Media Dissemination of Insider Trading News, Insiders' Profitability, and Mispricing

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Abstract

We document the negative consequences of media disseminating insider trading news. Outside investors are informed about insider transactions by the media and then trade in the same directions as insiders to gain profits, which drives prices in the same directions as insider transactions. As a result, media coverage of an insider transaction increases the profitability of this transaction for insiders even though such an effect is mitigated by media coverage of prior insider trading activities. Moreover, media coverage of routine insider trading that presumably contains no private information on firms' prospects results in mispricing of the stock as outside investors mimic insiders' trading indistinctively. In further analyses, we find that the effects of media dissemination on insider trading profitability and mispricing are mainly driven by trading activities of retail investors. To the extent that the media merely broadcast plain facts of insider trading instead of spreading fake news or misinformation, our findings can be viewed as the media dissemination having unintended and undesirable consequences. Our study complements prior research on the positive monitoring and information effects of media dissemination, broadening our understanding of the roles of the media in the capital market.

Introduction

Existing research establishes that the media plays a corporate governance role by generating contents that expose firms' governance problems (e.g., Miller 2006; Dyck, Volchkova, and Zingales 2008). The information that the media collects, creates, and disseminate affects managers' reputation. To the extent that managers are sensitive to their firms as well as themselves being reported or commented by the media, their decision making is affected by media coverage (Liu and McConnel 2013). In addition to the governance role, media coverage reduces information asymmetry and mispricing through information dissemination (e.g., Bushee, Core, Guay, and Hamm 2010). Specifically, Drake, Guest, and Twedt (2014) find that by disseminating the information more broadly, media coverage mitigates the mispricing of earnings information. Twedt (2016) documents that media dissemination increases the speed with which management forecast information is incorporated into price. Therefore, media not only plays a monitoring role, but also helps make stock market more efficient by disseminating news to more investors.

While the beneficial effects of the media are well documented, some argue that there is also a "dark side" of the media as it helps spread rumors, unverified claims, and misinformation (Silverman 2015). Moreover, even if the media disseminates authentic news, it could contribute to the information overload problem that has undesirable consequences (e.g., Bawden and Robinson 2009). In contrast to the growing literature on how media positively affects corporate governance and information environments, there is little empirical evidence on the possible negative impacts of the media. In this paper, we use a large sample of insider trading filings to investigate whether the information dissemination role of the media has unintended consequences, in particular whether media dissemination increases insiders' trading profitability and contributes to mispricing.

Dai, Parwada, and Zhang (2015) document that media coverage of prior insider trades reduces insiders' future trading profits and conclude that the media plays a governance role through dissemination. This is consistent with the extant literature that media coverage disciplines corporate managers. However, as Seyhun (1998) documents, outside investors can gain profits by mimicking insiders' transactions. If investors trade in the same directions as insiders, then these trades can push prices up (down) following insider purchases (sales), as evidenced by the fact that prices drift in the directions of insider transactions for an extended period of six to twelve months (e.g., Seyhun 1998; Cohen, Malloy, and Pomorski 2012). The larger the price movements resulting from the imitation trades by outside investors, the more profitable it is for insiders who traded before those outside investors. The media literature finds that investor activities increase as more investors obtain information from the media (e.g., Blankespoor, deHann, and Zhu 2018; Bushee, Cedergren, and Michels 2018), implying that the media broadcasting of insider trading news enables more outside investors to trade following the insider trades. Therefore, we predict that media dissemination of insiders trading news increases insider trading profitability of current insider transactions. Note that while disseminating *past* insider trading news in general may increase the scrutiny on *future* insider transactions and thus restrict *future* insider profits relative to insider transactions without media coverage (Dai et al. 2015), media dissemination of *current* insider transactions also increases the profitability of the *current* transaction by informing more investors who can then trade following the insiders.

Next, we investigate whether media coverage on insider transactions contributes to equity mispricing. Insiders sometimes buy and sell stocks to close a previous position, which are passive and backward-looking transactions (Seyhun 1998). More recently, Cohen et al. (2012) classify insider transactions into opportunistic trading that contain private information on firms' prospects and routine trading driven by personal liquidity and diversification

motives that are non-information based. The media only disseminates insider trading news available from regulatory filings without sorting out for the public whether a specific trade is information-based or not. To the extent that investors do not have the expertise to filter out information-based insider transactions and they mimic insider trading indistinctively, we predict that mispricing of stocks of routine insider trading is exacerbated as investors push prices up (down) for insider purchases (sales) that contain no information on a firm's prospects. [1]

We use open market common stock transactions by US corporate insiders from January 2000 to December 2015 obtained from Thomson Reuters Insider Filings database to examine our predictions. We obtain media coverage data from RavenPack that provides Dow Jones news releases associated with insider trading. To investigate whether media dissemination of current insider trading news increases insiders' trading profitability, we define insider trading profit as abnormal returns from the Carhart (1997) four-factor model estimated over the 181 calendar days after the date of insider trading, following Jagolinzer, Larcker, and Taylor (2011). We find that while media coverage of *prior* insider trading reduces the profitability of an insider transaction as documented in Dai et al. (2015), media coverage of the *current* insider transaction increases the profitability of that specific transaction for insiders.

Consistent with mispricing, we find that for routine insider trades, media dissemination of insider trading news is associated with long-run return reversals over days [+181, +540] following the initial return over days [0, +180] as we have documented earlier, where day 0 is the insider trading date. This indicates that media coverage is associated with stock prices increases (decreases) for insider purchases (sales) that contain no information on

[1] Note that we do not rule out the possibility that mispricing can occur even for stocks of information-based opportunistic insider trades, as investors can "overreact" and push the prices too high (low) for insider purchases (sales).

firms' prospects, and long-run return reversal occur to correct for the initial mispricing. Because Dow Jones Newswire coverage is unlikely to be random, we employ two commonly used methods First, following Drake et al. (2014), we conduct two-stage Heckman selection analyses using the press coverage of a firm excluding coverage of insider trading news in the 30 days prior to insider trading transactions as the exclusion restriction. Second, we conduct analysis using a propensity score matched sample that joins insider trades that are similar across the observable determinants but have different press coverage outcome (covered vs. non-covered insider trades). Our Heckman selection model and propensity score matching analyses lend support to causal effects of media dissemination on insider trading profitability and the mispricing resulting of insider trading.

Tetlock (2011) shows that retail investors are more likely to aggressively trade on stale news and its subsequent return reversal is larger for stocks with high retail trading volume, which is consistent with retail investors overreacting to information. We perform the following analyses to gain insights on retail investors' contribution to insider trading profitability and mispricing. We find an increase in abnormal trading volume by retail investors after insider trading news dissemination, measured as the firm's daily average retail shares traded within two days of the insider trading minus the firm's average retail trading volume over days [-35, -5] where day 0 is the media dissemination date, scaled by the total shares outstanding.[2] On the other hand, we find that abnormal daily average of large trades decreases with insider trading news are disseminated.[3] Even though decreases in abnormal large trading volume may indicate institutional investors reduce their trading activities after insider trading news is disseminated, institutional investors can intentionally or mechanically

[2] Following Boehmer et al. (2017), we classify trades with a TAQ exchange code of "D" and prices with just above or just below a round penny as retail trades. Our results are robust to alternative 30- day windows moving from [-40,-11] to [-30, -1].

[3] We do not find any evidence of decrease or increase of abnormal daily average trades for all trades (Untabulated).

break up their trade size into small trades (Cready, Kumas, and Subasi 2014). Therefore, readers should interpret the result that abnormal large trades increase after insider trading news with caution. Overall, we provide suggestive evidence that media dissemination of insider trading news mainly affects retail investors, who mimic insider transactions after being informed about those transactions by the media, contributing to increased insider trading profitability and mispricing of relevant stocks.

We also conduct a few additional analyses. We examine whether the effect of media dissemination varies with firms' information environments. We find that the effect of media dissemination on insider trading profitability is weaker for firms with better information environments, likely because investors have other channels to get insider trading news. However, we do not find that the effect of media dissemination of routine insider trading on mispricing varies with firms' information environments. Finally, we use the subsample of media coverage initiation to re-run our main analyses and find that our results continue to hold, further dispelling the endogeneity concern.

Our study contributes to the literature in the following ways. In contrast to the growing literature that documents positive monitoring and information effects of the media, our paper provides evidence that media's disseminating information can have negative consequences, albeit unintended. In the case of insider trading, our analyses suggest that media coverage can be a double-edged sword. On one hand, as documented in Dai et al. (2015), media dissemination of insider trading news put corporate managers under the spotlight, which potentially disciplines them as manifested by reducing future insider trading profitability. On the other hand, news on insider trading reaches more investors via media dissemination. This enables more outside investors to take advantage of insider information by trading in the same directions as insiders, and consequently prices move further in the directions of insider transactions. As such, media coverage increases insiders' profitability for

the very transaction that it covers. Our finding that media coverage of a current insider transaction increases its profitability for insiders, countervailing the profitability-decreasing effect of media coverage of prior insider trading, helps us to have a comprehensive understanding of the roles of media in insider trading.

Drake et al. (2014) document that media dissemination of earnings announcement news reduces the mispricing of cash flows. We find that media dissemination contributes to mispricing, because it informs more investors about insider trading activities, who then trade in the same directions following the insiders, even for non-information based routine insider trading. Therefore, while media dissemination of certain news, such as earnings announcements and management forecasts, can reduce mispricing and speed up price discovery (Drake et al. 2014; Twedt 2016), its dissemination of insider trading news can contribute to mispricing. Further, the mispricing, and increased insider trading profitability as we document, is not a result of the media disseminating fake news or manipulated information. Disseminating plain facts through media to broader audience benefits corporate insiders and induces mispricing, which are unintended (negative) consequences of media dissemination. We demonstrate that a complete view of the roles of the media is more than governance and information asymmetry reduction as documented in extant research. As such, we add to the media literature.

The rest of the paper proceeds as follows. Section 2 discusses the literature and our hypotheses. Section 3 describes our sample and research design. We present the main results in Section 4 and additional analyses in Sections 5 and 6. Section 7 concludes the paper.

2. Literature review and hypothesis

2.1 Role of the media

Investors consider news media to be a more credible source of information than analyst reports or firm disclosures (Kothari, Li, and Short 2009). Prior research shows that media coverage reduces information asymmetry, helps markets assimilate information, and disciplines corporate managers. Media coverage also affects stock returns and cost of capital (Fang and Peress 2009) and media coverage around earnings announcements lowers information asymmetry measured by bid-ask spreads and market depth through disseminating firm-initiated news and creating new information (Bushee et al. 2010). Engelberg and Parsons (2011) find that local media coverage of earnings announcements strongly predicts local trading. Drake, Guest, and Twedt (2014) provide evidence that the broader dissemination of the earnings announcements news by the media mitigates the cash flow mispricing. Exploiting newspaper strikes to assess the causal impact of media, Peress (2014) demonstrates that dissemination of information to a broader audience improves the speed of incorporating information into stock price. Twedt (2016) shows that the media dissemination of management forecasts is associated with larger initial price reactions to those forecasts and an increased speed of price discovery. Rogers, Skinner, and Zechman (2016) find that price and volume respond within minutes after media dissemination of insider trading news. Ahn, Drake, Kyung, and Stice (2019) show that business press dissemination of analyst recommendation revisions increases market efficiency in that it is associated with stronger initial price reactions to, and weaker post revision drifts after, an analyst recommendation revisions. Overall, the evidence clearly shows that media coverage reduces information asymmetry and speeds up information assimilation and price discovery.

The literature also supports the view that media plays a corporate governance role. The media helps discipline managers by exposing and disseminating questionable and illegal managerial activities. Miller (2006) finds that the press plays a watchdog role by identifying and rebroadcasting accounting malfeasance. Dyck et al. (2008) show that media coverage

increases the probability of correcting corporate governance problems in Russian firms. Negative press coverage influences executive compensation (Kuhnen and Niessen 2012) and media attention prompts managers to abandon value-decreasing acquisitions (Liu and McConnel 2013). Dai et al. (2015) show that media dissemination of insider trading news based on Form 4 filings decreases the profitability of future insider transactions, thus playing a disciplining role on insider trading.

2.2 Insider trading and media dissemination of insider trading news

It has been well documented that insiders earn abnormal profits by trading the securities of their own firms, and that insider trading contains information that predict future returns (e.g., Jaffe 1974; Lahkonishok, and Lee 2001; Cohen, Malloy, and Pomorski 2012). Consequently, outsiders can profit from publicly available information about insider transactions by imitating these insiders, i.e., trading in the same directions as the insiders (e.g., Seyhun 1986; Seyhun 1998). In particular, Seyhun (1998) documents that stock price reacts to insider transactions over a 12-month period and continues to drift in the directions of insider transactions even after 12 months. More specifically, he finds that stocks purchased by insiders outperform the market by about 7% in the next 12 months while those sold by insiders underperform the market by about 5% over the next 12 months. Therefore, outside investors can use insider information in their advantage by trading following insiders.

The Securities and Exchange Act of 1934 required that insiders' transactions be disclosed via filing a Form 4 within 10 days of the following month in which insiders traded. The federal insider trading laws in the US were not actively enforced until the early 1960s. In fact, it was not even clear at what time after the filing time would outsiders have access to insider transaction information in the SEC filings. Around 2002, the SEC required that insiders make the filing with the SEC within two business days of an insider's transaction, significantly reducing the lag between insider transactions and SEC filing. Most filings are

indeed made within the two-business day period (e.g., Brochet 2010). In 2003, the SEC required that the insider trading filings be made electronically via its EDGAR system. As such, the insider trading information becomes publicly available within two business days of the actual trade. However, this does not necessarily mean that investors are fully aware of the news as the EDGAR has low visibility and investors pay less attention to low visibility news (e.g., Barber and Odean 2008), and thus media's dissemination role can be important. Rogers et al. (2016) document that the Dow Jones newswire dissemination of insider trading news available at EDGAR is associated with market reactions. More broadly, the literature on media finds that dissemination of information through press coverage increases activities of investors, especially those of retail investors (e.g., Tetlock 2011; Blankespoor et al. 2018; Bushee et al. 2018).

2.3 Media dissemination, insider trading profitability, and mispricing

Our first prediction is that the dissemination of insider trading news increases the profitability for insiders. As the preceding discussion indicates, media dissemination makes the insider trading information available to a broader group of investors. With this information, outside investors can earn profits by trading in the same directions as insider transactions, as the stock price drifts in the directions of insider trades for an extended period of time (e.g., Seyhun 1998). To the extent that these trading activities by outside investors push prices up (down) after insider purchases (sales), media dissemination of the insider trading increases the profitability of very insider transactions that the media covers. In other words, compared with an insider trade that has low or no media coverage, an insider trade that has high media coverage generates higher profitability for the insider.

Our second prediction is on the mispricing of stocks after insider trading. It is worth noting that not all insiders' transactions contain forward-looking private information about their firms. Some insider transactions are passive trading to close previously opened positions

(Seyhun 1998). More generally, insiders often trade for personal liquidity and diversification and such trades are considered routine trades as opposed to information-based or opportunistic trades (Cohen et al. 2012). Routine insider buys and sells, by definition, do not contain private information and play no signaling role about firms' future prospects. However, investors may not be able to distinguish insiders' routine trades from information-based trades. The media merely broadcasts these insider transactions to a broader audience without identifying the transactions as routine or information-based. Tetlock (2011) shows that investors, especially retail investors, may overreact to media coverage of firm news, which leads to subsequent return reversals. This implies that if media dissemination results in sufficient subsequent trading (i.e., an overreaction) by outside investors in the same directions as insiders' routine trading, then the stocks will be mispriced as prices are pushed up (down) for routine insider purchases (sales) that contain no information on firms' prospects.

3. Research design and sample

3.1 Research design

Following Jagolinzer, Larcker, and Taylor (2011), we define insider trading profit as the abnormal return from the Carhart (1997) four-factor model estimated over the interval of days [0, +180] where day 0 is the date of the insider transaction, i.e.,181 calendar days since the date of insider trading.

$$R_{ijt} - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + \varepsilon_{ijt} \quad (1)$$

In equation (1), we measure net trades by netting the transactions of all individual executive officers for a firm at each trading day (hereafter, firm-date net trades). $R_{ijt} - R_{mt}$ is the daily return to firm *i*'s common shares minus the CRSP value-weighted market return over the 181 days at executive *j*'s trading date *t*; SMB_t, HML_t, and UMD_t are the size, book-to-market, and

momentum factors (Fama and French 1993; Carhart 1997). We measure trading profit as the intercept (α) to net purchase and the negative of the intercept ($-\alpha$) to net sales (i.e., the magnitude of the loss avoided by stock sales withholding bad news).

To examine the effect of news coverage on insider trading, we estimate the following model of insider trading profits:

$$Alpha_t = \beta_0 + \beta_1 Cov\_Cur + \beta_2 Cov\_Pre + \beta_Z Controls + \text{FE} + \varepsilon_{i,t} \quad (2)$$

Our purpose is to estimate whether media coverage of an insider transaction affects the profitability of that transaction. Our variable of interest is *Cov_Cur*, the natural logarithm of one plus the number of news articles related to insider trading in the window of days [0, +7], where day 0 is the insider trading date.[4] Because Dai et al. (2015) find that news coverage on prior insider trading reduces future insider trading profits, we control for media coverage of prior insider trading. Specifically, *Cov_Pre* is defined as the natural logarithm of one plus the number of news articles on insider trading over days [-360, -1], where day 0 is the date of the current insider trading. We estimate OLS regression models for the full sample, the insider buy sample and the insider sell sample. When we estimate the model using the insider buy (sell) sample, we replace *Cov_Cur* and *Cov_Pre* with variables measuring media coverage of insider buys (sells) correspondingly. We define *Cov_Cur_Buy* (*Cov_Cur_Sell*) as the natural logarithm of one plus the number of news articles related to insider purchases (sales) in the window of days [0, +7]. Similarly, *Cov_Pre_Buy* (*Cov_Pre_Sell*) is defined as the natural logarithm of one plus the number of news articles on insider buys (sells) over the windows of days [-360, -1], where day 0 is the date of the current insider trading.

Following prior literature (Aboody and Lev 2000; Lakonishock and Lee 2001;

[4] Alternatively, we measure media dissemination with an indicator variable that equals one if news articles cover insider trading news within seven days of the insider transaction, and our results are robust to this alternative measure

Brochet 2010; Dai et al. 2015), we include the following determinants of insider trading profits in our model (*Controls*). We include firm size and market to book ratio to control for size and growth effects (Lakonishok and Lee 2001). We include past return market-adjusted stock returns (*PriorReturn*) to control for insiders' potential contrarian behavior (Lakonishok and Lee 2015). We include stock return volatility (*PriorVolatility*), and research and development expenses (*R&D*) to control for information risk and R&D intensity (Aboody and Lev 2000). To control for private information by insiders, we include size of insider trades (*LnNetTradeSize*). Prior insider trading frequency (*PriorITTrans* and *LnNumTrans*) is included to control for information content of insider trades and prior signals of insider trading. Finally, we include executive fixed effects and year fixed effects to control for any time-invariant executive specific characteristic and time specific effects. Detailed definition of all variables used in empirical analyses are provided in Appendix A. Standard errors are clustered at firm and quarter level.

To test the role of media dissemination in mispricing after insider trading, we compute a future alpha in the window of days [+181, +540] where day 0 is the date of the media dissemination of insider transaction, i.e., future abnormal returns starting from 181 days after, and ending 540 days after, the date of insider transaction($Alpha_{t+1}$).[5] We regress $Alpha_{t+1}$ on media coverage of current insider transactions using routine trading samples:

$$Alpha_{t+1} = \beta_0 + \beta_1 Cov\_Cur + \beta_2 Cov\_Pre + \beta_z Controls + \text{FE} + \varepsilon_{i,t} \qquad (3)$$

For this test, we restrict our sample into insider transactions executed by routine traders because routine trading is likely to be non-information-based insider trades (Cohen et al. 2012). If the business press disseminates news on routine insider trades and such dissemination leads to trading by outsiders as if the routine insider transaction contains

[5] In untabulated analysis, we also try future alpha over the interval of days [+181, +720] and obtain qualitatively similar results.

information, then the trading profits is likely to increase initially and then be reversed in the future, consistent with mispricing of insider transactions.

3.2 Sample and descriptive statistics

We obtain insider trading data from the Thomson Reuters Insider Filings database from January 2000 to December 2015. Following Dai et al. (2015), our sample is restricted to firms listed on the NYSE, AMEX, and NASDAQ and focus on open market purchases and sales of common stocks (CRSP share codes 10 and 11) traded by officers and directors. As in Dai et al. (2015), our sample excludes the following insider transactions: (1) insider transactions with fewer than 100 shares, (2) insider transaction with trading prices of less than $2, (3) insider transactions with traded prices beyond the range between the daily low and high prices, (3) insider transactions with the number of shares traded by insiders greater than the total number of outstanding shares, (4) insider transactions with the number of shares traded by insiders greater than the total daily trading volume, and (5) firms with SIC codes between 6000 and 6999 (financial industries) or between 4900 and 4999 (utilities industries).

We obtain media coverage on insider trading data from RavenPack Dow Jones Edition. We choose news articles which are categorized as "regulatory releases of insiders' transaction" following Dai et al. (2015). For each news story, RavenPack assigns company relevance and novelty scores ranging from 0 to 100 to measure its information content. We only include news articles with company relevance scores of 100 where a firm is treated as the main subject of the news article. We count the number of news articles for regulatory releases of an insider transaction over the next 7 days to calculate *Cov_Cur*. We count the number of news articles for regulatory release of prior insider trading activities over 360 days to calculate *Cov_Pre*. We obtain accounting data from Compustat, stock price data from CRSP, analyst coverage data from I/B/E/S, and institutional ownership data from Thompson Reuters.

Our sample consists of 412,656 observations of firm-date level insider transactions.[6] Table 1 presents the descriptive statistics of our full sample. The mean (median) trading profits, $Alpha_t$, is 0.000 (-0.0484) with a standard deviation of 0.22, which are comparable to those reported in Jagolinzer et al. (2011). On average, the mean number of news articles issued within 7 days of insider transaction is about 2.99 while on average 48.25 news articles are issued prior to the current insider transaction. Insider sell transactions are more likely to be covered by media than insider purchases.

4. Empirical results

4.1 Test for insider trading profitability

Table 2 presents the regression results of equations (2) and (3) for the full sample, and insider buy and sell trades samples. In full sample analysis, we find that the coefficient on *Cov_Cur* is positive and significant in column 1, indicating that the number of news articles covering the insider trading is positively associated with insider trading profit of that transaction. Therefore, we provide evidence that insider trading profits increases as the media disseminates the insider trading news more. We find a negative coefficient on *Cov_Pre* in column 1, suggesting media coverage on prior insider trading news reduces the profits of the current insider trade, consistent with media disciplining insider trading (Dai et al. 2015). In column 2, we add the interaction between media coverage of the current insider trade and media coverage of prior insider trading to equation (2). The coefficient on *Cov_Cur*Cov_Pre* is negative and significant, but the magnitude is much smaller at -0.0136 compared to that of the coefficient on *Cov_Cur* at 0.0776. This suggests that media coverage of an insider transaction increases its profitability, even though such profitability-increase effect is less

[6] Our results are robust to using executive-date level research design.

pronounced if the media also covers prior insider transactions. The results of the insider buys and insider sells subsamples presented in the rest of Table 2 are generally consistent with those of the full insider trading sample.

4.2 Test for mispricing

The results for mispricing tests are presented in Table 3. Consistent with Table 2, we find a positive relation between media coverage of insider trading and insider trading profits in column 1 of Table 3, indicating that media coverage increases insiders' trading profitability in the first 181 days for insider trades that are unlikely to contain private information. Column 2 of Table 3 present results using the future alpha i.e., abnormal returns over the interval of days [+181, +540]. We find that the coefficient on *Cov_Cur* is negative with a p-value smaller than 0.01. The result shows a long-run return reversal for non-information based routine insider trading. The evidence in Table 3 is consistent with our prediction that media dissemination of insider trading news results in overreactions by outside investors trading stocks in the same directions as insiders' routine trading and returns for those stocks subsequently being reversed. It suggests that the media contributes to mispricing through disseminating insider trading news to the public, which can be viewed as an unintended consequence of media effect of disseminating information.

4.3 Heckman selection model

Media coverage is not likely to be a random decision. In our case, unobservable factors related to media coverage decisions of insider transactions can be associated with future stock returns of those insider transactions. Following Drake et al. (2014), we employ the Heckman Selection model to mitigate the concern of the media selection bias. We model the likelihood that an insider trades receives press coverage using a probit regression (first stage model) and estimate following model:

$$
\begin{aligned}
Cov\_Cur\_Dum_t &= \gamma_0 + \gamma_1 Prior30dayCoverage_t + \gamma_2 LnMVE_t + \gamma_3 MB_t \\
&+ \gamma_4 Past\_Return_t + \gamma_5 Past\_Volatility_t + \gamma_6 R\&D_t \\
&+ \gamma_7 Ln\_Net\_TradeSize_t + \gamma_8 Prior\_IT\_Frequency_t \\
&+ \gamma_9 LnNumTransaction_t + \gamma_{10} SP1500_t \\
&+ \gamma_{11} LnEmployee_t + \gamma_{12} LnFirmAge_t \\
&+ \gamma_{13} InstitutionalOwnership_t + \gamma_{14} LnNumInstitution_t \\
&+ \varepsilon_{i,t}
\end{aligned} \tag{4}
$$

In the first-stage model, we include a comprehensive set of firm characteristics that likely affect insider trading press coverage. And we use the media coverage of a firm in the 30 days prior to the insider trading date excluding insider trading news articles (*Prior30dayCoverage*) as the exclusion restriction, similar to Drake et al. (2014). While the identification of the selection bias can come solely from the nonlinearity of the inverse Mills ratio, it is better practice to include exclusion restrictions (Little 1985; Lennox, Francis, and Wang 2012). In our case, the prior media coverage of a firm on non-insider-trading-related news is likely to be associated with media coverage on insider trading news, but unlikely to have a direct impact on future stock returns that also measure future profitability of insider trading. We perform additional tests to determine the validity of our exclusion restriction variable. Specifically, the coefficients on *Prior30dayCoverage* are statistically significant in all three first-stage determinant models reported in Panel A of Table 4. Moreover, we include *Prior30dayCoverage* in our second-stage regression and find that the coefficients on *Prior30dayCoverage* are not statistically significant (untabulated). This suggests that the exclusion restriction requirement is satisfied. In untabulated analyses, we sequentially estimate the first-stage determinant model omitting one variable a time. Our results remain the same when we drop all variables from the determinant model except the exclusion restriction variable (Bushee, Matsmoto, and Miller 2003).

Based on the coverage determinant model presented in Panel A of Table 4, we calculate the inverse Mills ratio (*IMR*). We then estimate equations (2) and (4) in the second-

stage of the Heckman selection model with the inclusion of inverse Mills ratio. As reported in Panel B and C of Table 4, our results continue to hold. Therefore, our selection model analyses lend support to causal effects of media dissemination on insider trading profitability and the mispricing of stocks in routine insider trading.

4.4 Propensity Score Matching

To mitigate the concerns that the cross-sectional differences between media-covered trades and non-covered trades drive our results, we employ propensity score matching to identify a sample of insider trades that did not receive press coverage but are similar across observable covariates to the insider trades that received press coverage. Therefore, we estimate the determinants model of Equation (4) and match each insider trade observation that received press coverage with a non-covered insider trade that has closest propensity score within a maximum distance of 1%. This matching procedure yields 245,275 observations for insider trading profitability tests and 12,755 observations for routine trades' mispricing tests, respectively. Results are presented in Panels D and E of Table 4. Our results remain for both the insider profitability test and the mispricing test, suggesting that our main findings are not likely to be driven by selection bias due to non-random coverage effect.

5. Who trades following insider trading news: retail versus institutional investors

In this section, we conduct an analysis to shed more light on the exact channel of how media dissemination of an insider transaction affects its profitability and possibly contributes to mispricing of the stock. In particular, we examine whether retail trading, institutional trading, or both drives the insider trading profitability and mispricing. Prior research documents that retail investors are more likely to trade on news disseminated by media (Tetlock 2011; Bushee et al. 2018). Moreover, institutional investors have superior ability to obtain and process information than retail investors and they mitigate mispricing of accounting information (Hand 1990, Walther 1997, Bartov, Radhakrishnan and Krinsky

2000, Collins, Gong and Hribar 2003). Therefore, we expect that unsophisticated (i.e., retail) investors are likely to be the source of increased insider trading profitability and the mispricing resulting from media coverage on insider trading.

To provide direct evidence that retail trades are affected by insider transactions covered with media coverage, we examine the abnormal trading volume by retail and institutional investors after media dissemination of insider trading news. Following Blankespoor et al. (2018), we examine the change in abnormal daily retail trading volume within two days following the press coverage of the insider trading news. To identify retail investor trades, we classify trades with a TAQ exchange code of "D" and prices with just above or just below a round penny as retail trades (Boehmer et al. 2017). We measure abnormal retail trading volume (*Abnormal_Retail_Trade [0,+2]*) as the firm's daily average retail shares traded over days [0,+2] divided by total shares outstanding, minus the firm's trailing average over days [-35, -5] divided by total shares outstanding, where day 0 is the media dissemination date.[7] Panel A of Table 5 reports results of this analysis for all insider transactions. We find significantly positive coefficient on *Cov_Cur* in column 1 (0.151 with a p-value <0.05), consistent with increases in retail traders engaging in more trading after the news is disseminated and thus driving insiders' trading profitability.[8]

We also examine institutional investor trades around insider trading transactions because large trades are most likely to reflect institutional investor activity. Following Bushee et al. (2018), we define large trades as trades greater than or equal to $50,000. Abnormal trading volume for large trades (*Abnormal_Large_Trade [0, +2]*) is measured as the firm's daily average shares traded over days [0,+2] divided by total shares outstanding, minus the firm's trailing average over days [-35, -5] divided by total shares outstanding,

[7] Our results are robust to alternative 30-day windows moving from [-40,-11] to [-31, -1].
[8] Our results are qualitatively the same if we use the sample of only opportunistic insider trading.

where day 0 is the media dissemination date. Column 2 of Table 5 Panel A reports regression results for large trades tests. We find a negative coefficient on *Cov_Cur* (-0.0188 with a p-value < 0.01), indicating decreases in the number of large trades. While decreases in abnormal large trading volume may suggest that institutional investors reduce their trading activities after insider trading news is disseminated, institutional investors can intentionally or mechanically break up their trade size into small trades (Cready, Kumas, and Subasi 2014) and thus large trades are a very noisy measure of institutional trading. Therefore, all the results regarding large trades should be interpreted with caution.

Next, to investigate whether mispricing is driven by retail or institutional investors, we examine abnormal retail and large trading volume for routine trading sample. The positive coefficient on *Cov_Cur* for routine trading sample supports our prediction that mispricing is driven by retail investors. Results are reported in column 1 of Panel B of Table 5. The estimated coefficient is 0.0382 and statistically significant with a p-value of less than 10%. In column 2 of Table 5 Panel B, we find the negative coefficient on *Cov_Cur*, suggesting that abnormal daily large trading volume decreases for the routine trading sample. Again, decreases in trading volume with large trade size do not necessarily indicate that institutional investors reduce their trading activities because institutional investors break up their trade size into small trades. Therefore, our results reported in Panel B of Table 5 are consistent with retail investors, not institutional investors, overreacting to insider trading news, causing mispricing of insider trading information. Overall, our evidence suggests that it is the retail investors that trade following the media dissemination of insider trading news, which consequently contribute to increased insider profitability and mispricing.

6. Additional analyses

6.1 Executive and News Types

In this section, we examine whether our documented effects of media dissemination vary with the types of executives and news article. We conjecture that the media dissemination effect is greater for senior officers' trades than others, such as non-senior officers or directors. We define officers in senior officers (TMT Officers) as CEO, CFO, COO, CTO, CIO, and General Counsel. Non-senior officers are defined as any executives which are not classified as TMT officers. Directors are defined as person who is listed as directors who do not hold any executive position in the firm. The results are presented in Panel A of Table 7. We find that increases in insider trading profitability for the first 6 months and subsequent profitability reversal for trades by senior officers, but not by non-senior officers. Consistent with our conjecture, non-senior officers' trades do not experience profitability reversal, suggesting that media-covered trades by non-senior officers are unlikely to be driven by mispricing through media's dissemination. In other words, mispricing effect exists when trades by senior executives, who are viewed to hold more important private information, are disseminated through business press.

Next, we investigate whether media dissemination effect is driven by media's general attention on firms, not media' specific coverage on insider trades news. Dai et al. (2015) document systematic differences in press coverage practices between insider trading-related news and general news on firms. Results are reported in Panel B of Table 7. Consistent with findings of Dai et al. (2015), we find insignificant coefficient on *Con_Cur* in model (1) and negative significant coefficient in model (2), which are inconsistent with our previous findings. Therefore, we conclude that our findings are less likely to be driven by media's general coverage on firm.

6.2.Other sensitivity test

We also conduct several untabulated analyses and find that the empirical results we document earlier are robust. First, to further alleviate the endogenity concern, we rerun our

main analyses using the media coverage initiation subsample where media started to cover a firm's insider trading news at some point in time but had not covered such news before. This helps to rule out the correlated omitted variables that drive our results. We find that our results continue to hold using this subsample, further dispelling the endogeneity concern. Second, we use an indicator variable measuring whether there is media coverage of insider trading news instead of the number of news article covering insider trading. We continue to find that media coverage affects insiders' trading profitability and mispricing. Finally, our results remain if we add the inverse Mills ratio to each of the regressions.

7. Conclusion

Prior studies provide evidence that media coverage disciplines corporate managers by reducing insider trading profitability and improves pricing efficiency by speeding up the incorporation of information into stock price. In contrast to these studies, we document that media dissemination of insider trading news can have negative consequences. Specifically, while an insider transaction's profitability is lower as a result of media dissemination of prior insider trading news, insiders' trading profitability increases with media coverage of that specific insider transaction. Moreover, media coverage of routine insider trade that contains no private information on firms' prospects results in mispricing of the stock as outside investors trade in the same directions as insiders do after being informed about the insider trading by the media. We also find that the effects of media dissemination on insider trading profitability and mispricing are mainly driven by trading activities of retail investors. Complementing the extant literature on the positive monitoring and information effects of media, our study documents the (unintended) negative consequences of media dissemination in which media merely broadcast plain facts to a broader audience. Therefore, we provide a

complete view of the roles of the media beyond governance and information asymmetry reduction.

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Appendix A. Variable Definition

Variable Name	Description
Alpha [0, +180]	Abnormal daily return based on the four-factor model in a window [0, +180] following the transaction, where day 0 is the insider trading date. For insider sale transaction, abnormal daily return is multiplied by –1
Alpha [+181, +540]	Abnormal daily return to firm i's common shares minus the CRSP value-weighted market return over the 360 days starting from 181 days after the date of insider transaction
Abnormal_Retail_Trade [0,+2]	The firm's daily average retail shares traded over days [0, +2] divided by total shares outstanding, minus the firm's trailing average over days [-30, -1] divided by total shares outstanding, where day 0 is the insider filing date
Abnormal_Large_Trade [0,+2]	The firm's daily average shares traded over days [0, +2] divided by total shares outstanding, minus the firm's trailing average over days [-31, -1] divided by total shares outstanding, where day 0 is the insider trading filing date
Cov_Cur	Log of one plus the number of news coverage on insider trading in the window of days [0, +7] where day 0 is the date of insider transaction
Cov_Pre	Log of one plus the number of news coverage on insider trading in the window of days [-360, -1] where day 0 is the date of insider transaction
Cov_Cur_Buy	Log number of news coverage on insider buy transaction in a window [0, +7] on and after the date of insider buy transaction
Cov_Pre_Buy	Log number of news coverage on insider buy transaction in a window [-360, -1] prior to insider buy transaction
Cov_Cur_Sell	Log number of news coverage on insider sell transaction in a window [0, +7] on and after the date of insider sell transaction
Cov_Pre_Sell	Log number of news coverage on insider sell transaction in a window [-360, -1] prior to insider sell transaction
Cov_Cur_Dum	An indicator variable that equals one if the number of news coverage on insider trading in the window of days [0, +7] where day 0 is the date of insider transaction is greater than 0 and zero otherwise
LnMVE	Log of market capitalization prior to the transaction
MB	Market to book equity ratio in a fiscal quarter t prior to insider transaction
Return	Market adjusted return in a window [-360, -1] prior to insider transaction
Volatility	Standard deviation of dailty stock returns in a window [-360, -1] prior to insider transaction
R&D	An indicator variable equals to one if R&D > 0
LnNetTradeSize	Log of net transaction size in dollars in date t
LnPriorITFrequency	Log of insider transaction frequency in a window [-360, -1]
LnNumTransaction	Log of total number of transactions in date t
Analyst Following	Log of the number of analysts following a firm i
SP1500	An indicator variable that equals one if a firm has membership in the S&P 1500 stock index in year t and zero otherwise
Return Volatility	Standard deviation of daily stock returns in the past 60 months
LnEmployee	Log of number of employees
LnFirmAge	Log of firm age
InstitutionalOnwership	Percentage of institutional ownership
LnNumInstitution	Log of number of institutional investors
Prior30dayCoverage	An indicator variable that equals one if a firm is covered by media during 30 days prior to insider trading transactions date excluding insider trading news articles

Table 1. Descriptive Statistics

Variable	Obs	Mens	Q1	Median	Q3	SD
$Alpha_t$ [0, +180]	412,656	0.0000	-0.1200	-0.0484	0.1157	0.2241
$Alpha_{t+1}$ [+181, +540]	412,656	-0.0864	-0.1645	-0.0600	0.0184	0.1821
Cov_Cur	412,656	1.0159	0	1.0986	1.6094	0.8443
Cov_Pre	412,656	3.0603	2.3026	3.4965	4.2047	1.5849
Cov_Cur_Buy	412,656	0.1473	0	0	0	0.3959
Cov_Pre_Buy	412,656	1.1044	0	0.6931	1.9459	1.1078
Cov_Cur_Sell	412,656	0.6963	0	0.6931	1.0986	0.6974
Cov_Pre_Sell	412,656	2.1981	0.6931	2.4849	3.4012	1.5493
LnMVE	412,656	7.0674	5.8551	6.9290	8.1594	1.8006
MB	412,656	2.6665	1.3801	1.9660	3.1047	2.1033
Past_Return	412,656	0.2642	-0.0949	0.1143	0.4175	0.6677
Past_Volatility	412,656	0.0278	0.0171	0.0241	0.0343	0.0150
R&D	412,656	0.5046	0	1	1	0.5000
Ln_Net_TradeSize	412,656	9.1308	8.0085	9.2104	10.1592	1.6228
Prior_IT_Freuqnecy	412,656	3.8642	2.9444	3.8067	4.7185	1.4266
LnNumTransaction	412,656	0.7214	0	0	1.0986	0.9565
Opportunistic_IT	412,656	7.0674	5.8551	6.9290	8.1594	1.8006
LnTotal_500	407,375	0.9169	0.6931	0.6931	1.3863	0.7119
LnClosest_Distance	400,791	5.0962	3.9265	5.3091	6.7331	1.8513
Abnormal_Retail_Trade [0,+2]	19,058	0.0003	-0.0013	0.0000	0.0015	0.0047
Abnormal_Large_Trade [0,+2]	23,495	-0.0001	-0.0005	0.0000	0.0002	0.0043

Table 2. News Coverage on Insider Trading Profits

	$Alpha_t[0, +180]$					
	Full Sample		Buy Trade		Sell Trade	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Cov_Cur	0.0275***	0.0810***				
	(0.0000)	(0.0000)				
Cov_Pre	-0.0497***	-0.0409***				
	(0.0000)	(0.0000)				
*Cov_Cur*Cov_Pre*		-0.0120***				
		(0.0000)				
Cov_Cur_Buy			0.0256**	-0.0027		
			(0.0294)	(0.8838)		
Cov_Pre_Buy			-0.0057	-0.0160**		
			(0.3008)	(0.0115)		
*Cov_Cur_Buy*Cov_Pre_Buy*				0.0111*		
				(0.0713)		
Cov_Cur_Sell					0.0374***	0.0911***
					(0.0000)	(0.0000)
Cov_Pre_Sell					-0.0557***	-0.0452***
					(0.0000)	(0.0000)
*Cov_Cur_Sell*Cov_Pre_Sell*						-0.0130***
						(0.0000)
LnMVE	0.0085**	0.0089**	-0.0022	-0.0029	0.0102***	0.0106***
	(0.0134)	(0.0110)	(0.6491)	(0.5404)	(0.0068)	(0.0055)
MB	0.0017	0.0017	-0.0027	-0.0028	0.0019	0.0018
	(0.5565)	(0.5752)	(0.3499)	(0.3133)	(0.5460)	(0.5659)
Past_Return	-0.0046	-0.0042	-0.0139	-0.0140	0.0035	0.0040
	(0.4631)	(0.5102)	(0.1333)	(0.1305)	(0.6055)	(0.5684)
Past_Volatility	0.9701***	0.9135***	2.2739***	2.3125***	0.2064	0.2050
	(0.0008)	(0.0011)	(0.0000)	(0.0000)	(0.5337)	(0.5188)

R&D	0.0006	0.0009	0.0010	0.0008	0.0020	0.0019
	(0.9270)	(0.8965)	(0.9163)	(0.9362)	(0.7823)	(0.7911)
Ln_Net_TradeSize	-0.0036*	-0.0043**	0.0087***	0.0086***	-0.0052***	-0.0061***
	(0.0515)	(0.0167)	(0.0005)	(0.0006)	(0.0075)	(0.0014)
Prior_IT_Freuqnecy	0.0062**	0.0082***	-0.0026	-0.0034	0.0109***	0.0126***
	(0.0274)	(0.0034)	(0.4478)	(0.3213)	(0.0003)	(0.0000)
LnNumTransaction	0.0018	0.0017	-0.0057	-0.0056	0.0009	0.0005
	(0.3225)	(0.3562)	(0.2281)	(0.2331)	(0.6090)	(0.8017)
SP1500	-0.0145**	-0.0139**	0.0006	0.0011	-0.0171**	-0.0159**
	(0.0401)	(0.0486)	(0.9598)	(0.9272)	(0.0233)	(0.0328)
LnEmployee	-0.0032	-0.0029	-0.0042	-0.0034	-0.0058	-0.0060
	(0.4346)	(0.4768)	(0.4988)	(0.5865)	(0.1917)	(0.1804)
LnFirmAge	-0.0076*	-0.0081*	0.0045	0.0040	-0.0125**	-0.0129***
	(0.0934)	(0.0539)	(0.4824)	(0.5286)	(0.0118)	(0.0053)
InstitutionalOwnership	-0.0197	-0.0270	0.0229	0.0272	-0.0232	-0.0299
	(0.2918)	(0.1478)	(0.4170)	(0.3387)	(0.2425)	(0.1283)
LnNumInstitution	0.0011	0.0012	-0.0024	-0.0026	0.0014	0.0016
	(0.6646)	(0.6088)	(0.5444)	(0.5169)	(0.5806)	(0.5368)
Constant	0.0938***	0.0591**	-0.0831**	-0.0592	0.0857***	0.0512*
	(0.0004)	(0.0273)	(0.0500)	(0.1581)	(0.0034)	(0.0793)
Industry/Year Fixed	Yes	Yes	Yes	Yes	Yes	Yes
Firm Clustering	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,471,757	1,471,757	124,683	124,683	1,347,074	1,347,074
Adjusted R-squared	0.0522	0.0568	0.0377	0.0383	0.0694	0.0753

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests.

Table 3. Reversal of Trading Profits by Routine Traders

Dependent Variable	$Alpha_t$ [0, +180]	$Alpha_{t+1}$ [+181, +540]
VARIABLES	(1)	(2)
Cov_Cur	**0.0141***	**-0.0070****
	(0.0619)	**(0.0147)**
Cov_Pre	-0.0390***	-0.0058
	(0.0011)	(0.3888)
LnMVE	0.0047	0.0065
	(0.5831)	(0.1118)
MB	-0.0027	-0.0088***
	(0.4447)	(0.0010)
Past_Return	0.0345**	-0.2106***
	(0.0178)	(0.0000)
Past_Volatility	1.7813*	-0.1173
	(0.0628)	(0.8898)
R&D	-0.0038	-0.0235**
	(0.8685)	(0.0237)
Ln_Net_TradeSize	-0.0038	0.0005
	(0.2904)	(0.7926)
Prior_IT_Freuqnecy	0.0101*	0.0037
	(0.0542)	(0.2152)
LnNumTransaction	-0.0011	0.0041*
	(0.8523)	(0.0963)
SP1500	0.0056	-0.0027
	(0.8112)	(0.7936)
LnEmployee	-0.0085	-0.0057
	(0.4632)	(0.2566)
LnFirmAge	0.0242*	-0.0090
	(0.0937)	(0.3512)
InstitutionalOwnership	-0.0570	-0.1019***
	(0.2273)	(0.0015)
LnNumInstitution	0.0026	0.0054*
	(0.6386)	(0.0500)
Constant	0.0530	0.0916*
	(0.4403)	(0.0812)
Industry/Year Fixed	Yes	Yes
Firm Clustering	Yes	Yes
Observations	24,365	24,365
Adjusted R-squared	0.1340	0.6861

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests.

Table 4. Reversal of Trading Profits by Insider Trading Under Rule 10b5-1 Plan

Dependent Variable	$Alpha_t$ *[0, +180]* (1)	$Alpha_{t+1}$ *[+181, +540]* (2)
Cov_Cur	0.0259***	-0.0069***
	(0.0031)	(0.0068)
Cov_Pre	-0.0715***	-0.0039
	(0.0000)	(0.3469)
LnMVE	-0.0042	-0.0000
	(0.6162)	(0.9878)
MB	0.0096***	-0.0023*
	(0.0086)	(0.0708)
Past_Return	0.0102	-0.2119***
	(0.4956)	(0.0000)
Past_Volatility	-1.1729	-0.2652
	(0.2302)	(0.5542)
R&D	-0.0123	-0.0012
	(0.4822)	(0.8577)
Ln_Net_TradeSize	0.0069	0.0003
	(0.1010)	(0.8360)
Prior_IT_Freuqnecy	0.0109	0.0008
	(0.2233)	(0.7365)
LnNumTransaction	-0.0175**	0.0022
	(0.0102)	(0.3704)
SP1500	0.0248	0.0104*
	(0.1781)	(0.0507)
LnEmployee	0.0023	-0.0013
	(0.7989)	(0.6522)
LnFirmAge	-0.0031	0.0051
	(0.8065)	(0.1576)
InstitutionalOwnership	-0.0135	0.0038
	(0.8153)	(0.8497)
LnNumInstitution	-0.0073	-0.0001
	(0.1377)	(0.9721)
Constant	0.2114**	-0.0056
	(0.0490)	(0.8736)
Industry/Year Fixed	Yes	Yes
Firm Clustering	Yes	Yes
Observations	17,021	17,021
Adjusted R-squared	0.1346	0.8212

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests.

Table 5. Heckman Selection Model

Panel A) First-Stage Selection Regression

VARIABLES	***Cov_Cur_Dum*** (1)	***Buy_Cov_Dum*** (2)	***Sell_Cov_Dum*** (3)
Prior30dayCoverage	0.111***	0.001	0.143***
	(0.000)	(0.875)	(0.000)
LnMVE	0.049***	0.008***	0.028***
	(0.000)	(0.000)	(0.000)
MB	-0.020***	0.002*	-0.027***
	(0.000)	(0.072)	(0.000)
Past_Return	-0.030***	-0.220***	0.103***
	(0.000)	(0.000)	(0.000)
Past_Volatility	-12.826***	-4.625***	-20.949***
	(0.000)	(0.000)	(0.000)
R&D	0.064***	0.011***	0.063***
	(0.000)	(0.000)	(0.000)
Ln_Net_TradeSize	0.009***	-0.010***	0.021***
	(0.000)	(0.000)	(0.000)
Prior_IT_Freuqnecy	0.193***	-0.013***	0.254***
	(0.000)	(0.000)	(0.000)
LnNumTransaction	-0.073***	0.007***	-0.106***
	(0.000)	(0.000)	(0.000)
SP1500	-0.197***	-0.192***	-0.144***
	(0.000)	(0.000)	(0.000)
LnEmployee	-0.048***	0.005***	-0.054***
	(0.000)	(0.007)	(0.000)
LnFirmAge	0.108***	0.198***	0.080***
	(0.000)	(0.000)	(0.000)
InstitutionalOwnership	-0.088***	-0.704***	-0.001
	(0.000)	(0.000)	(0.903)
LnNumInstitution	0.059***	0.044***	0.057***
	(0.000)	(0.000)	(0.000)
Constant	-0.938***	-1.082***	-1.279***
	(0.000)	(0.000)	(0.000)
	0.111***	0.001	0.143***
Observations	335,556	335,556	335,556
Adjusted R-squared	0.0686	0.0350	0.105

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests.

Panel B) Second-Stage Regression – Insider Trading Profitability

	$Alpha_i[0, +180]$		
	Full	Buy	Sell
VARIABLES	(1)	(2)	(3)
Cov_Cur	0.0275***		
	(0.0000)		
Cov_Pre	-0.0497***		
	(0.0000)		
Cov_Cur_Buy		0.0255**	
		(0.0302)	
Cov_Pre_Buy		-0.0060	
		(0.2584)	
Cov_Cur_Sell			0.0375***
			(0.0000)
Cov_Pre_Sell			-0.0556***
			(0.0000)
LnMVE	0.0086**	0.0012	0.0089*
	(0.0476)	(0.8334)	(0.0579)
MB	0.0017	-0.0041	0.0024
	(0.5961)	(0.1723)	(0.4706)
Past_Return	-0.0046	-0.0157*	0.0045
	(0.4623)	(0.0970)	(0.5166)
Past_Volatility	0.9353	1.3404	0.6200
	(0.2690)	(0.2235)	(0.4928)
R&D	0.0008	0.0055	-0.0001
	(0.9219)	(0.6234)	(0.9944)
Ln_Net_TradeSize	-0.0036**	0.0092***	-0.0055***
	(0.0472)	(0.0004)	(0.0040)
Prior_IT_Freuqnecy	0.0067	0.0114	0.0050
	(0.5871)	(0.4588)	(0.6973)
LnNumTransaction	0.0016	-0.0108	0.0032
	(0.7223)	(0.1507)	(0.4907)
SP1500	-0.0150	-0.0136	-0.0114
	(0.3074)	(0.4638)	(0.4574)
LnEmployee	-0.0033	-0.0078	-0.0043
	(0.5362)	(0.2897)	(0.4630)
LnFirmAge	-0.0073	0.0125	-0.0158*
	(0.3950)	(0.2675)	(0.0770)
InstitutionalOwnership	-0.0199	0.0168	-0.0210
	(0.3021)	(0.5571)	(0.3050)
LnNumInstitution	0.0012	0.0020	-0.0004
	(0.7788)	(0.7543)	(0.9353)
IMR	0.0043	0.1153	-0.0513
	(0.9643)	(0.3312)	(0.6107)
Constant	0.0882	-0.2407	0.1527
	(0.5128)	(0.1625)	(0.2727)

Industry/Year Fixed	Yes	Yes	Yes
Firm Clustering	Yes	Yes	Yes
Observations	1,471,757	124,683	1,347,074
Adjusted R-squared	0.0522	0.0379	0.0695

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests.

Panel C) Second-Stage Regression – Mispricing of Routine Trade Sample

VARIABLES	$Alpha_t$ [0, +180] (1)	$Alpha_{t+1}$ [+181, +540] (2)
Cov_Cur	0.0144*	-0.0071**
	(0.0524)	(0.0123)
Cov_Pre	-0.0397***	-0.0054
	(0.0009)	(0.4274)
LnMVE	-0.0024	0.0109**
	(0.8407)	(0.0287)
MB	0.0005	-0.0108***
	(0.9164)	(0.0008)
Past_Return	0.0415**	-0.2149***
	(0.0103)	(0.0000)
Past_Volatility	4.5963*	-1.8563
	(0.0948)	(0.2076)
R&D	-0.0170	-0.0153
	(0.4869)	(0.1636)
Ln_Net_TradeSize	-0.0049	0.0012
	(0.1861)	(0.5413)
Prior_IT_Freuqnecy	-0.0270	0.0267
	(0.4088)	(0.1515)
LnNumTransaction	0.0123	-0.0041
	(0.3380)	(0.5487)
SP1500	0.0383	-0.0228
	(0.2418)	(0.2678)
LnEmployee	0.0016	-0.0119
	(0.9207)	(0.1128)
LnFirmAge	0.0020	0.0047
	(0.9271)	(0.7690)
InstitutionalOwnership	-0.0368	-0.1144***
	(0.4342)	(0.0007)
LnNumInstitution	-0.0094	0.0128**
	(0.3783)	(0.0236)
IMR	-0.3420	0.2113
	(0.2699)	(0.1980)
Constant	0.4781	-0.1710
	(0.2079)	(0.4269)
Industry/Year Fixed	Yes	Yes
Firm Clustering	Yes	Yes
Observations	24,365	24,365
Adjusted R-squared	0.1356	0.6873

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests

Panel D) Propensity Score Matching – Insider Trading Profitability

	$Alpha_i[0, +180]$		
	Full	Buy	Sell
VARIABLES	(1)	(2)	(3)
Cov_Cur	0.0275***		
	(0.0000)		
Cov_Pre	-0.0458***		
	(0.0000)		
Cov_Cur_Buy		0.0286***	
		(0.0100)	
Cov_Pre_Buy		-0.0101*	
		(0.0559)	
Cov_Cur_Sell			0.0386***
			(0.0000)
Cov_Pre_Sell			-0.0524***
			(0.0000)
LnMVE	0.0099***	0.0001	0.0118***
	(0.0022)	(0.9867)	(0.0008)
MB	0.0000	-0.0031	0.0002
	(0.9887)	(0.2948)	(0.9262)
Past_Return	-0.0042	-0.0090	0.0033
	(0.4507)	(0.4003)	(0.5903)
Past_Volatility	1.0117***	2.5032***	0.2305
	(0.0001)	(0.0000)	(0.4407)
R&D	-0.0028	-0.0068	-0.0012
	(0.6478)	(0.5129)	(0.8578)
Ln_Net_TradeSize	-0.0024*	0.0081***	-0.0039**
	(0.0829)	(0.0021)	(0.0104)
Prior_IT_Freuqnecy	0.0052**	-0.0051	0.0109***
	(0.0411)	(0.2063)	(0.0001)
LnNumTransaction	0.0002	-0.0028	-0.0014
	(0.9260)	(0.5964)	(0.4205)
SP1500	-0.0140**	0.0002	-0.0170***
	(0.0178)	(0.9899)	(0.0073)
LnEmployee	-0.0047	-0.0048	-0.0075**
	(0.1592)	(0.4652)	(0.0393)
LnFirmAge	-0.0024	0.0043	-0.0064
	(0.5114)	(0.5114)	(0.1102)
InstitutionalOwnership	-0.0176	0.0296	-0.0241
	(0.3333)	(0.3370)	(0.2228)
LnNumInstitution	0.0013	-0.0042	0.0020
	(0.5772)	(0.3432)	(0.3995)
Constant	0.0570**	-0.0860*	0.0463*
	(0.0140)	(0.0643)	(0.0725)
Industry/Year Fixed	Yes	Yes	Yes
Firm Clustering	Yes	Yes	Yes

Observations	1,102,973	97,352	1,005,621
Adjusted R-squared	0.0463	0.0366	0.0637

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests.

Panel E) Propensity Score Matching – Mispricing of Routine Trade Sample

VARIABLES	$Alpha_t$ [0, +180] (1)	$Alpha_{t+1}$ [+181, +540] (2)
Cov_Cur	0.0170**	-0.0070**
	(0.0369)	(0.0179)
Cov_Pre	-0.0355***	-0.0052
	(0.0037)	(0.4056)
LnMVE	0.0069	0.0056*
	(0.4364)	(0.0997)
MB	-0.0022	-0.0085***
	(0.5445)	(0.0007)
Past_Return	0.0303**	-0.2153***
	(0.0458)	(0.0000)
Past_Volatility	2.3460**	-0.3616
	(0.0221)	(0.5956)
R&D	-0.0147	-0.0240**
	(0.5220)	(0.0167)
Ln_Net_TradeSize	-0.0024	0.0010
	(0.4904)	(0.5645)
Prior_IT_Freuqnecy	0.0074	0.0041
	(0.2172)	(0.1557)
LnNumTransaction	-0.0013	0.0024
	(0.8300)	(0.3129)
SP1500	0.0131	-0.0023
	(0.6162)	(0.8001)
LnEmployee	-0.0104	-0.0056
	(0.3700)	(0.1876)
LnFirmAge	0.0202	-0.0049
	(0.1642)	(0.5713)
InstitutionalOwnership	-0.0778	-0.0959***
	(0.1215)	(0.0013)
LnNumInstitution	0.0029	0.0051*
	(0.6115)	(0.0636)
Constant	0.0296	0.0764
	(0.6612)	(0.1012)
Industry/Year Fixed	Yes	Yes
Firm Clustering	Yes	Yes
Observations	17,090	17,166
Adjusted R-squared	0.1192	0.7116

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests

Table 6. Effect of Media Coverage on Insider Trading on Retail, and Large Trades

Panel A) Full Sample

Dependent Variable	Abnormal Trading Volume	
	Abnormal_Retail_Trade [0,+2]	*Abnormal_Large_Trade* [0,+2]
	(1)	(2)
Cov_Cur	**0.0151****	**-0.0188*****
	(0.0394)	**(0.0004)**
Cov_Pre	-0.0131**	0.0073
	(0.0463)	(0.1504)
LnMVE	0.0036	-0.0242***
	(0.3274)	(0.0000)
MB	0.0027	-0.0019
	(0.3612)	(0.3646)
Past_Return	0.0065	-0.0547***
	(0.5477)	(0.0000)
Past_Volatility	0.0721	-0.9558**
	(0.9061)	(0.0464)
R&D	0.0019	0.0039
	(0.8769)	(0.7162)
Ln_Net_TradeSize	-0.0033	-0.0073***
	(0.1972)	(0.0006)
Prior_IT_Freuqnecy	-0.0035	0.0008
	(0.3286)	(0.7980)
LnNumTransaction	0.0010	-0.0054*
	(0.7749)	(0.0863)
Constant	0.1875	0.2456**
	(0.1071)	(0.0453)
Industry/Year Fixed	Yes	Yes
Firm Clustering	Yes	Yes
Observations	19,058	23,495
Adjusted R-squared	0.0065	0.0167

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests.

Panel B) Abnormal Trading Volume for Routine Trading Sample

Dependent Variable	Abnormal Trading Volume	
	Abnormal_Retail_Trade [0,+2]	*Abnormal_Large_Trade* [0,+2]
	(1)	(2)
Cov_Cur	**0.0382***	**-0.0321****
	(0.0965)	**(0.0220)**
Cov_Pre	0.0052	0.0210
	(0.8154)	(0.1943)
LnMVE	0.0017	0.0055
	(0.8728)	(0.6495)
MB	-0.0013	0.0082
	(0.8930)	(0.1270)
Past_Return	-0.0038	-0.0725**
	(0.8921)	(0.0120)
Past_Volatility	0.0309	1.7966
	(0.9881)	(0.3010)
R&D	-0.0072	-0.0387
	(0.8664)	(0.3454)
Ln_Net_TradeSize	-0.0012	-0.0115
	(0.8895)	(0.1183)
Prior_IT_Freuqnecy	-0.0121	-0.0240**
	(0.2960)	(0.0353)
LnNumTransaction	-0.0019	0.0174*
	(0.8382)	(0.0795)
Constant	-0.1058	-0.1331
	(0.5016)	(0.4697)
Industry/Year Fixed	Yes	Yes
Firm Clustering	Yes	Yes
Observations	1,691	1,504
Adjusted R-squared	0.0071	0.0182

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests.

Table 7. Cross-Sectional Analysis - Reversal of Trading Profits of Routine Trade Sample

Panel A) Executive Officers and Directors

	Senior Officers		Non-Senior Officers		Directors	
Dependent Variables	$Alpha_t[0, +180]$	$Alpha_t[+180, +540]$	$Alpha_t[0, +180]$	$Alpha_t[+180, +540]$	$Alpha_t[0, +180]$	$Alpha_t[+180, +540]$
	(1)	(2)	(3)	(4)	(5)	(6)
Cov_Cur	0.0297***	-0.0094***	0.0284***	-0.0038	0.0297***	-0.0110***
	(0.0000)	(0.0042)	(0.0006)	(0.2796)	(0.0000)	(0.0001)
Cov_Pre	-0.0590***	-0.0081***	-0.0521***	-0.0002	-0.0398***	-0.0035*
	(0.0000)	(0.0016)	(0.0000)	(0.9385)	(0.0000)	(0.0840)
LnMVE	0.0082*	0.0066***	0.0170**	0.0018	0.0073	0.0052**
	(0.0882)	(0.0046)	(0.0265)	(0.5494)	(0.1248)	(0.0325)
MB	0.0017	-0.0036**	-0.0014	-0.0029	0.0032	-0.0034***
	(0.6178)	(0.0167)	(0.7425)	(0.1467)	(0.4491)	(0.0076)
Past_Return	-0.0012	-0.1683***	-0.0068	-0.1839***	-0.0037	-0.1622***
	(0.8976)	(0.0000)	(0.5486)	(0.0000)	(0.6654)	(0.0000)
Past_Volatility	0.9948**	-2.0506***	0.6064	-2.8459***	1.2029***	-1.9177***
	(0.0263)	(0.0000)	(0.4030)	(0.0000)	(0.0035)	(0.0000)
R&D	0.0039	0.0030	0.0009	0.0085	-0.0006	0.0018
	(0.6915)	(0.4788)	(0.9585)	(0.1670)	(0.9498)	(0.7233)
Ln_Net_TradeSize	-0.0029	-0.0028*	-0.0047	-0.0039*	-0.0041	-0.0058***
	(0.2546)	(0.0568)	(0.2445)	(0.0853)	(0.1724)	(0.0000)
Prior_IT_Freuqnecy	0.0100***	-0.0001	0.0108**	-0.0033*	0.0017	0.0012
	(0.0054)	(0.9692)	(0.0213)	(0.0993)	(0.6611)	(0.3810)
LnNumTransaction	0.0028	0.0012	-0.0037	0.0035	0.0025	0.0030*
	(0.2000)	(0.3974)	(0.4978)	(0.1287)	(0.4584)	(0.0601)
SP1500	-0.0143	0.0060	-0.0142	-0.0000	-0.0214*	0.0085*
	(0.1185)	(0.1066)	(0.3267)	(0.9968)	(0.0696)	(0.0668)
LnEmployee	-0.0052	-0.0052**	-0.0085	-0.0035	0.0021	-0.0032

	(0.4090)	(0.0451)	(0.2915)	(0.3233)	(0.7179)	(0.2448)
LnFirmAge	-0.0033	-0.0033	-0.0162*	-0.0043	-0.0119*	0.0052
	(0.5522)	(0.3668)	(0.0925)	(0.3798)	(0.0692)	(0.1097)
InstitutionalOwnership	-0.0154	-0.0513***	-0.0142	-0.0242	-0.0145	-0.0513***
	(0.5264)	(0.0020)	(0.7339)	(0.1450)	(0.5819)	(0.0001)
LnNumInstitution	-0.0010	0.0020	0.0050	0.0006	0.0007	0.0011
	(0.7570)	(0.1761)	(0.2776)	(0.7565)	(0.8361)	(0.5019)
Constant	0.0941***	0.0753***	0.0723	0.1046***	0.0799**	0.0682***
	(0.0087)	(0.0015)	(0.2082)	(0.0055)	(0.0212)	(0.0004)
						-0.0110***
Industry/Year Fixed	Yes	Yes	Yes	Yes	Yes	Yes
Firm Clustering	Yes	Yes	Yes	Yes	Yes	Yes
Observations	478,824	480,338	70,490	70,709	481,570	483,552
Adjusted R-squared	0.0793	0.5694	0.0561	0.6283	0.0437	0.4996

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests.

Panel B) Non-Insider Trading News Coverage

Dependent Variables	$Alpha_t$ [0, +180] (1)	$Alpha_{t+1}$ [+181, +540] (2)
Cov_Cur	**-0.0026**	**-0.0024*** **
	(0.1482)	**(0.0006)**
Cov_Pre	-0.0063	-0.0007
	(0.1822)	(0.7604)
LnMVE	0.0027	0.0031*
	(0.4727)	(0.0649)
MB	-0.0001	-0.0029***
	(0.9839)	(0.0043)
Past_Return	-0.0058	-0.1723***
	(0.3487)	(0.0000)
Past_Volatility	1.1771***	-2.0754***
	(0.0002)	(0.0000)
R&D	0.0019	0.0027
	(0.7866)	(0.3512)
Ln_Net_TradeSize	-0.0014	-0.0042***
	(0.4514)	(0.0000)
Prior_IT_Freuqnecy	-0.0036	-0.0030***
	(0.2283)	(0.0031)
LnNumTransaction	0.0048**	0.0012
	(0.0110)	(0.2038)
SP1500	-0.0138*	0.0076***
	(0.0525)	(0.0050)
LnEmployee	-0.0005	-0.0021
	(0.9105)	(0.1896)
LnFirmAge	-0.0004	-0.0002
	(0.9291)	(0.9117)
InstitutionalOwnership	-0.0071	-0.0402***
	(0.7159)	(0.0000)
LnNumInstitution	-0.0001	0.0018**
	(0.9685)	(0.0492)
Constant	0.0148	0.0742***
	(0.5993)	(0.0000)
Industry/Year Fixed	Yes	Yes
Firm Clustering	Yes	Yes
Observations	1,471,757	1,477,379
Adjusted R-squared	0.0158	0.5679

All variables are defined in Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. *p*-values are presented in parentheses. * indicates statistical significance at the 0.10 level for two-sided tests. ** indicates statistical significance at the 0.05 level for two-sided tests. *** indicates statistical significance at the 0.01 level for two-sided tests