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Does the media help or hurt retail investors during the IPO quiet period?☆

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ABSTRACT

We examine how the media influences retail trade and market returns during the "quiet period" that follows a firm's IPO. We find that more media coverage during this period is associated with more purchases by retail investors and that such purchases are attention-driven, rather than information-based. Further, these retail trades are negatively associated with stock returns at the firm's first earnings announcement post-IPO. Our results suggest that media coverage, combined with market frictions that limit price efficiency in the post-IPO period, leads to worse investing outcomes for retail investors.

1. Introduction

We investigate how media coverage relates to retail investor trade and stock price reactions to news in the period immediately following a firm's initial public offering (IPO). As part of its mission of protecting investors and maintaining efficient markets, the Securities and Exchange Commission (SEC) requires that firms make their IPO prospectus the primary source of information related to a new security offering. By restricting firms from separately disseminating additional information, the SEC seeks to prevent unequal access to information and to reduce the likelihood that promotional disclosure influences investors. However, while the SEC can restrict a firm's communications, the media operates outside the purview of SEC control. How the media influences retail investor trading following an IPO is unclear. Prior literature finds that the media

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enhances a firm's information environment by disseminating information more broadly (e.g., Bushee et al., 2010; Engelberg and Parsons, 2011). Thus, the media can potentially aid retail investors by providing information on companies with limited operating histories and a limited ability to communicate after the IPO. Alternatively, media coverage could potentially harm retail investors in exactly the ways the SEC seeks to prevent by encouraging investors to purchase newly issued securities based on heightened attention, without fully considering the balanced and comprehensive information of the prospectus.

Securities regulations and underwriter agreements effectively restrict a firm's ability to communicate with investors for 25 days following an IPO. Colloquially, this time-period is known as the post-IPO "quiet period." Security analysts are also limited in their ability to issue research reports during this time due to prospectus delivery requirements and Financial Industry Regulatory Authority (FINRA) rules. The goal of these restrictions is to make the statutory prospectus the primary source of information related to the offering and to ensure that all investors have access to essentially the same information. Despite these restrictions, three factors likely put retail investors at risk in the post-IPO period: (1) an IPO firm's limited operating history and less developed information environment may increase the costs of integrating fundamental information into an assessment of firm value; (2) the highly-visible IPO event could attract retail traders who are more susceptible to attention-induced trade; and (3) market frictions in the immediate post-IPO period—such as costly short-selling (Geczy et al., 2002), underwriter price support (Aggarwal, 2000), and lock-up agreements (Bradley et al., 2001)—make any correction of mispricing by sophisticated investors more difficult.

In the post-IPO period, media coverage could help retail investors overcome these issues through an "information effect." Retail investors may find the comprehensive, but complex, information of the prospectus costly to process. These investors would benefit if the media disseminates information in a more clear and concise way (Drake et al., 2014). Further, retail investors who trade based on fundamental information would avoid the post-IPO period if they anticipate higher trading costs during this time, such as higher information asymmetries (Boehmer et al., 2006) and a comparative disadvantage in processing public information (Field and Lowry, 2009). However, if media coverage effectively substitutes for the lack of firm and analyst disclosures, it would encourage these retail investors to participate in the immediate post-IPO market. Such trading by more sophisticated retail investors could improve price efficiency, especially given the arbitrage constraints faced by institutional investors.

Alternatively, media coverage could create an "attention effect" by exacerbating these factors and harming retail investors during the post-IPO quiet period, even though the media may be providing useful information during this time. Prior work shows that, in general, retail traders are susceptible to attention-induced trade (Barber and Odean, 2008; Blankespoor et al., 2019). Given the attention created by the IPO, the post-IPO period could attract a higher percentage of attention-prone retail traders than usual. These traders would be more likely to react to the visibility provided by media articles, as opposed to their information content. Moreover, Bushee and Friedman (2016) argue that investors who are susceptible to uninformative signals are more likely to react to these signals when fundamental information is less precise. If media information is less precise than firm press releases or analyst reports, then such investors would put more weight on the attention generated by media coverage, rather than the information content. In addition, any bias in the media's coverage decisions could result in retail investors only receiving a subset of relevant information if these investors fail to adequately consider the information in the IPO firms' prospectuses. These problems could be exacerbated for IPO firms because of their limited operating histories and less developed information environments. Normally, any mispricing created by attention-based trade would be corrected by sophisticated investors. However, arbitrage constraints in the immediate post-IPO period increase the likelihood that retail trade influences price. The confluence of these factors raises the possibility that media coverage prompts unprofitable attention-based trade by retail investors.

We examine the role of the media in the IPO quiet period using a sample of 982 IPOs between 2007 and 2016. We use intraday TAQ data to identify retail investor trades using the Boehmer et al. (2017) method. This approach is preferable to using small trade sizes (e.g., less than $5000) given the increasing tendency of sophisticated investors to split up trades (Cready et al., 2014). We measure media coverage using RavenPack, which allows us to classify news media articles based on sentiment (i.e., positive vs. negative).

First, we test whether media coverage is associated with retail investor trades in post-IPO firms during the quiet period. Given that retail traders receive a relatively small allocation in the IPO, media coverage likely triggers retail purchases as opposed to sales (e.g. Lee, 1992; Aggarwal et al., 2002). Consistent with this, we find that media coverage is positively associated with retail investor purchases. Next, we examine whether this finding reflects the information effect of the media or the attention effect. The attention effect predicts that any visibility prompts retail purchasing, whereas the information effect predicts that only positive sentiment news increases retail purchasing. Consistent with an attention effect, we find that both positive and negative sentiment news is significantly associated with retail investor purchases immediately after the IPO. Thus, media coverage during the quiet period appears to serve as an attention-grabbing mechanism that triggers greater retail purchases regardless of the nature of the news.

Next, we examine how retail trade relates to abnormal stock returns at a firm's first earnings announcement post-IPO. If retail investor purchases in advance of the initial earnings announcement reflect attention-driven trade, this coordinated retail trade could exert upward pressure on prices (Barber and Odean, 2008; Da et al., 2011), which must then reverse at some future information event. Consistent with this interpretation, we find a negative association between retail purchases and stock returns at the first earnings announcement. Further, we find that this relation is strongest when media coverage is high. Taken together, the evidence suggests that media coverage of a firm drives retail investor buying, which in turn pushes up the

price of the stock. At the earnings announcement, more precise information related to firm performance is revealed and the stock price adjusts to reflect fundamental value.

We also examine whether the effect of media coverage on retail trade is stronger during the IPO quiet period than during other time windows. First, we compare each firm's immediate post-IPO period to the equivalent period one year later. We find that the association between news coverage and retail trade is significantly weaker one year later relative to the quiet period. Moreover, while the association between retail trade and earnings announcement returns one year later is not significantly different from that in the IPO period, this association is also not significantly different from zero. Next, we compare our IPO sample to a sample of firms undergoing a seasoned equity offering (SEO). While we do not find that the association between news coverage and retail trade is significantly weaker, the association between retail trade and earnings announcement returns is significantly weaker and is again not significantly different from zero. Overall, these results suggest that the post-IPO quiet period exacerbates the association between news coverage and retail trade, consistent with media coverage assuming a more prominent role during the quiet period due to the lack of alternative information sources. This attention-driven trade appears to be particularly detrimental to retail traders during this time window due to lower price efficiency.

While we interpret the positive association between media coverage and retail purchases as evidence that retail investors respond to the presence of increased media coverage, an alternative explanation is that both the media and retail investors respond to the same underlying economic events. Relatedly, retail trade may respond to movements in the firm's stock price, and media coverage may respond to this increase in retail investor interest. To address these alternative explanations, we control for prior stock returns in our main analyses to reduce the likelihood that the returns themselves, as opposed to media coverage, drive retail trade. We also examine retail trade at the intraday level. We find that retail trade in the post-IPO quiet period is more pronounced in the trading hours *following* a news release. However, we find no evidence in this period that retail trade increases in the hours *preceding* a news release. These findings are consistent with our interpretation that media coverage prompts retail trade, rather than vice versa. However, we acknowledge that the media's decision to cover a firm is nonrandom and may be driven by factors we cannot observe or measure, and these factors may similarly influence retail investors trading decisions. Thus, the associations we document should be interpreted with caution and in context of the larger literature examining the effect of the media on investment (e.g. Engelberg and Parsons, 2011; Lawrence et al., 2018).

These caveats notwithstanding, our results suggest that media coverage of an IPO firm during the quiet period can result in worse investing outcomes for retail traders. This finding is consistent with the SEC's concern that information outside the prospectus may inappropriately influence retail traders' investment decisions. However, it is important to highlight that we study the effect of the media, which is outside the control of the SEC. If the SEC allowed firms to make additional disclosures during this time period, these disclosures might offset the media's influence by offering an alternative viewpoint or clarifying points of contention, or they could result in even more attention-driven trade based on firms inappropriately promoting their securities. While we cannot comment directly on whether changing the quiet-period restrictions would protect or harm investors, our results suggest that the SEC's current post-IPO quiet-period restrictions are not fully achieving their goal of investor protection.

By offering insights into how retail traders react to increased media coverage in the post-IPO setting, we also contribute to the literature on the costs and benefits of securities regulation over firm disclosure. While an expansive literature focuses on the benefits of more transparent firm disclosures, other work documents that high compliance costs discourage some firms from accessing capital markets (e.g. Bushee and Leuz, 2005; Engel et al., 2007; Leuz et al., 2008). Our findings contribute to this literature by documenting a potential cost of restricting firm and analyst disclosure; namely, increased attention-driven retail trade that is negatively associated with future returns. While this is not a cost borne by the firm, it is a cost from the perspective of a regulator whose mission includes investor protection. Our study also highlights the prominent role that market frictions (like those typified in the IPO aftermarket) play in a setting where information is partly restricted by SEC regulation. Media coverage during a period when market frictions limit price efficiency—combined with a less developed information environment—leaves retail investors worse off and underscores the importance of efficient markets in protecting retail traders.

2. Institutional background

The SEC has a three-part mission of protecting investors; maintaining fair, orderly, and efficient markets; and facilitating capital formation. To meet these goals, the SEC requires most securities sold in the United States to be registered, with firms publicly disclosing information related to their business and financial position in a prospectus prior to offering a security for sale and in periodic reports on an ongoing basis thereafter. Such disclosure requirements reduce the gap between informed and uninformed traders, with the goal of protecting otherwise uninformed traders and increasing investor participation in financial markets (e.g. Healy and Palepu, 2001). Around a firm's IPO, the SEC limits a firm's communications with market participants by restricting firms from disseminating information outside of the prospectus. Colloquially, this time period is referred to as the "quiet period." During this period, the SEC seeks to prevent unequal access to information and to reduce the likelihood that investors are influenced by material that is more promotional in nature. However, the SEC specifically provides safe harbor for firms to continue releasing factual business information, which results in some firm press releases during the quiet period.

Restrictions on firm communications begin when the firm decides to undergo an IPO (see Fig. 1 for a timeline). As some uncertainty exists regarding the exactness of this date, the SEC offers safe harbor for certain communications made more than

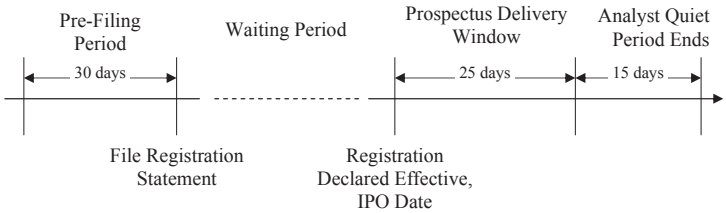

Fig. 1. Timeline of IPO Quiet Periods. This figure summarizes windows of restricted disclosure related to a firm's IPO. The beginning of the pre-filing period is indeterminately defined as the point in time a company decides to make a public offering. However, issuers have safe harbor for statements made more than 30 days prior to filing a registration statement. As discussed in the text, the length of the quiet period related to analysts varies over time but ends 40 days after the IPO for much of our sample.

30 days prior to filing a registration statement (Rule 163A). Once a firm files a registration statement, the firm can make written offers to sell securities only through a conforming prospectus.[1] This time period, which ends when the registration statement is declared effective, is sometimes referred to as the "waiting period." Note that an "offer" to sell securities is very broadly defined as "every attempt or offer to dispose of, or solicitation of an offer to buy, a security or interest in a security, for value".[2] Written offers are also somewhat broadly defined, as most electronic communications, including radio and TV, are interpreted as "written." These restrictions effectively limit firms from making additional disclosure outside of the regulatory prospectus.

While these restrictions lapse for the firm once the offering is complete, underwriters have an obligation to deliver a current prospectus with all shares for 25 days after the offering (the "prospectus delivery window" or "post-effective period"), even in conjunction with secondary market sales.[3] Firms generally refrain from (and underwriting agreements restrict) the disclosure of information that would cause the prospectus to be misleading or incomplete during this 25-day window following the IPO. If a firm does make a disclosure which compels the firm to update the prospectus, this material will be subject to liability under Section 12(a)(2) [a liability for negligence], as opposed to the lesser liability under the higher standard of Rule 10b-5 [a liability for fraud]. A desire to avoid this greater liability further suppresses disclosure. Together, these regulations effectively restrict firm disclosure for 25 calendar days after an IPO.

The SEC has somewhat liberalized these rules with the 2005 Securities Offering Reform.[4] In particular, firms can now use a "free writing prospectus" after filing a registration statement to release information that would have previously constituted an illegal prospectus. In practice, firms rarely use free-writing prospectuses post-IPO. This is likely because the free-writing prospectus creates a higher level of liability under Section 12(a)(2).

Quiet period regulations also limit the ability of security analysts to provide information about the firm. Overseen by the SEC, FINRA rules govern the quiet period as it relates to analyst research reports. In 2002, FINRA passed a rule that an analyst whose firm acted as a manager or co-manager in an offering had to wait 40 days before issuing a research report. Later, this rule was amended to state that, in addition, affiliated analysts whose firm did not act as a manager or co-manager still must wait 25 days after the IPO to issue a research report. In practice, a *de facto* 25 day quiet period already existed for all analysts because of the 25-day prospectus delivery window. As part of the JOBS Act in 2012, the analyst report quiet period was eliminated for emerging growth companies (EGCs). Since September 25, 2015, the post-IPO quiet period for all other firms was reduced to 10 days per FINRA rule 2241. However, due to the prospectus delivery requirements, the effective quiet period is likely to remain at 25 days.

3. Hypothesis development

Prior work finds that the post-IPO period is characterized by greater information asymmetry due to the less developed information environment and shorter operating history of IPO firms. Institutional investors exploit this information asymmetry, with their post-IPO sales of stocks predicting future returns (Boehmer et al., 2006; Chemmanur et al., 2010). Managers of smaller IPO firms attempt to mitigate this information asymmetry through voluntary disclosure (Barth et al., 2017). However, the post-IPO quiet period limits a firm's ability to communicate with investors. Consistent with the quiet period limiting information flow, Cedergren (2017) finds that stock returns reflect greater firm-specific information (i.e., stock return synchronicity) after the quiet period expires for firms that increase firm-initiated press releases after quiet period expiration. During the quiet period, the SEC restrictions on firm and analyst communication make alternative sources of information more important. For example, Liu et al. (2014) find that pre-IPO media coverage is important enough to an IPO firm's

[1] The 2012 JOBS Act allowed EGCs to have oral and written communications with certain institutional investors in order to "test the waters" prior to or after filing a registration statement. However, the ability to communicate with retail investors was unchanged.

[2] https://www.law.cornell.edu/uscode/text/15/77b.

[3] https://www.law.cornell.edu/cfr/text/17/230.174.

[4] Shroff et al., (2013) study seasoned equity offerings and find these reforms increased pre-offering disclosures. Further, their evidence suggests the rules reduced information asymmetry, but not market conditioning behavior, around the offerings.

information environment that it is significantly related to the firm's long-term value, liquidity, analyst coverage, and institutional ownership.

Outside of the IPO setting, prior work finds that the media plays a key role in shaping a firm's information environment. Greater dissemination of information through media coverage is associated with a reduction in information asymmetry and an increase in activity by retail traders (e.g., Bushee et al., 2010; Engelberg and Parsons, 2011; Blankespoor et al., 2018). Media coverage also improves price efficiency with respect to specific information releases, such as cash flow numbers, management guidance, insider trading disclosures, and analyst opinions (Drake et al., 2014; Rees et al., 2015; Twedt, 2016; and Rogers et al., 2016). Overall, these results suggest that media coverage has the potential to improve a firm's information environment and price efficiency in the post-IPO period, which would help retail investors who might otherwise avoid trading due to information asymmetries and high information processing costs.

However, while the media may improve firms' information environments on average, media coverage could induce attention-based trade in the post-IPO period. Prior literature finds that retail investors are more likely to purchase than sell attention-grabbing stocks (Barber and Odean, 2008), and that retail investors underperform the market to a greater extent when they trade more frequently (Barber and Odean, 2000) or trade around information events such as earnings announcements (Taylor, 2010).[5] Bushee and Friedman (2016) present a model in which some investors are more influenced by non-informative signals, such as attention, and the degree of this influence depends on the relative precision of available informative signals. Empirically, they find that traders are more influenced by weather-induced mood when the precision of fundamental information (measured using the quality of a country's disclosure standards) is lower. Thus, to the extent that media coverage provides less precise information than firm press releases or analyst reports, retail investors would put more weight on the attention generated by media coverage, rather than the information content, when faced with the absence of more precise supplemental information in firm and analyst disclosures. Further, the information contained in media articles likely represents incomplete summaries relative to the more complete information contained in a firm's prospectus. Thus, retail investors who trade based on media articles likely remain at an informational disadvantage relative to more sophisticated traders.

Based on this prior work, we first predict that greater media coverage will be associated with greater retail trading during the post-IPO quiet period. Media coverage provides additional information and additional visibility during the quiet period, both of which should increase the likelihood of retail investor trade. Further, we predict that greater media coverage will not affect retail buying and selling equally, but will primarily affect retail purchases. Immediately post-IPO, retail traders are less likely to own shares; thus, media coverage more likely affects purchase decisions, as retail investors are unlikely to take short positions (Barber and Odean, 2008). We also predict the effect of media coverage on retail trading will be most pronounced in the period immediately following the IPO and will diminish thereafter. As the quiet-period restrictions lapse and information sources closer to the firm (i.e., management and affiliated analysts) become available, the media likely contributes less information as a percentage of the total information available for a firm. Further, after the publicity and visibility provided by the IPO, additional media coverage likely brings the firm to the attention of fewer investors for the first time, generating relatively less trade.

Next, we examine whether retail traders react to media coverage because of the information content of the news (the "information effect") or because the news brings a stock to their attention (the "attention effect"). We test these competing predictions by testing how the relation between media coverage and retail investor trade varies with the sentiment of the news. Under the information effect, positive news stories are most likely to trigger purchasing, while negative news stories reduce retail demand for a stock. However, under the attention effect, both positive and negative news stories prompt retail buying because attention-driven trade does not respond to the content of the news article, but rather to the visibility that the news article gives the firm (Lee, 1992; Barber and Odean, 2008).[6]

Finally, we test predictions for how post-IPO retail trade relates to abnormal returns at the firm's first earnings announcement. Prior literature documents that coordinated trade by retail investors can move prices (Barber and Odean, 2008). This effect may be particularly strong in the period immediately after the IPO, as the lead underwriter typically discourages parties who received an initial allocation from "flipping," or immediately selling shares when demand is weak (Aggarwal, 2000). High short-selling costs and restrictions on insider trading in the post-IPO period may also prevent stock prices from more quickly reverting from retail trading-induced price pressure. The ability to short IPO-stocks is typically restricted in the first month of trading and is relatively expensive for those traders who do have the ability to borrow shares

[5] Taking a somewhat different approach, Da et al. (2011) measure retail investor attention using Google search volume and find that higher search volumes are associated with a short-term price run up followed by longer-term reversal. They also find that search volume is associated with a stronger pattern of IPO underpricing, followed by longer-term underperformance.

[6] It is also possible that the media presents a biased view of the firm in its reporting; e.g., reports positive economic news with a negative tilt. This raises the concern that investor purchasing associated with negative news may reflect investors responding to positive economic news that the media reports with a negative bias. However, prior work suggests the RavenPack assigned sentiment reflects the true economic nature of the news (von Beschwitz et al., 2013). Further, we find the sentiment of firm or analyst provided news is highly correlated with media article sentiment; i.e., the correlation in the quiet period between indicator variables for positive sentiment articles is 0.74, and for negative sentiment articles is 0.62. Relatedly, the media may prefer reporting on negative events (Niessner and So, 2018; Call et al., 2018). However, any preference in story selection is unlikely to create an inference problem in our setting, as we examine the effects of media conditional on the coverage decision (i.e. we do not use media as a proxy for the existence of an underlying economic event).

(Geczy et al., 2002). Lock-up restrictions prevent insiders from revealing private information through trade (Bradley et al., 2001) and may also shape the firm's disclosure strategy, with firms limiting the disclosure of bad news (Ertimur et al., 2014).

The relation between retail trades during the quiet period and returns around the first earnings announcement could again reflect an information effect or an attention effect of the media. The information effect would predict that media coverage helps retail traders anticipate and trade on news that will be revealed at the earnings announcement. In this case, retail trade occurring after the IPO but prior to the first earnings announcement would be positively associated with returns at the earnings announcement. The attention effect would predict that media coverage that induces uninformed, attention-driven retail trade would result in coordinated retail purchasing, putting upward pressure on a firm's stock price (Da et al., 2011). Given the arbitrage constraints during the quiet period, such price pressure would create a negative association between post-IPO retail trade and future returns at the first earnings announcement. In this scenario, we anticipate returns will revert at the earnings announcement, as earnings provide a relatively precise signal of firm performance. With a higher quality signal regarding fundamental value now available, attention traders may give less weight to uninformative signals (Bushee and Friedman, 2016). Moreover, the release of additional information could prompt other, more sophisticated investors to increase their trading activity.[7]

4. Sample and data

4.1. Sample selection

We collect IPO data from SDC Platinum, financial information from Compustat, earnings announcement dates from IBES, market data from CRSP and TAQ, and news articles from RavenPack. Our sample begins in 2007, which is when RavenPack's Web Edition begins coverage. We exclude IPOs with offer prices below $5.00 and IPOs for banks (SIC codes 602X and 603X). We also require that the security issuance has a share code of 11 or 12 in CRSP, which excludes ADRs, unit offers, closed-end funds, and REITs. From CRSP and TAQ, we require coverage of the security for 126 trading-days following the IPO date. We require that RavenPack coverage of a firm begins by the date of the firm's IPO. We take the earnings announcement date from IBES, adjusting to the next trading date if the announcement time occurs after trading hours. In cases where the IBES earnings announcement date disagrees with the date from Compustat, we hand collect the date from firms' press releases. Together, these restrictions result in a sample of 982 IPOs during the 2007 to 2016 period.

Panel A of Table 1 shows the number of IPOs by year in our sample period. The highest number of IPOs was in 2014 (about 21 percent of our sample), while there were very few IPOs after the financial crisis in 2008 and 2009 (two and four percent of our sample, respectively). Several IPOs from 2016 are omitted due to the firms not yet being listed on CRSP. Other than these years, IPOs are fairly evenly distributed (8−16 percent per year).

We use this sample of IPOs to test the relation between retail trades and media coverage in two ways. First, we conduct within-firm analyses using daily levels of retail trade and media coverage in a specification with firm fixed-effects. This specification directly controls for time-invariant firm attributes, such as the level of visibility a firm has going into its IPO. This analysis uses a sample of 124,714 firm-day observations from the IPO date (day 0) to 126 trading days after the IPO.[8] Second, we perform some analyses at the firm-level, aggregating our measures of trading activity and media coverage from the IPO date to the first post-IPO earnings announcement. This analysis involves one observation per firm and yields a sample size of 982.

Fig. 2 gives the timing of each firm's first earnings announcement following the IPO. Only eight percent of earnings announcements occur prior the end of the 25-day quiet period, and 33 percent occur within 40 calendar days of the IPO. Fig. 3 shows the timing of the quarter-end associated with these earnings announcements. For 52 percent of the sample, the quarter ended prior to the IPO, with 86 firms (nine percent of the sample) having quarter ends within five days following the IPO. Overall, there do not appear to be distinct patterns of firms timing their IPO relative to their quarter end.

4.2. Trade measures

We construct our measure of retail trades from TAQ data (see Appendix A for all variable definitions). While prior literature has used trade size to identify retail trading (e.g., trades less than $5000 are assumed to be retail-initiated trades; Lee and Radhakrishna, 2000; Barber et al., 2009), the prevalence of algorithmic trading and the splitting of orders by institutional investors renders trade size a less reliable measure (Cready et al., 2014). Further, high frequency trading makes it difficult to accurately sign trades by matching trades to quotes (Easley et al., 2012; Johnson and So, 2017). Therefore, we follow Boehmer et al. (2017) to identify retail trades. This method exploits the fact that most retail trades do not take place on registered exchanges. Instead, a broker (e.g. Charles Schwab) often fills retail trades internally from its own inventory or sends the trade to a wholesaler (e.g. Citadel). When this occurs, the trade appears in TAQ with an exchange code of “D”. Further, when trades

[7] Consistent with this conjecture, we find a significantly greater increase in large trade relative to retail trade at the earnings announcement ($p=0.017$).

[8] We look at the period within 126 trading days of the IPO to obtain a balanced panel for the within-firm analysis. The maximum possible number of days between the IPO and the first earnings announcement is 180 calendar days: a 90-day quarter plus a 90-day filing deadline for the 10-K of a non-accelerated filer. Thus, we include a half-year, or 126 trading days, for each firm.

Table 1
Sample Composition and Media Characteristics. This table gives the frequency of IPOs by year in our sample (Panel A) and the number of news articles attributable to each media source in our sample (Panel B).

Panel A: IPO's in Sample by Year		
Year	Freq.	Percent
2007	148	15.07
2008	18	1.83
2009	41	4.18
2010	88	8.96
2011	78	7.94
2012	91	9.27
2013	149	15.17
2014	208	21.18
2015	112	11.41
2016	49	4.99
Total	982	100.00
Panel B: Media Sources		
Source	Freq.	Percent
Dow Jones Newswires	14,646	17.87
Reuters	7728	9.43
Yahoo! Finance	4322	5.27
CNBC	3259	3.98
Individual.com	3167	3.86
MT Newswires	2453	2.99
TMC Net	2377	2.90
Marketwatch	1628	1.99
Yahoo! News	1539	1.88
Bloomberg Businessweek	1518	1.85
Marketwatch (Online)	1482	1.81
RTTnews	1454	1.77
TheStreet	1394	1.70
Seeking Alpha	1136	1.39
Forbes.com	889	1.08
Other	32,984	39.88

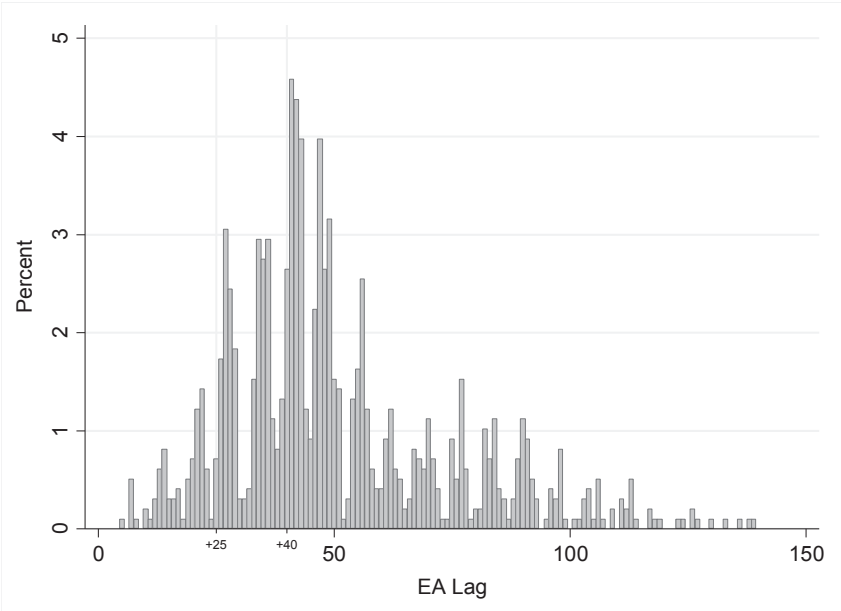

Fig. 2. First Earnings Announcement relative to IPO Date. This figure gives the frequency of firms' first earnings announcements relative to their IPO. Day 0 is the IPO date. EA Lag is expressed in calendar days.

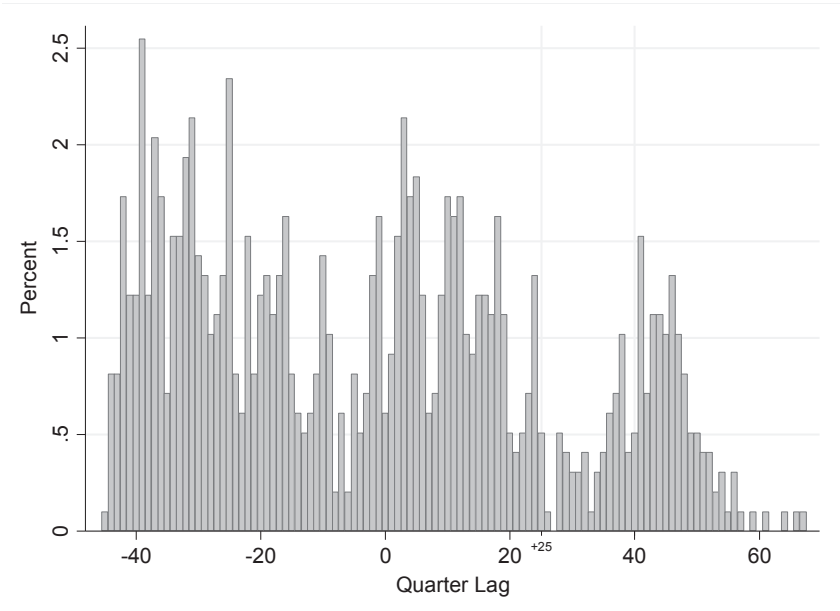

Fig. 3. Quarter End of First Earnings Announcement Relative to IPO. This figure gives the frequency of the quarter end date associated with firms' first earnings announcement date post-IPO. Day 0 is the IPO date. Quarter Lag is expressed in calendar days.

are filled in this way, the broker or wholesaler will often give a small amount of price improvement (a fraction of a cent) over the existing best bid or offer. Thus, purchase orders are filled just below a full cent and sales orders are filled just above a whole cent. In contrast, Regulation NMS requires orders on exchanges and limit orders to be priced in round pennies. Thus, following Boehmer et al. (2017), we classify trades with TAQ exchange code of "D" and prices with just above a round penny (fraction of a cent between zero and 0.4, exclusive) as retail sales and those with prices just below a round penny (fraction of a cent between 0.6 and one, exclusive) as retail purchases.[9]

Within a given trading day, we define the variable *Net Retail* as the sum of shares classified as retail purchases less the sum of shares classified as retail sales, scaled by the total number of shares traded that day. We then multiply by 100 to express the number as a percentage. In our firm-level analysis, we sum all retail purchases and subtract all retail sales from the IPO date up until the earnings announcement, and then divide by the total share volume during this time frame. We then partition retail trading activity into deciles based on this measure and divide by 10, so *Net Retail* takes values from 0.1 to 1, in increments of 0.1. Higher values of this variable reflect greater retail purchases. Since we measure retail trade as a proportion of total volume, our measure captures relative changes in the prevalence of retail trade, as opposed to overall shifts in market activity.

We contrast retail trades to large trades in order to provide a benchmark for sophisticated investor trading, which we assume will be more informationally-efficient. We measure large trades as trades greater than or equal to $50,000. While some institutional investors split trades into smaller orders, making it unclear whether small orders reflect retail trade, large trades should reflect only institutional investor activity. We sign large trades using the Lee and Ready (1991) algorithm, matching trades to quotes with a zero second delay. Similar to *Net Retail*, we calculate *Net Large* as large purchases less large sales, as a percentage of total trades.[10]

4.3. Media coverage measures

We construct our measures of news releases from the RavenPack Full Edition database, which includes the union of RavenPack's Dow Jones, Web, and PR Editions. We require that RavenPack assign a story a relevance of 100, indicating that the firm was featured prominently in the news story. To reduce noise in our variable measurement, we exclude several news classifications that likely have limited information content and visibility to retail traders. Specifically, we exclude stories where the (1) RavenPack assigned category equals "earnings", "revenue", or "conference-participant" (the first two categories

[9] Boehmer et al. (2017) validate this classification of trades into buys and sells by comparing their classification to true buying and selling using a proprietary dataset that includes buy and sell classifications.

[10] Using these classifications, retail trades comprise about 9 (6) percent of total trades on average in the firm-day (firm-level) sample. Large trades comprise about 12 (21) percent at the firm-day (firm-level). There is a small positive correlation between retail trade and total trade (0.01 in the firm-day sample, 0.10 in the firm-level sample); however, our retail trade measure is divided by total trades to control for any possible effect of total trade volume.

typically relate to firms announcing the date of an upcoming earnings announcement, and the third relates to announcements of participation in upcoming conferences)[11]; (2) RavenPack type contains "IPO" or "public-offering" (stories announcing the completion of the offering) or equals "trading" (trading halts and resumptions); and (3) RavenPack group equals "insider trading", "order-imbalances", or "investor-relations" (the last typically being stories about upcoming conference calls or institutions reporting holdings). Finally, we exclude firm press releases and articles related to analyst ratings as these represent firm-initiated and analyst-initiated news. We separately control for these firm- and analyst-initiated news articles in our analyses.

We define our measure of news coverage, *All News*, as the count of all news stories on a given day. News events occurring after trading hours are adjusted to the next trading day. In the firm-day level analysis, we use an indicator, *I(All News)*, which takes a value of one when *All News* is positive, signifying the existence of a news article on that trading day. For the firm-level analysis, we sum all news stories from the IPO up until the earnings announcement, and then divide by the number of days in this time period. We then use the logarithm of this sum plus one in the analysis.

Panel B of Table 1 shows the number of articles by media outlet in our sample. About 27% of the articles are from the two largest newswires: Dow Jones and Reuters. No other outlet accounts for more than 6% of the sample.

4.4. Other variables and controls

We include a number of controls for other sources of variation in firm visibility and attractiveness to retail traders. *Firm PR* is the number of firm-initiated press releases and *Analyst* is the number of articles reporting analyst ratings. These variables control for alternative sources of news. *EA Lag* is the number of calendar days between a firm's IPO and its first earnings announcement. Earnings announcements that occur outside the previously discussed quiet periods (that is, after 25 or 40 calendar days) are likely to be preceded by more news releases. The related variable *Days*, which gives the number of trading days from the IPO, is used in some analyses. The variable *ln(MVE)* is the logarithm of the firm's market value of equity, measured at the close of the offering date, and *ln(Sales)* is the logarithm of one plus the sum of sales over the four quarters prior to the IPO. These variables capture larger firms, which tend to have richer information environments. *BTM* captures the ratio of book value of equity from the first quarter-end post IPO to the market value of equity on the close of the offer. There is some evidence that retail traders prefer high book-to-market stocks (Barber and Odean, 2000).

We also include controls for IPO visibility and for "hot" IPO markets. *Day 1 Return* is the return from the offer price to the closing price on the IPO date. Firms with large opening day returns likely generate more visibility. We control for pre-IPO visibility using *Pre-IPO News*, defined as the number of articles on a firm in the window beginning 30 trading days prior to the IPO and ending on the day prior to the IPO (Liu et al., 2014). We apply the same filters to articles as when constructing the *All News* variable. We also include *Industry Return*, defined as the return in a firm's Fama-French 48 industry in the 12 months preceding the IPO, and *Industry Return+*, which equals *Industry Return* when this return is positive and zero otherwise; thus allowing this control to vary in up and down markets (e.g. Lowry and Schwert, 2004). *Tech Firm* is an indicator variable using the classification of technology firms given in Loughran and Ritter (2004).[12] We define *EA CAR*, which we use as a dependent variable in several analyses, as the cumulative market-adjusted return over the three-day window centered on the first earnings announcement a firm makes following its IPO, expressed as a percentage. Finally, in the firm-day analysis, we also control for lagged market-adjusted abnormal returns (*Lag AbRet*). This variable controls for the possibility that both retail traders and the media react to stock returns, as opposed to investors reacting to media coverage.

Table 2 presents summary statistics for these variables. Panel A gives summary statistics at the firm-day level for the window [0, +126]. Firm-level variables are excluded from Panel A because these variables will be subsumed by firm fixed-effects in the analyses at the firm-day level. *Net Retail* measured on a daily basis has a negative mean and zero median, suggesting that retail investors have some large net sales days over the 127 trading-day window. The mean of *All News* reveals that average media coverage is 0.66 articles per day. The lower means of *Firm PR* and *Analyst* are consistent with the quiet period restricting firm and analyst disclosure post-IPO; although the time window covered in Panel A extends beyond the quiet period expiration.

Panel B gives summary statistics for variables measured at the firm-level. Most of these variables are measured at a single point in time within our sample. For example, we measure *MVE* at the IPO date for each firm. As previously discussed, the trading and news variables in Panel B reflect their values when measured over the time period beginning at the IPO and ending prior to the firm's first earnings announcement. The positive mean and median values of *Net Retail* indicate that retail investors tend to be net purchasers during the post-IPO period, consistent with their smaller participation in the initial IPO allocation. In contrast, sophisticated investors tend to receive larger initial allocations and to be net sellers after the IPO, as

[11] This restriction also excludes earnings announcement press-releases in the firm-day analyses.

[12] Our sample period does not contain any truly "hot" IPO markets from a historical perspective but does contain a few calendar quarters that would be considered "cold." We partitioned the sample using average first-day returns and number of IPOs to create an in-sample measure of hot and cold IPO markets. We did not find any significant differences in results across these partitions, suggesting that our results are not driven by hot or cold IPO markets.

Table 2
Summary Statistics. This table summarizes the various trading, news, and firm variables used in our analysis. Panel A describes variables at the firm-day level, covering the 127 trading days following each IPO. Panel B describes variables at the firm-level, with a single observation per IPO. See Appendix A for variable definitions.

Panel A: Firm-Day Variables								
	Count	Mean	Std. Dev.	Min	p25	Median	p75	Max
Net Retail	124,714	−0.06	5.69	−100.00	−1.41	0.00	1.36	100.00
Net Large	124,714	−0.57	13.84	−99.14	−2.18	0.00	1.52	98.92
All News	124,714	0.66	5.49	0.00	0.00	0.00	0.00	482.00
I(All News)	124,714	0.10	0.30	0.00	0.00	0.00	0.00	1.00
Firm PR	124,714	0.03	0.19	0.00	0.00	0.00	0.00	15.00
I(Firm PR)	124,714	0.03	0.17	0.00	0.00	0.00	0.00	1.00
Analyst	124,714	0.07	0.69	0.00	0.00	0.00	0.00	55.00
I (Analyst)	124,714	0.03	0.16	0.00	0.00	0.00	0.00	1.00
Panel B: Firm-Level Variables								
	Count	Mean	Std. Dev.	Min	p25	Median	p75	Max
Net Retail	982	0.03	0.77	−4.03	−0.23	0.04	0.34	8.34
Net Large	982	−3.89	8.00	−43.58	−7.00	−2.34	0.00	36.25
All News	982	0.85	3.77	0.00	0.11	0.29	0.73	102.98
ln (All News)	982	0.41	0.47	0.00	0.10	0.26	0.55	4.64
Firm PR	982	0.03	0.05	0.00	0.00	0.00	0.04	0.54
ln (Firm PR)	982	0.02	0.04	0.00	0.00	0.00	0.04	0.43
Analyst	982	0.13	0.21	0.00	0.00	0.07	0.17	3.79
ln (Analyst)	982	0.11	0.14	0.00	0.00	0.07	0.15	1.57
EA Lag	982	50.57	23.90	5.00	35.00	45.00	62.00	139.00
MVE	982	1112.31	2685.89	15.34	223.64	455.30	1047.87	51,285.00
ln (MVE)	982	6.21	1.19	2.73	5.41	6.12	6.95	10.85
BTM	982	0.35	0.48	−2.38	0.16	0.28	0.46	4.77
Sales	982	843.34	4710.69	0.00	22.37	106.30	402.31	131,037.00
ln (Sales)	982	4.41	2.46	0.00	3.15	4.68	6.00	11.78
Day1 Return	982	15.74	27.38	−40.31	0.00	7.54	24.52	217.00
Pre-IPO News	982	5.65	54.34	0.00	0.00	0.00	2.00	1404.00
ln (Pre-IPO News)	982	0.64	1.05	0.00	0.00	0.00	1.10	7.25
Industry Return	982	18.78	16.30	−31.45	8.89	19.64	29.03	88.05
Tech Firm	982	0.29	0.46	0.00	0.00	0.00	1.00	1.00
EA CAR	982	0.05	10.06	−44.33	−4.41	−0.11	4.66	46.43

seen in the negative mean and median values of *Net Large*. Similar to Panel A, the mean number of media articles is 0.85 per day in the post-IPO period.

5. Results

5.1. Quiet period and news releases

Before discussing our main results, we first offer evidence of the efficacy of the IPO quiet period, as our predictions assume these restrictions alter firms' disclosure behaviors (see Cedergren, 2017). Panel A of Table 3 reports the frequency of firm press

Table 3
Quiet Period and News Releases. This table gives the frequency and effect of both firm and media releases in various time windows relative to the IPO. *Firm PR* is the number of press-releases with the firm as the subject. *All News* is the number of qualifying news articles with the firm as the subject. *I(Firm PR)* and *I(All News)* are indicators for *Firm PR* and *All News* being greater than zero, respectively. In panel B, *Trading Volume* is share volume as a percentage of shares outstanding. Note volume on all days is significantly greater than zero. We only test the incremental volume on days with a firm press release or news coverage.

Panel A: News Articles Per Firm, Per Day					
Calendar days relative to IPO:	(1) [0, 24]	(2) [25, 39]	(3) [40+]	(2) − (1) Differences in Freqs.	(3) − (1)
Firm PR	0.022	0.030	0.034	0.008***	0.012***
All News	1.239	0.570	0.569	−0.669***	−0.670***
Panel B: Trading Volume					
Calendar days relative to IPO:	(1) [0, 24]	(2) [25, 39]	(3) [40+]	(2) − (1) Differences in Effects	(3) − (1)
Volume when *I(Firm PR)* = 0	1.778	0.805	0.755		
Incremental Volume on Days when *I(Firm PR)* = 1	0.007	0.507***	0.320***	0.500***	0.313***
Volume when *I(All News)* = 0	1.140	0.727	0.652		
Incremental Volume on Days when *I(All News)* = 1	4.493***	0.959***	1.155***	−3.534***	−3.338***

*p < 0.10 **p < 0.05 ***p < 0.01.

releases (*Firm PR*) and news articles (*All News*) in three separate time windows following the IPO that mirror the quiet periods shown in Fig. 1. In the [0,24] window following the IPO, firms issue 0.022 press releases per day on average (excluding press releases that fall into the excluded categories listed in Section 4.4). The frequency of firm press releases increases by 36 percent to 0.030 per day in the [25, 39] window. The frequency again increases to 0.034 per day in the [40+] window. Both of these increases are statistically significant relative to the frequency in the [0, 24] day window. By comparison, firms are the subject of 1.239 news articles per day in the [0, 24] window, with this frequency significantly declining in the later time windows.[13]

Panel B of Table 3 reports trading volume over the three time windows, measured as total volume as a percentage of shares outstanding, comparing days with news releases to those days without. Trading volume in the [0, 24] window is not significantly different on days the firm issues a press release relative to days when the firm does not. Press releases issued more than 24 days following the offering, however, are associated with significantly higher volume.[14]

Overall, these findings suggest that the few press releases firms do issue in the 24 days following the offering are limited in their influence on traders, consistent with quiet period restrictions preventing firms from releasing consequential information during this time. In contrast, news articles are associated with significantly greater volume in the 24 days following the offering, and this increase tends be greater than the increases in later time windows. This suggests investors find news articles particularly relevant in the days immediately following the offering, perhaps because of the dearth of information available from the firm.

5.2. Media coverage and retail investor trades: within-firm analyses

We first test the relation between media coverage and retail investor trade within-firm, regressing daily levels of net trades on daily news articles. Table 4 presents the results of these regressions. *Net Retail* is calculated for each firm-trading day and *I(All News)* indicates the presence of a news article on the same day. All firm-level controls are subsumed by firm fixed-effects. This regression includes all dates within 126 trading days of the IPO plus the IPO date itself, for a balanced panel of 127 trading days per IPO firm.

In Panel A, the positive and significant coefficient on *I(All News)* in the first column indicates that firms experience more retail purchases on the specific days they receive news coverage. In contrast, the coefficient on *I(All News)* is insignificant when the dependent variable is replaced with *Net Large*. This result is consistent with our prediction that media coverage in the post-IPO period influences retail purchases. The absence of a positive association between media coverage and net large purchases suggests that these results are not driven by some omitted economic event during the post-IPO window that would lead all investors to buy the stock, but rather by retail investors reacting to media coverage in a different manner than more sophisticated investors.

In the third and fourth columns of Panel A, we allow the association between *I(All News)* and the trade variables to vary depending on how many calendar days have passed since the IPO. The different time windows represent the quiet period cutoffs discussed in Section 2 and illustrated in Fig. 1. The coefficient on *I(All News)* in the third column gives the association between *I(All News)* and retail trading during the [0, 24] day window. Consistent with the results from the first column, this coefficient is significantly positive, indicating that news articles within the 25-day post-IPO quiet period are positively associated with retail purchases. The significantly negative coefficients on both *I(All News)*Day [25,39]* and *I(All News)*Day[40+]* reflect a weaker association between news articles and retail trade once the restrictions on firm and analyst communication lapse. Untabled tests reveal no significant association between *I(All News)* and *Net Retail* in these later time periods (i.e. adding the interaction to the main effect gives an overall effect that is insignificantly different from zero).

In contrast to these results, when *Net Large* is the dependent variable, the coefficient on *I(All News)* is significantly negative, as shown in column 4. Further, this negative association attenuates in latter time periods, as indicated by the positive and significant coefficients on *I(All News)*Day[25,39]* and *I(All News)*Day[40+]* in this column. Untabled tests show that *I(All News)* is not significantly associated with *Net Large* in these later periods. One interpretation of this finding is that, while large trade is not associated with news in general, these traders do provide liquidity for media-driven retail trade in the period immediately following the IPO. In sum, the evidence in Panel A of Table 4 suggests that media coverage plays a significant role in influencing retail purchases following a firm's IPO.

As discussed in Section 3, these findings could reflect an information effect (i.e., media coverage makes retail traders better informed, thereby reducing adverse selection concerns and encouraging them to trade) or an attention effect (i.e., media coverage makes retail traders aware of the stocks, leading to attention-driven purchases). To differentiate between the information and attention effects, we split the media coverage variables into positive and negative news components using RavenPack's event sentiment score, which uses a proprietary algorithm to classify each article's sentiment. Prior studies find

[13] *Firm PR* is also diffused over the [0, 24] day window, with 16 percent of firm press releases coming within five days of the IPO (i.e. in the first 20 percent of the time window). *All News* is relatively more clustered near the IPO, with 68 percent of the articles in the [0, 24] day window coming within five days of the IPO.

[14] We find similar patterns for intraday return variance (computed as in Zhang et al., 2005, p. 1396). The results are also qualitatively unchanged if earnings announcement dates are excluded.

Table 4
Associations between News and Trade within Firm. This table presents the results of OLS regressions of our trading measures on news measures and controls at the firm-day level. *Net Retail* is retail buys less sells, as a percentage of all trades. *Net Large* is similarly defined for trades greater than $50,000. The analysis includes 127 trading days for each firm. *I(All News)* is an indicator variable, taking value of one on days where there is at least one news article with the firm as the subject. *I(All News): Positive* and *I(All News): Negative* are similar indicators, taking values of one on days there is at least one positive or negative news article, respectively. *Day[x,y]* are indicator variables for the day being in the specified lag relative to the IPO date (e.g. *Day[25,39]* means the observation's date is between 25 and 39 calendar days after the IPO, inclusive). The omitted category is *Day[0,24]*. See Appendix A for full variable definitions. Firm and year fixed effects are included. T-statistics in parentheses are based on standard errors clustered by firm and day.

Panel A: By Time Period

Dep. Var. =	Net Retail	Net Large	Net Retail	Net Large
I(All News)	0.14*** (2.68)	−0.01 (−0.08)	0.38*** (4.33)	−0.86*** (−2.97)
Day [25,39]			0.24*** (3.15)	0.70*** (3.22)
Day [40+]			0.33*** (5.91)	1.16*** (7.16)
I(All News)*Day [25,39]			−0.35** (−2.08)	0.95* (1.71)
I(All News)*Day [40+]			−0.33*** (−3.17)	0.95*** (2.97)
I(Firm PR)	0.10 (1.20)	−0.20 (−0.80)	0.15* (1.74)	−0.21 (−0.84)
I (Analyst)	0.43*** (5.39)	0.42** (2.09)	0.40*** (5.10)	0.28 (1.39)
Lag AbRet	−0.00 (−0.76)	0.05*** (6.46)	−0.00 (−0.74)	0.05*** (6.36)
ln (Days)	0.11*** (6.04)	0.52*** (9.88)		
N	124,714	124,714	124,714	124,714
Adj. R-Sq.	0.0131	0.0043	0.0131	0.0041

Panel B: By News Sentiment

Dep. Var. =	Net Retail	Net Large
Day [25,39]	0.24*** (3.15)	0.69*** (3.22)
Day [40+]	0.33*** (5.98)	1.17*** (7.29)
I(All News): Positive	0.37*** (3.83)	−0.59* (−1.90)
I(All News): Positive*Day [25,39]	−0.27 (−1.38)	0.96 (1.53)
I(All News): Positive*Day [40+]	−0.27** (−2.45)	0.82** (2.35)
I(All News): Negative	0.24** (2.10)	−1.15* (−1.73)
I(All News): Negative*Day [25,39]	−0.35 (−1.29)	1.21 (1.09)
I(All News): Negative*Day [40+]	−0.31** (−2.18)	0.93 (1.34)
I(Firm PR Pos.)	0.12 (1.25)	−0.49* (−1.84)
I(Firm PR Neg.)	−0.10 (−0.44)	0.76 (1.20)
I (Analyst Pos.)	0.42*** (5.62)	0.30 (1.36)
I (Analyst Neg.)	0.12 (0.63)	−0.08 (−0.18)
Lag AbRet	−0.00 (−0.81)	0.05*** (6.26)
N	124,714	124,714
Adj. R-Sq.	0.0131	0.0041

*p < 0.10 **p < 0.05 ***p < 0.01.

this measure reliably predicts market reactions to news (e.g. von Beschwitz et al., 2013). If the information effect holds, then the direction of net retail trade should differ based on the sentiment of the article. If the attention effect holds, the sentiment of the news is unlikely to matter, with both positive and negative news stories generating retail purchases.

Panel B of Table 4 gives the results of this analysis. The results are consistent with the attention effect. The first column in Panel B shows that both the positive and negative components of *I(All News)* are positively associated with *Net Retail* in the period immediately after the IPO. Although the positive component of *I(All News)* is larger in magnitude, this difference is not statistically significant (p-value = 0.44). The interactions of the positive component with *Day[25,39]* and *Day[40+]* show that the association of positive news with retail trade significantly weakens in the later time period. The interactions with the negative component of *I(All News)* show that the association of negative news with retail trade flips sign in the later periods; however, the overall effect is not significantly different from zero. Overall, the presence of news appears to drive retail purchasing immediately after the IPO regardless of its sentiment, with this association weakening in later time windows.

The second column of Panel B shows that both the positive and negative components of *I(All News)* are negatively associated with *Net Large*. This finding could again be interpreted as evidence that large traders provide liquidity to attention-driven retail traders in the time period immediately following the IPO. There is less evidence that these associations change over time; although the interaction of the positive component with *Day[40+]* is significantly positive.

5.3. Media coverage and retail investor trades: across-firm analyses

Table 5 presents cross-sectional regressions of trade on media coverage. In this table, the measures of trades and media coverage are aggregated at the firm-level from the IPO date to the first post-IPO earnings announcement. The results of Table 5 yield similar inferences to those from Table 4. In the first column, where *Net Retail* is the dependent variable, the coefficient on *ln(All News)* is positive and significant. Again, net large purchases do not exhibit the same sensitivity to news coverage

Table 5
Associations between News and Trade across Firms. This table presents the results of OLS regressions of our trading measures on news measures and controls at the firm level. The analysis includes one observation per firm. *Net Retail* is retail buys less sells, as a percentage of all trades in decile ranks from 0.1 to 1.0. *Net Large* is similarly defined for trades greater than $50,000. *All News* is the number of news articles per day with the firm as the subject during the time from the IPO up to the firm's first earnings announcement. We use the logarithm of one plus this quantity in the analyses. *All Positive* and *All Negative* are similarly defined but use only news articles of positive or negative sentiment, respectively. See Appendix A for full variable definitions. Year fixed effects are included. T-statistics in parentheses are based on standard errors clustered by quarter-year (e.g. 2007Q1).

Dep. Var. =	Net Retail	Net Large	Net Retail	Net Large
ln (All News)	0.16*** (6.03)	0.04 (1.13)		
ln (All Positive)			0.15*** (5.31)	0.05 (1.23)
ln (All Negative)			0.15** (2.33)	0.04 (0.76)
ln (Firm PR)	−0.52** (−2.56)	−0.22 (−0.77)		
ln (Firm PR Pos.)			−0.59** (−2.46)	−0.08 (−0.26)
ln (Firm PR Neg.)			−0.71 (−1.10)	−0.95 (−1.12)
ln (Analyst)	0.04 (0.64)	−0.11* (−1.77)		
ln (Analyst Pos.)			0.05 (0.70)	−0.07 (−1.13)
ln (Analyst Neg.)			−0.33** (−2.19)	−0.33* (−1.73)
ln (Pre-IPO News)	−0.01 (−0.75)	0.00 (0.49)	−0.01 (−0.92)	0.00 (0.27)
ln (MVE)	−0.00 (−0.11)	−0.01 (−0.63)	−0.00 (−0.19)	−0.01 (−0.70)
ln (Sales)	−0.01** (−2.46)	0.00 (0.71)	−0.01** (−2.35)	0.00 (0.63)
BTM	−0.01 (−0.94)	−0.01 (−0.62)	−0.02 (−1.01)	−0.01 (−0.65)
Day1 Return	0.00** (2.08)	0.00*** (4.33)	0.00* (1.91)	0.00*** (4.00)
ln (Days)	0.03 (1.61)	0.07*** (3.24)	0.03 (1.49)	0.07*** (3.23)
Tech Firm	0.02 (1.31)	0.01 (0.22)	0.03 (1.40)	0.00 (0.10)
Industry Return	−0.00* (−1.84)	0.00 (0.25)	−0.00 (−1.68)	0.00 (0.30)
Industry Return+	0.01** (2.06)	−0.00 (−0.29)	0.01* (1.89)	−0.00 (−0.34)
N	982	982	982	982
Adj. R-Sq.	0.0859	0.0519	0.0858	0.0523

*p < 0.10 **p < 0.05 ***p < 0.01.

during the post-IPO period, as seen in column 2. Thus, media coverage has a significant effect on retail investor trades, and this effect does not appear to be driven by news that would trigger a similar response from sophisticated investors.

The third and fourth columns of Table 5 examine the relation between trade and media coverage when we split *ln(All News)* into its positive and negative sentiment components. We again find that both positive and negative sentiment news are positively associated with *Net Retail*, consistent with an attention effect. At the firm level, we find no significant relation between *Net Large* and either the positive or negative sentiment media coverage.

Overall, the results from Tables 4 and 5 suggest a positive association between retail trading and media coverage. Further, we find this association does not depend on the sentiment of the news in the period immediately following the IPO, supporting the attention effect.

5.4. Retail trade and earnings announcement returns

Table 6 presents an analysis of the relation between retail trade preceding a firm's first post-IPO earnings announcement and the abnormal returns during the announcement. A positive association would suggest that retail traders are able to trade in the direction of future earnings news during the post-IPO period, consistent with retail investors making informed trades. Alternatively, a negative association would suggest uninformed, attention-driven trade, consistent with the results in Tables 4 and 5.

In all columns of Table 6, the dependent variable is *EA CAR*, which is the market-adjusted three-day abnormal return centered on the earnings announcement date. The column headings indicate whether we use *Net Retail* or *Net Large* as our *Trade Measure* in the regression. The negative coefficient on *Trade Measure* in column 1 indicates that greater net retail purchases prior to the earnings announcement are associated with lower abnormal returns at the earnings announcement date. When *Net Large* is used as the *Trade Measure* in column 2, the coefficient on *Trade Measure* is insignificant, suggesting no association between sophisticated investor trading and earnings announcement returns. These findings are consistent with attention-driven retail trading driving the price up in advance of the earnings announcement, leading to a reversal when earnings are announced.

An alternative explanation for the positive association between *Net Retail* and *EA CAR* is that retail investor trades incorporate future earnings information into the pre-earnings announcement price. If earnings news is positive, on average, this effect would result in a lower return reaction at the earnings announcement date. However, in untabled analysis, we find that pre-announcement net retail trade is associated with larger *absolute* abnormal returns at the earnings announcement. This finding is inconsistent with retail traders incorporating information into price in advance of the earnings announcement,

Table 6
Earnings Announcement Returns and Trade. This table presents OLS regressions of the three-day market-adjusted return at the firm's first earnings announcement post-IPO on our trading measures and controls. In each model, the independent variable *Trade Measure* takes the value of the measure given in the column heading. *Net Retail* is retail buys less sells, as a percentage of all trades in decile ranks from 0.1 to 1.0. *Net Large* is similarly defined for trades greater than $50,000. *All News* is the number of news articles per day with the firm as the subject during the time from the IPO up to the firm's first earnings announcement. We use the logarithm of one plus this quantity in the analyses. Continuous variables are mean-centered in models where interacted. See Appendix A for full variable definitions. Year fixed effects are included. T-statistics in parentheses are based on standard errors clustered by quarter-year (e.g. 2007Q1).

Dependent Variable =EA CAR				
Trade Measure =	Net Retail	Net Large	Net Retail	Net Large
Trade Measure	−2.13** (−2.41)	−0.11 (−0.08)	−1.88* (−2.01)	−0.06 (−0.04)
ln (All News)			0.50 (0.26)	−1.25 (−0.78)
Trade Measure*ln (All News)			−3.88* (−1.88)	−2.45 (−1.25)
ln (Firm PR)	−3.53 (−0.52)	−3.71 (−0.54)	3.45 (0.47)	5.39 (0.70)
ln (Analyst)	−9.00*** (−3.03)	−9.30*** (−3.13)	−7.30** (−2.47)	−7.85** (−2.46)
ln (Pre-IPO News)	−0.53 (−1.21)	−0.56 (−1.30)	−0.18 (−0.42)	−0.19 (−0.45)
ln (MVE)	−0.14 (−0.35)	−0.15 (−0.39)	−0.09 (−0.22)	−0.03 (−0.07)
ln (Sales)	0.25 (1.46)	0.27 (1.60)	0.29* (1.69)	0.31* (1.83)
BTM	0.55 (1.08)	0.56 (1.09)	0.73 (1.46)	0.75 (1.48)
Day1 Return	0.00 (0.17)	0.00 (0.05)	0.01 (0.46)	0.01 (0.44)
ln (Days)	−0.16 (−0.31)	−0.14 (−0.29)	−0.59 (−1.00)	−0.64 (−1.07)
Tech Firm	0.99 (1.07)	0.92 (1.02)	1.01 (1.09)	1.06 (1.16)
Industry Return	0.06 (0.56)	0.07 (0.65)	0.05 (0.47)	0.06 (0.60)
Industry Return+	−0.08 (−0.68)	−0.09 (−0.80)	−0.07 (−0.62)	−0.08 (−0.74)
N	982	982	982	982
Adj. R-Sq.	0.0249	0.0214	0.0299	0.0266

*p < 0.10 **p < 0.05 ***p < 0.01.

which would have resulted in a smaller absolute return reaction at the announcement date. Further untabled analysis shows that the positive association between *Net Retail* and *EA CAR* is driven by earnings announcements with negative returns.[15] That is, greater retail purchases are not associated with a muted response to positive earnings news, but with a stronger negative response to negative earnings news. Overall, this evidence is most consistent with the interpretation that retail investor buying in the quiet period drives up price, which then reverses at the first earnings announcement after the IPO.

In the last two columns of Table 6, we examine how the presence of media coverage moderates the relation between retail trade and returns at the earnings announcement. In these specifications, we include both trading and media coverage variables, as well as their interaction, as independent variables. We mean-center the trading and media coverage variables in these columns. We find a negative and significant coefficient on the interaction of *Net Retail* and *ln(All News)*, indicating that the association between net retail trade and earnings announcement returns becomes more negative with more pre-earnings announcement news articles. This finding further supports the attention effect, with retail investor purchasing exerting upward pressure on price only when media coverage focuses attention on the firm, thus coordinating retail investor purchasing behavior.

5.5. Comparison of IPO and non-IPO time periods

The evidence thus far suggests that media coverage is associated with more purchases by retail investors and that retail investor purchases are negatively associated with stock returns at the firm's first earnings announcement post-IPO. Potentially, these associations could exist at any point in a firm's life cycle. The SEC's motivation for restricting firm communication during the quiet period stems from concerns that investors will be more easily influenced by disclosures from newly public companies, as these firms have less verifiable information available in the form of historical financial information. Further, the market for the firm's shares may be less developed, and restrictions on trade (such as the underwriter prohibiting share-flipping, or difficulty in short-selling) may decrease price efficiency. Thus, while attention-driven trade may be present among retail investors at any point in time, these investors may be particularly vulnerable to attention-grabbing events just after the IPO, and this trade is more likely to occur at prices not supported by fundamentals. In the following, we test the extent to which the associations we document are confined to the post-IPO period.

We use two alternative samples in this analysis. First, we use the same sample of IPO firms, but examine media coverage and trade one year after the IPO. For this next year, we measure the news and trading variables over the 30 trading days prior to the earnings announcement.[16] We define the indicator variable *Year[t+1]* to equal one when the observation comes from

[15] We infer the direction of earnings news from the sign of the earnings announcement return, as more direct measures of earnings surprise are unavailable or unreliable in this setting. Using analyst forecasts would result in sample attrition, as the quiet period prevents forecasts from affiliated analysts, and time-series estimates of expected earnings are likely unreliable for the newly public firms.

[16] Twenty firms are dropped from this sample, as they are no longer publicly traded firms at this point (e.g., they were acquired).

the next year, and zero when the observation is from the post-IPO period. Second, we compare trade in the post-IPO period to the period following a seasoned equity offering (SEO) for a different sample of firms. We gather all SEOs from SDC during our sample period of 2007–2016, subject to the same restrictions as our IPO sample (i.e., exclude SIC codes 602X and 603X and offer prices below $5.00; require that the security issuance has a share code of 11 or 12 in CRSP). Similar to the IPO sample, we calculate our news and trading measures over the period from the SEO to the first earnings announcement following the SEO. We define the indicator variable of *SEO* to equal one for observations from the SEO sample. Note that SEOs do not have quiet periods following the offering in the same way as IPOs, as the post-offering prospectus delivery window does not exist for SEOs. However, like IPOs, SEOs have lockup agreements and analyst-related quiet periods, so the SEO setting does not perfectly contrast with the information frictions present in the IPO setting.[17]

Panel A of Table 7 compares the association between news coverage and trade in the post-IPO window to the associations found in the alternative samples. Similar to Table 5, the coefficient on *ln(All News)* when *Net Retail* is the dependent variable reveals a positive association between media coverage and net retail trading. The significantly negative coefficient on the interaction of *Year[t+1]* and *ln(All News)* shows this association is significantly smaller prior to the next year's earnings announcement. In contrast, we do not find evidence that the association between media coverage and retail trade is significantly different prior to the first earnings announcement post-SEO.

Panel B of Table 7 compares the Table 6 associations between trade and earnings announcement returns for the first post-IPO earnings announcement to both the earnings announcement one year later and the first earnings announcement following an SEO. The negative coefficient on *Trade Measure* in the *Net Retail* columns again shows that retail purchases in advance of the first earnings announcement post-IPO predict more negative returns at this earnings announcement. In the first column, the interaction of *Year[t+1]* with *Trade Measure* shows that the association between *Net Retail* and *EA CAR* at the next year's earnings announcement is not statistically different from the association at the first earnings announcement post-IPO. However, this is likely due to the large standard error around the coefficient on *Net Retail* at the *Year[t+1]* earnings announcement. Adding the coefficients on the main effect and interaction of *Net Retail* with *Year[t+1]* shows the coefficient on *Net Retail* is −0.65 during this time window, with a standard error of 1.64 (p-value of 0.691). The significantly positive coefficient on *SEO*Trade Measure* in the *Net Retail* column indicates that the association between retail trade and earnings announcement returns is significantly weaker at the first earnings announcement post-SEO, relative to the first earnings

Table 7
Comparing the Post-IPO period to Alternative Time-Windows. This table examines our results in alternative time-windows. Panel A regresses our trade measures on news measures and controls. Panel B regresses the three-day market-adjusted return at the earnings announcement on our trading measures and controls. *Net Retail* is retail buys less sells, as a percentage of all trades in decile ranks from 0.1 to 1.0. *Net Large* is similarly defined for trades greater than $50,000. *All News* is the number of news articles per day with the firm as the subject during the time from the IPO up to the firm's first earnings announcement for IPO firms. We use the 30 days prior to the earnings announcement in the one-year later sample and the time between the SEO and the first earnings announcement post-SEO in the SEO sample. We use the logarithm of one plus this quantity in the analyses. *Year[t+1]* is an indicator for the observation coming from the earnings announcement period one-year after the earnings announcement used in the main analysis. *SEO* is an indicator for the observation coming from an SEO-firm as opposed to an IPO-firm. See Appendix A for full variable definitions. Year fixed effects are included. T-statistics in parentheses are based on standard errors clustered by quarter-year (e.g. 2007Q1).

Panel A: Associations between Various News and Trade Measures				
Dep. Var. =	Net Retail	Net Large	Net Retail	Net Large
ln (All News)	0.16*** (6.02)	0.04 (1.13)	0.16*** (6.06)	0.04 (1.14)
Year [t+1]*ln (All News)	−0.08* (−1.80)	−0.07 (−1.31)		
SEO*ln (All News)			0.01 (0.14)	−0.03 (−0.82)
Controls	Yes	Yes	Yes	Yes
N	1924	1924	4265	4265
Adj. R-Sq.	0.0527	0.0255	0.0638	0.0162
Panel B: Earnings Announcement Returns and Trade. Dependent Variable =EA CAR				
Trade Measure =	Net Retail	Net Large	Net Retail	Net Large
Trade Measure	−2.18** (−2.46)	−0.10 (−0.08)	−2.18** (−2.47)	−0.10 (−0.08)
Year [t+1]*Trade Measure	1.53 (0.76)	0.37 (0.17)		
SEO*Trade Measure			2.59** (2.35)	0.64 (0.48)
Controls	Yes	Yes	Yes	Yes
N	1924	1924	4265	4265
Adj. R-Sq.	0.0189	0.0173	0.0090	0.0082

*p < 0.10 **p < 0.05 ***p < 0.01

[17] The SEO analyst quiet period is shorter than in IPOs. Effective September 25, 2015, the post-SEO analyst quiet period is three days. Prior to this, the analyst quiet period was 10 days. Further, the JOBS Act eliminated the analyst quiet period for SEOs of EGCs, and underwriters do not enforce an informal quiet period, as in the IPO setting. Lockup agreements for SEOs are also typically shorter. The modal SEO lockup is 90 days, as opposed to 180 days for IPOs (Karpoff et al., 2013).

Table 8
Associations between Various News and Trade Measures within Firm using Intraday Windows. This table presents an analysis of net retail trade in the time windows immediately following and preceding a news article's release. *Net Retail*, the dependent variable, is retail buys less sells, as a percentage of all trades. *Post* is an indicator variable equaling one when the observation spans the 6.5 trading hours following a news article's publication. *Pre* is an indicator variable equaling one when the observation spans the 6.5 trading hours preceding a news article's publication. The omitted category is trading days not spanned by either a *Pre* or *Post* window. Only non-overlapping windows are used. *Day[x,y]* are indicator variables for the observation being in the specified lag relative to the IPO date (e.g. *Day[25,39]* means the observation's date is between 25 and 39 calendar days after the IPO, inclusive). The time period for the analysis is the 127 trading days following the IPO. See Appendix A for full variable definitions. Firm and year fixed effects are included. T-statistics in parentheses are based on standard errors clustered by firm and day.

Dep. Var. = Net Retail, from intraday windows			
	Ind. Vars. Interacted with Time Window Indicators:		
Window:	Day [0,24]	Day [25,39]	Day [40+]
Post	0.51*** (4.09)	0.14 (0.80)	0.03 (0.38)
Pre	0.25 (1.45)	0.75*** (3.48)	0.14* (1.95)
I(Firm PR)	−0.20 (−0.72)	−0.27 (−0.92)	0.25** (2.39)
I (Analyst)	0.30* (1.89)	1.18*** (5.44)	0.25*** (2.74)
Lag AbRet	0.03** (2.00)	−0.02 (−1.03)	−0.01 (−1.51)
ln (Days)	−0.04 (−0.71)	0.13 (0.32)	0.19*** (3.59)
N		120,076	
Adj. R-Sq.		0.0134	

*p < 0.10 **p < 0.05 ***p < 0.01.

announcement post-IPO. Similar to the results related to *Year[t+1]*, adding the coefficients on the main effect and interaction of *Net Retail* with *SEO* reveals the coefficient on *Net Retail* of 0.41 is not significantly different from zero (p-value of 0.620) during the post-SEO window.

Overall, these results suggest that the association between news and retail trade is significantly weaker one year later for the same set of firms. However, we do not find this association is significantly weaker following an SEO. Nonetheless, the post-SEO association between retail trade and returns is significantly weaker than after the IPO, and this association is not significantly different from zero for both SEO firms and for IPO firms one year after the IPO. These results are consistent with investors being particularly sensitive to media coverage post-IPO due to the firms' relatively undeveloped information environments and the market for the firms' shares being less efficient, allowing for attention-driven trade to move prices.[18]

5.6. Intraday analysis

The media's decision to cover a given firm on a given day is nonrandom and likely depends in part on the demand for information regarding a particular firm. This suggests the possibility of reverse causality; i.e., heavy retail purchases during a day leads to stock price changes, which in turn attract greater media coverage. For example, Appendix B shows an article for Ultragenx that appeared on Yahoo! Finance 13 days after the firm's IPO. The article focuses on the results of a patient trial, but the headline emphasizes the stock price effects of the news. Thus, it could be that the underlying event prompted retail trade and market returns, and the media responded to these returns.[19] Alternatively, it could be that the same underlying event prompts both retail trade and media coverage simultaneously.

Throughout the analysis, we control for lagged market returns to address these concerns. Further, we also perform an intra-day analysis that more precisely measures the relative timing of news articles and retail trade. In this intra-day analysis, we construct our *Net Retail* measure using all trades in the 6.5 h trading window (i.e. the length of a full trading day) immediately following and immediately preceding a news article. We use only non-overlapping windows to ensure that a pre-article window will never overlap with a post-article window. We include indicators for a trading window representing a pre-article trading window (*Pre*) or post-article trading window (*Post*). The omitted category is trading days that do not overlap with a pre- or post-article window. The exclusion of overlapping trading windows reduces the sample size in this analysis compared to our main analyses.

[18] We also estimated all of our results using two alternative measures of news coverage: *Novel News* (count of only the first article for each RavenPack news story identifier) and *Dissemination* (*All News* divided by *Novel News*). All of the results have the same sign and significance for *Novel News*. All of the main results have the same sign and significance for *Dissemination*, but some of the time-period interaction tests are insignificant (e.g., Tables 4 and 7), likely due to the smaller sample size resulting from the requirement of a news story on a given date.

[19] RavenPack codes each article by news topic, but only uses one topic code per article, which introduces substantial noise in the coding scheme. For example, the Ultragenx article in Appendix B is coded as relating to "stock-prices" likely due to the one sentence on the stock price rise even through the remainder of the article is discussing product market news (which is presumably the source of the stock price increase). Over 70% of the articles in the quiet period are coded as relating to capital market activity (e.g. "stock-prices"), compared to 16% of articles after the quiet period for the same firms. We estimated our results using the number of articles coded as relating to Capital Markets, Financial, Operations, Event, and Governance. Only the number of Capital Markets articles significantly explains net retail trade. This result suggests that news articles that mention stock prices have the largest association with retail purchasing. However, we interpret this result with caution due to our concerns about the reliability of the RavenPack coding scheme.

Table 8 shows that, during the quiet period of Day [0,24], *Post* is significantly positive, while *Pre* is not significant. This result suggests that retail purchasing is significantly higher in the period immediately following news articles, but that retail purchasing does not increase immediately prior to the article. This finding is inconsistent with the alternative interpretations that media coverage responds to retail trade or that both media and retail trade respond to the same underlying events. Instead, higher retail purchasing follows media coverage.

The remaining columns show the results for Day [25,39] and Day [40+], when alternative information sources (e.g., the firm and its analysts) become more prevalent. We find that *Post* is not significant in these windows, whereas *Pre* is now positive and significant. Thus, when firm or analyst disclosures are more likely to precede news articles, we see higher retail purchasing before the news articles, suggesting that retail traders are reacting to the original disclosure by the firm or analyst, rather than the subsequent news articles. Overall, this test suggests that retail investors are reacting to the media in the period immediately following the IPO, when alternative information sources are not available, but then are reacting prior to news articles when the firm and analyst are less constrained in releasing information.

6. Conclusion

We examine the association between media coverage and retail trade immediately following a firm's IPO and find that greater media coverage is associated with greater retail investor purchases. This effect is strongest immediately after a firm's IPO and weakens for the same set of firms one year later. Consistent with media coverage generating attention-driven retail investor trade, we find that the association between media coverage and retail investor purchases does not depend on the sentiment of the media coverage. We also find that greater retail purchases are negatively associated with abnormal returns at the firm's first earnings announcement post-IPO. This finding is consistent with coordinated attention-driven trade pushing up prices, which then revert at the firm's earnings announcement.

As the media's decision to cover a given firm is nonrandom, we cannot definitively establish that media coverage causes attention-driven retail trade. In particular, stock price movements may attract both retail trade and media attention. Relatedly, media coverage may respond to increased retail trade and the associated increase in demand for information from these investors. We try to rule out these alternative explanations with controls for prior returns and an intraday analysis that precisely identifies the timing of trade relative to news releases. We also note that prior work establishes causal evidence that media coverage drives trade (Engelberg and Parsons, 2011; Lawrence et al., 2018) and finds that retail traders are sensitive to returns news presented by the media (Blankespoor et al., 2019). While we find evidence of media coverage associating with attention-trade, the media's role in capital markets likely varies by setting. Future work may help us better understand the extent to which the media influences different investor groups in other unique contexts.

Our findings suggest that the SEC's concern that information outside the prospectus may unduly influence retail traders' investment decisions is well founded. However, regulating the media is clearly beyond the scope of the SEC. It is possible that if the SEC allowed firms to make additional disclosures during the quiet period, these disclosures would offset the media's influence by offering an alternative viewpoint or clarifying points of contention. However, the fact that retail investors seem to ignore the information content of media coverage, and instead respond with attention-driven trade calls into question the efficacy of any regulatory intervention aimed at facilitating retail investors' access to information, consistent with Blankespoor et al. (2019). Our results thus highlight the importance of price efficiency in protecting retail traders, as the existence of pricing frictions in the immediate IPO aftermarket likely contribute to the retail trade driving up prices, which revert at the firm's first earnings announcement post-IPO.

Appendix A. Variable Definitions

Firm-level variables	
Net Retail	For the period from the IPO to the first earnings announcement: All retail buys less retail sells, using the Boehmer et al. (2017) method, as a percentage of all trades. Deciles of this variable (from 0.1 to 1.0) are used in the analyses.
Net Large	For the period from the IPO to the first earnings announcement: All large buys less large sells, as a percentage of all trades. Large trades are more than $50,000. Deciles of this variable (from 0.1 to 1.0) are used in the analyses.
All News	For the period from the IPO to the first earnings announcement: The number of qualifying news articles from RavenPack full edition with the firm as the subject, scaled by the number of trading days in this time period. The logarithm of one plus this variable is used in the analyses.
Firm PR	For the period from the IPO to the first earnings announcement: The number of unique news articles with the firm as the subject and a news-type of “press-release,” scaled by the number of trading days in this time period. The logarithm of one plus this variable is used in the analyses.
Analyst	For the period from the IPO to the first earnings announcement: The number of news articles from RavenPack full edition with the firm as the subject and classified by RavenPack as “analyst-ratings,” scaled by the number of trading days in this time period. The logarithm of one plus this variable is used in the analyses.

EA Lag	The number of calendar days between the IPO and the first post-IPO earnings announcement.
MVE	Market value of equity in millions, calculated on the close of the offer date. The logarithm of this variable is used in the analyses.
BTM	Book value of equity at the first quarter-end post-IPO, divided by *MVE*.
Sales	Sales over the prior four quarters ending prior to the IPO, in millions.
Day1 Return	Return from the offer price to the close price on day of the IPO.
Pre-IPO News	For the period from 30 trading days prior to the IPO to the day prior to the IPO: The number of qualifying news articles from RavenPack full edition with the firm as the subject. The logarithm of one plus this variable is used in the analyses.
Industry Return	The return in the firm's Fama-French 48 industry over the 12 months prior to the IPO.
Industry Return+	Equal to *Industry Return* when *Industry Return* is positive, and zero otherwise.
Tech Firm	An indicator variable taking a value of one if the firm is a technology firm, as defined by Loughran and Ritter (2004).
EA CAR	Cumulative market-adjusted return in the 3-day window (−1,+1) around the earnings announcement, as a percentage.
Firm-Day Variables	
Net Retail	For each trading day: All retail buys less retail sells, using the Boehmer et al. (2017) method, as a percentage of all trades.
Net Large	For each trading day: All large buys less large sells, as a percentage of all trades. Large trades are defined as more than $50,000.
All News	Number of qualifying news articles from RavenPack full edition on each trading day with the firm as the subject. An indicator for this variable being greater than zero is used in the analyses: *I(All News)*.
Firm PR	For each trading day: The number of unique news articles from RavenPack with the firm as the subject and a news-type of "press-release." An indicator for this variable being greater than zero is used in the analyses: *I(Firm PR)*.
Analyst	For each trading day: The number of news articles from RavenPack full edition with the firm as the subject and classified by RavenPack as "analyst-ratings." An indicator for this variable being greater than zero is used in the analyses: *I(Analyst)*.

Appendix B. Example Article from RavenPack

Ultragenyx Jumps on Positive Patient Data

Zacks Equity Research (copied from Yahoo! Finance).

February 13, 2014.

Ultragenyx Pharmaceutical Inc. (RARE) will be presenting encouraging data on its mucopolysaccharidosis 7 (MPS 7) candidate, rhGUS (recombinant human beta-glucuronidase, UX003), at the 10th Annual World Lysosomal Disease Network Symposium. Investors reacted positively to the news with the stock soaring 11.6% on the news.

Data from a case study of an advanced multi-system MPS 7 patient (12 years old) with respiratory insufficiency, who is being treated with rhGUS will be presented. The preliminary data suggests that rhGUS helps in reducing lysosomal storage (based on reduced excretion of urinary glycosaminoglycans), as well as the size of the enlarged liver and spleen. Plus, an improvement in pulmonary function was noted. Additionally, no infusion-related side effects were found during the first 14 weeks of treatment.

We remind investors that in Dec 2013, Ultragenyx had initiated an open-label phase I/II study to evaluate the safety and efficacy of rhGUS (administered every alternate week through intravenous infusion) in five MPS 7 patients aged between 5 and 30 years. Interim data from the phase I/II study is expected this year. The initial primary analysis phase of 12 weeks will be followed by dose-exploration and long-term extension.

The U.S. Food and Drug Administration (:FDA) has granted an emergency Investigational New Drug (eIND) for rhGUS. MPS 7 represents an underserved market with no approved therapies being available.

Ultragenyx is a biopharmaceutical company. Other biopharma stocks that are worth considering include *Alexion Pharmaceuticals, Inc.* (ALXN), *Emergent BioSolutions, Inc.* (EBS) and *Actelion Ltd.* (ALIOF). All three sport a Zacks Rank #1 (Strong Buy).

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