post* – an indicator equal to one if the report is issued around a confounding information event, defined as an earnings announcement, I/B/E/S research report, abnormal media coverage, or a DD report by a different user, over the [-1,0] window, where day 0 is the day of the DD report. Details of each confounding event are below:
  - *Earning Report* – a quarterly or annual earnings announcement (Source: I/B/E/S).
  - *I/B/E/S Report* – an earnings forecast or investment recommendation by a sell-side analyst. (Source: I/B/E/S).
  - *Abnormal Media Coverage* – an indicator equal to one if *Bloomberg’s* daily media score is greater than zero. Bloomberg records the number of news articles released for a stock over the hour and then creates a number score each hour by comparing past 8-hour average count to all hourly counts over the previous 30 days for the same stock. A value of 0 indicates that the media coverage is in the lowest 80% of the hour counts relative to the previous 30 days. Similarly, Bloomberg assigns a score of 1, 2, 3, or 4 if the average is the value is in the 80% to 90%, 90% and 94%, 94 and 96%, or greater than the 96%. Bloomberg creates a daily score by taking the maximum of these hourly scores. (Source: Bloomberg).

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**Table 1: Descriptive Statistics**

This table reports summary statistics on the sample of Due Diligence (DD) reports on Reddit's Wallstreetbets (*WSB*). DD reports are reports identified by the poster (and verified by the moderator) as containing some of analysis and offering a clear buy or sell signal. We report the number of DD reports for our full sample (2018-2020) and each year in our sample. We also report the number of unique firms covered by the DD report (*Firms*), the number of DD reports recommending a buy or sell recommendation, and the average number of words in the report (*Report Length*). We limit the sample to DD reports that focus on a single common stock ticker. Panel A tabulates the results for all DD reports the results for the full sample. Panel B limits the sample to *Non-Confounded* reports which exclude any reports that have a confounding information event, defined as an earnings announcement, I/B/E/S research report, abnormal media coverage, or a DD report by a different user, over the [-1,0] window, where day 0 is the day of the DD report. Panel C limits the sample to *Intraday* reports defined as any DD report issued on a trading day between 9:30 am and 4:00 pm.

**Panel A: Full Sample**

	<i>DD Report</i>	<i>Firms</i>	<i>Buys</i>	<i>Sells</i>	<i>Report Length</i>
2018	203	113	159	44	247
2019	403	165	308	95	335
2020	1734	506	1419	315	369
Full Sample	2340	612	1886	454	352

**Panel B: Non-Confounded Sample**

	<i>DD Report</i>	<i>Firms</i>	<i>Buys</i>	<i>Sells</i>	<i>Report Length</i>
2018	49	33	39	10	281
2019	66	57	51	15	386
2020	463	225	382	81	421
Full Sample	578	281	472	106	404

**Panel C: Intraday Sample**

	<i>DD Report</i>	<i>Firms</i>	<i>Buys</i>	<i>Sells</i>	<i>Report Length</i>
2018	77	63	63	14	189
2019	156	81	119	37	260
2020	636	291	523	113	308
Full Sample	869	363	705	164	289

**Table 2: Determinants of WSB Coverage**

This table presents the results from a regression of *WSB* coverage on firm characteristics. In Specification 1, the dependent variable is total *WSB* coverage defined as  $\text{Log}(1 + \text{Total DD Reports})$  for firm  $i$  during month  $m$ . Specifications 2 and 3 replace *Total DD Reports* with DD reports recommending a buy recommendation (*Buy DD Reports*) and DD reports recommending a sell recommendation (*Sell DD Reports*). Specification 4 reports the difference in the number of buy versus sell DD reports defined as  $\text{Log}(1 + \text{Buy DD Reports}) - \text{Log}(1 + \text{Sell DD Reports})$ . The independent variables include the following firm characteristics: the percentage of the firm's shares held by institutional investors at the end of the prior year (*Inst. Ownership*), the number of common shareholders (*Breadth of Ownership*), market capitalization (*Size*), book to market (*BM*), return volatility (*Volatility*), share turnover (*Turnover*), past one-month returns ( $\text{Return}_{m-1}$ ), past returns over the prior two to twelve months ( $\text{Ret}_{m-2, m-12}$ ), past one-year profitability (*Profitability*), an indicator equal to one if past one-year profitability was negative (*Negative Prof*), the number of unique media articles mentioning the firm the prior year (*Media Coverage*), and the number of sell-side analysts issuing a forecast for the firm in the prior year (*IBES Coverage*). All independent variables are standardized to have mean zero and unit variance. All specifications also include month fixed effects. Standard errors are clustered by firm and month, with  $t$ -statistics reported in parentheses.

	Total DD Reports	Buy DD Reports	Sell DD Reports	Buy - Sell
	[1]	[2]	[3]	[4]
<i>Log (Inst Ownership)</i>	-0.49 (-4.26)	-0.38 (-4.04)	-0.14 (-3.48)	-0.25 (-3.55)
<i>Log (Breadth of Ownership)</i>	0.13 (1.27)	0.09 (1.08)	0.04 (0.86)	0.05 (0.74)
<i>Log (Size)</i>	1.40 (4.19)	1.13 (4.09)	0.43 (3.39)	0.70 (3.55)
<i>Log (BM)</i>	-0.06 (-0.71)	-0.03 (-0.39)	-0.04 (-0.96)	0.01 (0.13)
<i>Log (Vol)</i>	0.50 (4.04)	0.38 (3.69)	0.16 (3.44)	0.22 (2.69)
<i>Log (Turn)</i>	0.44 (3.21)	0.35 (3.28)	0.11 (2.15)	0.24 (3.14)
<i>Return (m-1)</i>	0.01 (0.27)	0.01 (0.19)	0.01 (0.63)	0.00 (-0.09)
<i>Return (m-2, m-12)</i>	0.15 (1.21)	0.15 (1.41)	-0.01 (-0.23)	0.16 (1.80)
<i>Profitability</i>	0.10 (1.39)	0.03 (0.52)	0.06 (2.21)	-0.03 (-0.47)
<i>Negative Prof</i>	0.47 (2.39)	0.42 (2.33)	0.10 (2.02)	0.32 (2.20)
<i>Log (Media Coverage)</i>	-0.19 (-1.25)	-0.14 (-1.19)	-0.10 (-1.35)	-0.04 (-0.57)
<i>Log (IBES Coverage)</i>	0.18 (1.85)	0.15 (1.92)	0.03 (1.04)	0.12 (1.98)
Obs. (Firm-Months)	102,593	102,593	102,593	102,593
Fixed Effects	Month	Month	Month	Month
R-square	3.15%	2.65%	1.27%	1.34%

**Table 3: Event-Time Returns around DD Report Recommendations**

This table reports the buy-and-hold abnormal returns for different horizons following DD report recommendations. We measure returns starting from the day of DD report (i.e., day 0). For reports issued outside of trading hours, the day 0 return is the CRSP return for the trading day following the recommendation. For reports issued during trading hours, we obtain the prevailing midpoint quote from TAQ for the stock at the time the report is published on *WSB*, and we calculate the day 0 return from the quoted midpoint to the closing price. We measure the cumulative returns from day 0 through day  $x$ , where we set  $x$  equal to either zero, one, five, or 21 trading days. We also consider a holding period that skips the first two trading days and holds until day 21 [2,21]. We report the returns on the firm in the DD report less the returns on either the CRSP value-weighted market portfolio (*Market-Adjusted Returns*) or a portfolio matched on size, book-to-market, and momentum (*DGTW-Adjusted Returns*). Panels A and B report the results for buy and sell recommendations, respectively. Panel C tests whether the returns from buy and sell recommendations are significantly different from each other. Standard errors are clustered by firm and date, with  $t$ -statistics reported in parentheses.

<b>Panel A: Buy Recommendations</b>						
	Obs.	[0]	[0,1]	[0,5]	[0,21]	[2,21]
Market-Adjusted Returns	1878	0.91 (3.91)	1.20 (3.54)	1.76 (3.17)	3.92 (3.57)	2.78 (2.74)
DGTW-Adjusted Returns	1878	0.86 (3.94)	1.12 (3.65)	1.45 (2.95)	3.17 (3.34)	2.13 (2.39)
<b>Panel B: Sell Recommendations</b>						
	Obs.	[0]	[0,1]	[0,5]	[0,21]	[2,21]
Market-Adjusted Returns	454	-0.07 (-0.18)	0.32 (0.43)	-0.90 (-0.80)	-0.55 (-0.34)	-0.29 (-0.18)
DGTW-Adjusted Returns	454	-0.15 (-0.39)	0.08 (0.12)	-1.14 (-1.12)	-1.42 (-0.95)	-0.94 (-0.60)
<b>Panel C: Buy - Sell Recommendations</b>						
	Obs.	[0]	[0,1]	[0,5]	[0,21]	[2,21]
Market-Adjusted Returns	2332	0.98 (2.25)	0.88 (1.26)	2.66 (2.20)	4.47 (2.69)	3.07 (1.88)
DGTW-Adjusted Returns	2332	1.01 (2.47)	1.04 (1.63)	2.59 (2.34)	4.59 (2.96)	3.07 (1.97)

**Table 4: Event-Time Returns around DD Post Recommendations and Confounding Information Events**

This table repeats the analysis in Table 3 after partitioning all DD reports into *Confounded* and *Non-Confounded* reports. *Confounding* reports are DD reports that are issued around a confounding information event, defined as an earnings announcement, I/B/E/S research report, abnormal media coverage, or a DD report by a different user, over the [-1,0] window, where day 0 is the day of the DD report. All other reports are classified as *Non-Confounded*. We report the buy-and-hold returns following the DD report less the returns to a portfolio matched on size, book-to-market, and momentum (*DGTW-Adjusted Returns*). Panels A and B report the results for buy and sell recommendations, respectively. Standard errors are clustered by firm and date, with t-statistics reported in parentheses

<b>Panel A: Buy Recommendations</b>						
	Obs.	[0]	[0,1]	[0,5]	[0,21]	[2,21]
<i>Confounded</i>	1410	0.66 (3.37)	0.93 (2.88)	1.29 (2.70)	3.11 (2.99)	2.25 (2.23)
<i>Non-Confounded</i>	468	1.43 (2.74)	1.70 (2.74)	1.92 (1.85)	3.36 (2.35)	1.75 (1.33)
<i>Confound - Non-Confound</i>	1878	-0.76 (-1.46)	-0.78 (-1.17)	-0.67 (-0.61)	-0.26 (-0.17)	0.50 (0.34)
<b>Panel B: Sell Recommendations</b>						
	Obs.	[0]	[0,1]	[0,5]	[0,21]	[2,21]
<i>Confounded</i>	348	-0.27 (-0.99)	-0.70 (-1.97)	-1.45 (-1.33)	-1.10 (-0.76)	-0.26 (-0.18)
<i>Non-Confounded</i>	106	0.25 (0.18)	2.67 (1.06)	-0.07 (-0.04)	-2.50 (-0.97)	-3.18 (-0.95)
<i>Confound - Non-Confound</i>	454	-0.52 (-0.36)	-3.37 (-1.33)	-1.38 (-0.70)	1.40 (0.58)	2.91 (0.89)

**Table 5: WSB Reports and the Intensity of Retail Trading**

This table presents results from the estimation of Equation (3):

$$Retail\_Trades_{i,t} = \beta_1 Post_{i,t} + \beta_2 Ret_{i,t-1} + Report_i + HalfHour_t + \varepsilon_{i,t}.$$

*Retail Trades* is the total number of retail trades in half-hour window  $t$  around the publication of DD report  $i$ . Trades are classified as retail using the approach of Boehmer, Jones, Zhang, and Zhang (2020). *Post* is equal to one for trading in the post-event period and zero for trading in pre-event period and  $Ret_{i,t-1}$  is the DGTW-adjusted return on the previous trading day. *Report* denotes WSB Report fixed effects and *Half Hour* denotes half-hour fixed effects. In Specification 1 the sample includes all DD reports and the event period includes the trading prior to the report through the first trading day after the report [-1,0]. Specification 2 repeats Specification 1 after limiting the sample to *Non-Confounded* reports (as defined in Table 1). Specification 3 limits the sample to *Intraday* reports (as defined in Table 1) and shrinks the event window to the day of the report [0]. Standard errors are clustered by firm and date, and  $t$ -statistics are reported below each estimate.

	[1]	[2]	[3]
<i>Post</i>	0.12 (6.23)	0.07 (2.05)	0.07 (3.01)
<i>Ret (-1)</i>	-0.01 (-0.04)	0.06 (0.19)	
Obs. (Firm-Half Hours)	57,910	14,202	9,408
Reports	2,308	564	858
Report Fixed Effects	Yes	Yes	Yes
HH Fixed Effects	Yes	Yes	Yes
R-squared	89.77%	87.85%	93.85%
Event Window	[-1,0]	[-1,0]	[0,0]
Sample	All	Non-Confounded	Intraday

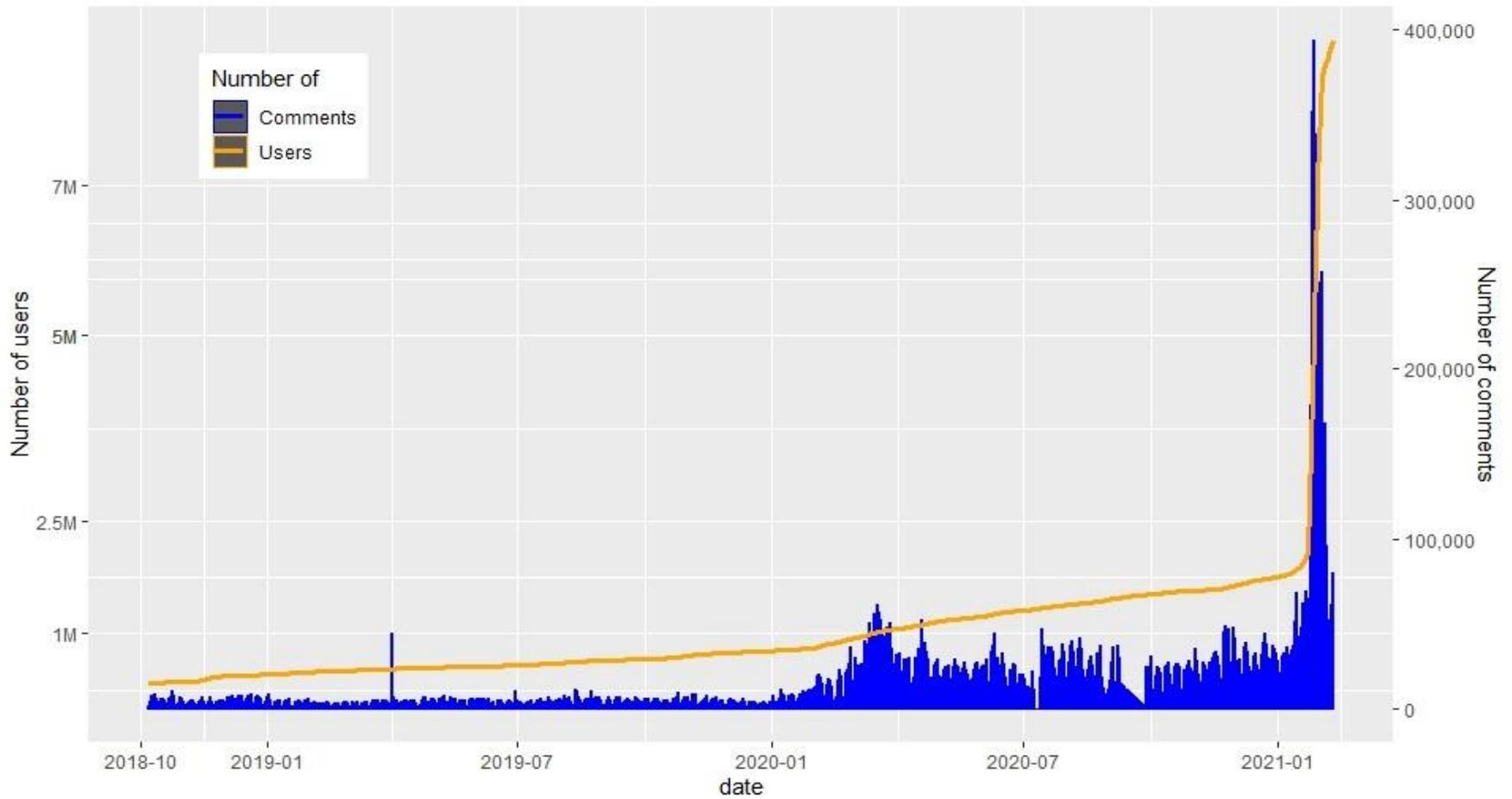
**Table 6: WSB Reports and the Informativeness of Retail Trading**

This table presents results from the estimation of Equation (4):

$$Retail\_OIB_{i,t} = \alpha + \beta_1 Post_{i,t} + \beta_2 Post_{i,t} \times Buy_{it} + \beta_3 Post_{i,t} \times Ret5_{i,t} + Ret_{i,t-1} + Report_i + HalfHour_t + \varepsilon_{i,t}.$$

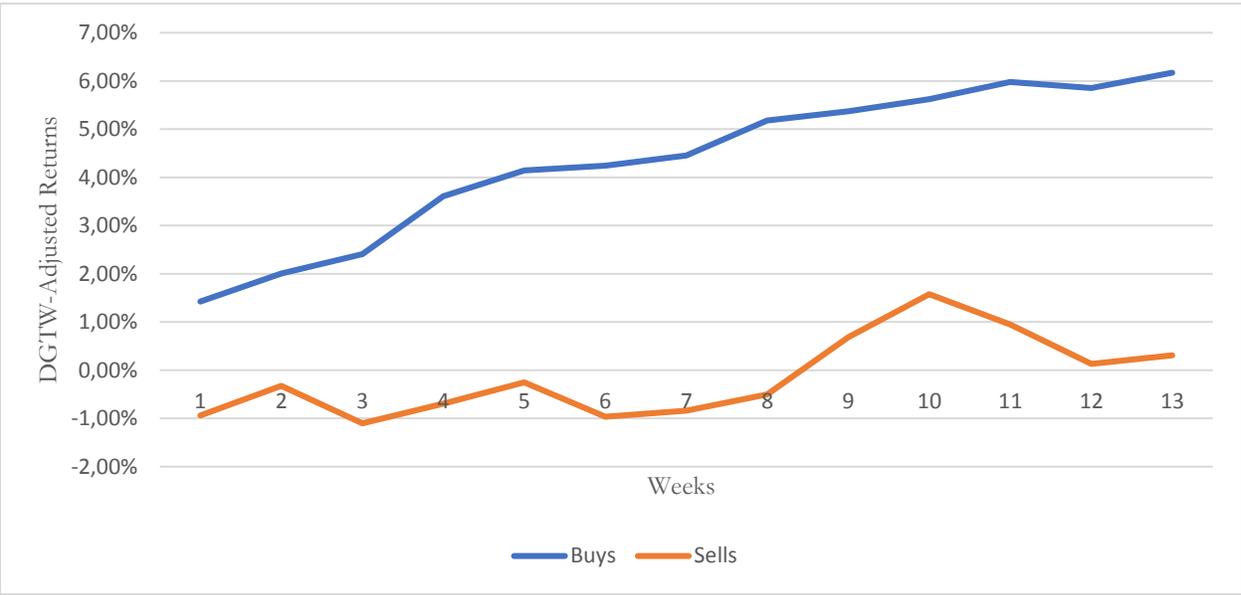
*Retail OIB* is the retail order imbalance for firm *i* during half-hour *t*, defined as the difference between the number of retail purchases less the number of retail sales scaled by the total number of retail trades. Retail purchases and sales are classified as in Boehmer, Jones, Zhang, and Zhang (2020). *Post* is equal to one for trading that occurs after the DD report is issued and zero for trading that occurs before the report is issued, and *Ret<sub>it-1</sub>* is the DGTW-adjusted return on the previous trading day. *Buy* is an indicator equal to one if the DD report is a buy recommendation and 0 if the DD report is a sell recommendation. *Ret5* is the five-day DGTW-adjusted return following the DD report, measured over days [1,5]. In Specification 1 the sample includes all DD reports and the event period includes the trading prior to the report through the first trading day after the report [-1,0]. Specification 2 repeats Specification 1 after limiting the sample to *Non-Confounded* reports (as defined in Table 1). Specification 3 limits the sample to *Intraday* reports (as defined in Table 1) and shrinks the event window to the day of the report [0]. Standard errors are clustered by firm and date, and *t*-statistics are reported below each estimate.

	[1]	[2]	[3]
<i>Post</i>	0.03 (0.06)	0.65 (0.55)	-2.85 (-2.28)
<i>Post</i> × <i>Purchase</i>	-0.43 (-0.73)	-1.87 (-1.30)	2.51 (1.87)
<i>Post</i> × <i>Ret5</i>	4.54 (2.07)	5.70 (1.80)	9.90 (2.06)
<i>Ret (-1)</i>	-0.67 (-0.33)	-0.95 (-0.34)	
Obs. (Firm-Half Hours)	57,833	14,176	9,408
DD Reports	2,305	563	858
Report Fixed Effects	Yes	Yes	Yes
HH Fixed Effects	Yes	Yes	Yes
R-squared	27.96%	24.50%	38.64%
Event Window	[-1,0]	[-1,0]	[0,0]
Sample	All	Non-Confounding	Intraday



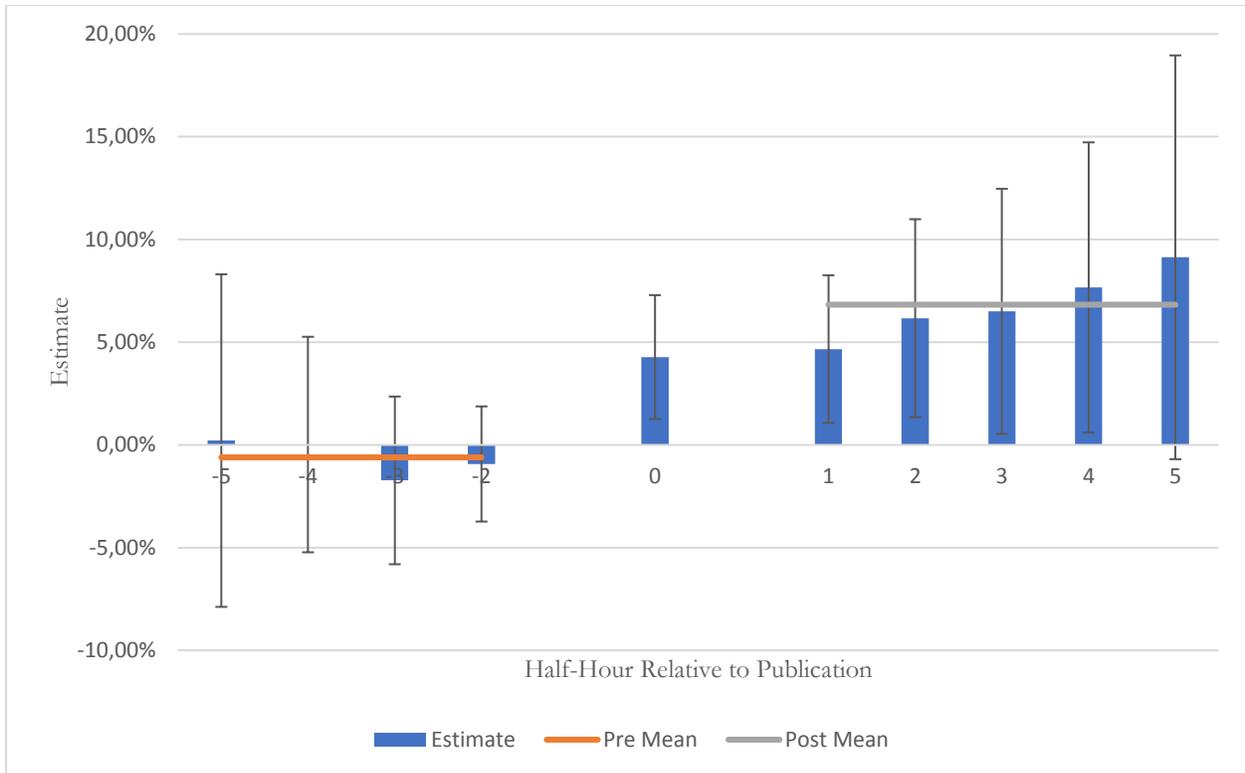
**Figure 1: Growth in Reddit's Wallstreetbets (*WSB*)**

This figure plots the total number of users (orange line) and total number of daily comments (blue bars) on *WSB* from October 2018 through January 2021. This data can be found at <https://subredditstats.com/r/wallstreetbets>.



**Figure 2: Event-Time Abnormal Returns around *WSB* DD Reports**

This table reports the buy-and-hold abnormal returns for following DD report recommendations. We measure returns starting from the day of DD report (i.e., day 0). For reports issued outside of trading hours, the day 0 return is the CRSP return for the trading day following the recommendation. For reports issued during trading hours, we obtain the prevailing midpoint quote from TAQ for the stock at the time the post is published on *WSB*, and we calculate the day 0 return from the quoted midpoint to the closing price. We measure the buy-and-hold returns following the DD report less the returns to a portfolio matched on size, book-to-market, and momentum (*DGTW-Adjusted Returns*) from day 0 through day  $x$ , where we set  $x$  equal to 5 days (Week 1), 10 days (Week 2), through 65 days (Week 13).



**Figure 3. WSB DD Reports and the Intensity of Retail Investor Trading: Event Time**

This figure plots estimates from Specification (3) of Table 5 after replacing the single *Post* indicator with ten indicators marking off event windows [-5] through [5], excluding period [-1] which is the omitted (or benchmark) period. We report the coefficients on these variables as blue bars, and their 90% confidence intervals, based on standard errors clustered by firm and day, as error bars. The average of the pre-event and post-event coefficient estimates appear as orange and grey horizontal lines.