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The Impact of Internet Articles on Investor Trading Decisions by Investor Types: Evidence from Korean Stock Market

Abstract:

This study investigates the impact of internet articles, such as blogs or internet community posts, on investors' trading decisions in response to uncertain news (i.e., rumors). Leveraging the unique disclosure requirement in Korea, which verifies rumors via firm disclosures, we are able to identify trading activities associated with rumors. We find that internet article coverage affects individual investors' decisions, but not those of institutional investors. Moreover, the post-disclosure returns deteriorate only for individual investors with internet article coverage. Overall, these results suggest that internet articles adversely affect individual investors' trading decisions on rumors, resulting in a wealth transfer from individual investors to institutional investors.

Keywords: Internet articles; social media; rumor; investment decision; institutional investors;

individual investors

1. Introduction

This study investigates the influence of internet articles, such as blog or community posts, on investors' trading decisions in the presence of rumors. We utilize the regulations of the Korea Exchange (KRX), which monitors the market and requires firms to confirm the accuracy of rumors. This regulation enables us to identify the presence of rumors. Additionally, a distinctive feature of the Korean data is the availability of net purchase trading volume, categorized by investor type. We examine whether the amount of internet information preceding a rumor is related to the trading activity of individual, institutional, and foreign investors.

We posit that internet articles can impact investors' trading decisions in two ways. First, internet articles may provide value-relevant information that improves investment decision-making. Studies have shown the informative nature of content from SeekingAlpha.com (a website for stock market opinion and analysis) (Chen et al. 2014), internet posts by professionals (Drake et al. 2017), and social network articles (Van Bommel 2003). Second, internet articles may disseminate deceptive information, misleading investors' trading decisions. It is difficult to detect fake news on internet platforms (Clarke et al. 2021), and such misinformation can undermine the credibility of other news from the platform (Kogan et al. 2021). This incorrect information complicates the process of determining the validity of rumors (Jia et al. 2020; Han and Yang 2013), leading to flawed trading decisions. Moreover, investors may inadvertently incorporate inaccurate and misleading information from internet articles, as such information often attracts more attention than factual information (Ahern and Sosyura 2015).

We predict that individual investors, being less sophisticated and having limited abilities to gather and process information (Kaustia and Knüpfer 2008; Kaustia and Rantala 2015; Blankespoor et al. 2019; Tetlock 2011), are more susceptible to rumors. They may rely on internet

articles for investment decisions without fully comprehending the quality of the information provided. In contrast, sophisticated investors, such as institutional or foreign investors, possess superior abilities to gather and process information and are less likely to rely on internet articles for trading decision. Therefore, we hypothesize that the impact of internet articles on investor decision-making varies across investor types.

H1. The association between internet article coverage and trading behavior surrounding inquiry disclosure differs across investor types.

We further investigate the outcomes of trading decisions influenced by internet articles. If these articles enhance investors' ability to process rumors, a larger article coverage would lead to positive returns. However, if the articles mislead investors, they may inaccurately assess the rumors' credibility and experience negative returns. Therefore, we expect a negative (positive) association between individual (institutional) investors' net purchases and post-response returns and hypothesize the following:

H2. The association between investors' net purchases and post-response returns in the presence of internet article coverage varies among investor types.

This study provides important implications for individual investors' trading behavior. The existing literature suggests that individual investors understand and interpret information based on personal experiences (Kaustia and Knüpfer 2008) or they tend to enter the stock market through social learning (Kaustia and Knüpfer 2012). We show that individual investors may rely heavily on internet articles while overlooking potential risks. This issue is increasingly relevant due to the growing reliance on non-traditional information sources, including social media platforms like Twitter, Reddit, YouTube, Instagram, Facebook, and WhatsApp. Social media has emerged as a

significant source of news and information, with over two-thirds of Americans occasionally getting news from these platforms (Shearer and Matsa, 2018). Institutional investors are also increasingly consuming and utilizing digital and social media content (Connell and Tingley, 2019). However, individual investors exhibit a higher dependence on social media for investment decisions. A survey by Oxford Risk showed that 7% of UK respondents consider social media as their primary source of information, with younger investors relying more heavily on social media (Fintech Finance News, 2021).

Despite the growing reliance on social media for information, many consumers remain skeptical about the credibility of the information they encounter. A majority of consumers (57%) anticipate news on social media to be largely inaccurate (Shearer and Matsa, 2018). This emphasizes the need for investors to be cautious and critically evaluate information obtained from social media platforms.

Additionally, our study supports previous research indicating that individual investors fail to distinguish stale news (Tetlock 2011) or overlook readily available accounting information (Blankespoor et al. 2019). Our findings also shed further light on how individual and institutional investors react differently to rumors. Our evidence provides a clear insight into the trading behavior of individual investors by using data that allows us to identify the trading behavior of different types of investors, thus addressing the issue of misclassification using trading volume cutoff (Cready et al. 2014).

This study also contributes to the literature on the information content of internet articles. Previous literature shows that the tone of articles about firms in SeekingAlpha predicts their future returns (Chen et al. 2014). Conversely, there is a downside to internet article activities. Drake et al. (2017) demonstrated that coverage from non-professional internet intermediaries hampers price

discovery. This study examines this negative aspect of internet article activities by illustrating how they can undermine individual investors' ability to process information, thereby leading to poor investment decisions.

The remainder of this paper is organized as follows. Section 2 describes the research design. Section 3 presents and discusses the empirical findings, and Section 4 provides the conclusions.

2. Research Design

2.1. Sample selection

We identify the presence of rumors using a unique disclosure requirement in Korea termed as “inquiry disclosure”. Under this disclosure requirement, KRX publicly requests clarification from the relevant firm when it detects rumors or substantial market movements and firms are required to respond to the inquiry within one business day. This requirement aims to protect investors by encouraging firms to disclose any unrevealed information in a timely manner.

Our sample comprises 4,126 firm responses between 2006 and 2019, after excluding those with missing information for regression analyses.

2.2. Internet article coverage

We collect internet articles from Naver¹, the leading internet service provider in Korea, which hosts two widely utilized platforms: blog and café. As of November 22, 2020, statistics show that 72.3% of the 17 million Korean bloggers use Naver's blogging platform.² Naver cafés function as internet forums where members can share content. The most popular cafés have millions of members and thousands of articles posted per day.³ To examine the impact of internet article coverage on trading decision surrounding rumors, we collect all the internet articles from two weeks before the company responds to the inquiry.⁴ We collect 593,662 blog articles and

860,850 café articles by crawling through the search results.⁵ To identify articles related to corporate value, we employ a neural network model. We train this model through a random sampling procedure, where 1% of blog and café articles are randomly chosen and manually classified as either relevant or non-relevant to corporate value.^{6 7}

2.3. Regression model

For Hypothesis 1, we obtain the net purchase data for individuals, institutions, and foreign⁸ investors. We then regress the net purchases for each type of investor on *internet Article Coverage* in Equation (1).

$$Net\ Purchase_{i,t} = \beta_0 + \beta_1 Internet\ Article\ Coverage_{i,t} + \sum \beta_j Control_{i,t-1,j} + \varepsilon_{i,t} \quad (1)$$

The main variable of interest is *Internet Article Coverage*, defined as the natural logarithm of one plus the number of internet articles issued within -14 days and -1 day prior to the response of firm *i* on day *t*. The dependent variable, *Net Purchase*, denotes the net purchases of individual, institutional, and foreign investors for three days before firm *i*'s response to the inquiry on day *t*. We choose three days to identify trading decisions, as we expect the market participants react to the rumor and trade on it within a relatively short period.

For Hypothesis 2, which tests the association between each investor's net purchases and post-response returns, we use the following equations.

$$PRET_{i,t} = \beta_0 + \beta_1 Net\ Purchase_{i,t} + \sum \beta_j Control_{i,t-1,j} + \varepsilon_{i,t} \quad (2)$$

PRET is the cumulative abnormal return over a 15-day period following the response of firm *i* on day *t*.⁹ A positive (negative) coefficient on *Net Purchase* for a specific investor type indicates that the investor's net purchase before the response to the rumor is related to a positive (negative) return in the future.

We control for various factors that could affect trading activity surrounding rumors. These include internet article coverage (*Internet Article Coverage*), firm characteristics such as return on assets (*ROA*), standard deviation of *ROA* (*std(ROA)*), leverage, firm size (*Log(MV)*), Tobin's *Q*, research and development expenditures (*R&D*), and asset intangibility. We also control for market-related characteristics, including whether the firm is listed on the KOSDAQ, market index returns in the previous month (*Market*), and year- and industry-fixed effects. We note that the firm-level control variables are constructed using the most recent data available. We winsorize all continuous variables at the 1% and 99% percentiles.

3. Results

<Insert Table 1 around here>

Table 1 presents the regression results of Equation (1). According to Column (1), the coefficient on *Internet Article Coverage* is positive and significant, suggesting that greater internet article coverage is associated with increased net purchases by individual investors. Columns (2) and (3) show that institutional and foreign investors are not significantly affected by internet articles when making investment decisions. These findings align with the view that individual investors are the primary users of internet articles.

The differences between the coefficient on *Internet Article Coverage* in column (1) and those in columns (2) and (3) are statistically significant at the 10% and 5% level, respectively. However, the coefficients in columns (2) and (3) are not significantly different from each other.

Overall, the results presented in Table 1 reject Hypothesis 1 and demonstrate that internet articles affect the trading decision of individual investors differently compared to other types of investors.¹⁰

<Insert Table 2 around here>

Table 2 shows the regression results of Equations (2), which test the return consequences surrounding rumors. Panel A of Table 2 displays the regression results that test Hypothesis 2. The coefficient on *Net Individual Purchase* in column (1) is negative and significant at the 10% level, whereas the coefficient on *Net Institutional Purchase* in column (2) is positive and significant at the 1% level. The difference between the coefficients on *Net Individual Purchase* and *Net Institutional Purchase* is significant at the 1% level, and the difference between the coefficients on *Net Institutional Purchase* and *Net Foreign Purchase* is significant at the 5% level, leading to the rejection of Hypothesis 2. The difference between the coefficients on *Net Individual Purchase* and *Net Foreign Purchase* is not significant.¹¹

Panel B of Table 2 exhibits the regression results of Equation (2) for the subsample of firms with no internet article coverage (columns (1) to (3)) and those with internet article coverage (columns (4) to (6)). Notably, the coefficients on net purchase variables are not significant in columns (1) to (3), whereas the results in columns (4) to (6) are similar to those in Panel B of Table 2. The differences between coefficients are significant when comparing individual and institutional investors as well as institutional and foreign investors, but only for the subsample with internet article coverage, resulting in the rejection of Hypothesis 2. In summary, the differences in net purchases among investors are only prominent when internet article coverage is present.¹²

Given that the sum of the net purchases of all parties participating in the stock market in a day is zero, our findings imply a potential wealth transfer effect surrounding firms' responses to inquiries. As shown in Table 1, individual investors purchase stocks surrounding a firm's response, suggesting that institutional or foreign investors on average maintain a short position on the stock. In Panels A and B of Table 2, we demonstrate that the net purchase of individual investors results in negative return consequences, whereas institutional investors do not experience such outcomes. These findings are consistent with a wealth transfer from individual investors to institutional investors, particularly when there is internet article coverage.

To address the concern that investor attention may drive our results, we repeat the regressions with added controls for news articles associated with stock valuation (Barber and Odean 2008) and non-stock internet articles, as these may capture investors' attention by increasing the exposure of the firm's name to (potential) investors (Grullon et al. 2004). Our robustness tests indicate that our results are not fully attributable to investor attention. In addition, our results align with the view that rumors are typically positive on average. To address this concern, we separate the firms into two subgroups based on the cumulated abnormal return (CAR) for the three days before the firm provides inquiry disclosure and conduct the analyses again. We find that our results hold for the subsample of firms whose CAR is positive, while the results are silent for the subsample of firms whose CAR is negative. We infer that price-increasing rumors are prevalent in the Korean stock market, which can be attributed to the substantial restrictions on short selling (Financial Services Commission 2021). In addition, we perform a cross-sectional analysis using subgroups of firms based on the median of firms' market value. This analysis is designed to demonstrate whether individual investors rely more on internet article for firms with

poor information environment, as proxied by market value. We find that our results are more pronounced for smaller firms, consistent with our expectation.

4. Conclusion

We investigate whether internet articles improve investors' trading decisions on rumors, considering the different types of investors. Prior studies find that internet articles play a significant role in disseminating rumors and exacerbating price discovery (Jia et al. 2020). However, it is unclear whether the impact of internet articles on investment decisions varies among different investor types. To investigate this, we utilize Korea's mandatory disclosure requirement, "inquiry disclosure," which allows us to identify rumors, along with unique data from the KRX on net purchasing volume by individual, institutional, and foreign investors.

We find that individual investors are the net purchaser before firms respond to the inquiry. Internet article coverage is negatively related to the post-event return. Moreover, individual investors' net purchase is negatively associated with post-event returns only when internet articles are present. This implies that individual investors trade based on internet articles and these trades result in negative stock returns. We also observe a wealth transfer from individual to institutional investors.¹³ Overall, our evidence suggests that activities related to internet articles impede individual investors' processing of information regarding rumor, leading to suboptimal investment decisions.

¹ <http://naver.com>

² <http://www.blogchart.co.kr>

³ The main difference between blog and café is that a blog is generally open to anyone for reading, whereas café articles are restricted to its members. Even though Naver café articles are not usually accessible to non-members, joining as a member does not involve a lot of effort. Therefore, we assume that this difference does not vary the implication.

⁴ We limit the period to two weeks for two reasons: 1) to exclude stale Internet articles and include more timely articles in the analyses and 2) to make crawling feasible, considering the number of articles we collected from it.

⁵ We did not use a ticker, which is a six-digit number in Korean stock market, because we noticed that many Internet articles use firm names without the ticker when they discuss firm valuation.

⁶ We classify reviews for firm products as articles that are not related to the stock market, even though Tang (2018) shows that aggregate third-party comments on products predict future stock returns. This is because we focus on the short-term impact of Internet article coverage on the trade based on rumors. We presume that product reviews do not have an immediate effect on investors' decisions.

⁷ The neural network model trained with the manually classified subsample achieves over 90% of classification accuracy in our validation set. The trained model classifies 27,875 blog articles and 284,760 café articles as those related to stock valuation from the initial 593,662 and 860,850 articles, respectively.

⁸ Foreign investors are those who obtain user ID for stock trade. If foreigners stay more than six months in Korea, ID requirement is exempted. We do not make a strong prediction on the behavior of foreign investors in this study. Although foreign investors have limited ability to obtain information because of the gap in both language and distance, they are generally informed institutions. More importantly, foreigners are less likely to be exposed to the Korean Internet articles. As such, they are less likely to be affected by Internet article activities and work as a benchmark that shows behavior without any Internet article influence.

⁹ To identify whether the consequences are positive or negative, we use abnormal returns without taking the absolute value.

¹⁰ The impact of Internet articles on trading decisions is not different between institutional and foreign investors. Such insignificance is presumably because foreign investors are mostly foreign institutions and not foreign individuals.

¹¹ This result is consistent with previous tables, which show that foreign investors do not participate in trading activities in association with Internet article activities.

¹² We note that the untabulated results using 7-days post-response return yield similar results.

¹³ It is also possible for individual investors to share information sources that are not available to institutional investors, resulting in divergent trading decisions between the two groups. It is worth considering this possibility when interpreting our results.

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Appendix A: Variable Definition

Variable	Definition
<i>Internet Article Coverage</i>	The natural logarithm of 1 plus the number of blog and café articles during 14-day prior to response disclosures.
<i>Net Purchase (Individual, Institution, and Foreign)</i>	The sum of net purchases of either of the three classes of investors (individual, institutional, and foreign) for three days prior to the firm's response, scaled by the average net purchase of non-event periods (between $t-120$ and $t-21$), following Choe et al. (1999).
<i>t-day Post-response Return</i>	The sum of daily abnormal returns for t days after the firm's response. We obtained the abnormal return by adjusting the return for the market return.
<i>ROA</i>	Pretax income divided by beginning total assets.
<i>std(ROA)</i>	Standard deviation of <i>ROA</i> for last three years.
<i>Leverage</i>	Total liability divided by total assets.
<i>Log(MV)</i>	Natural logarithm of the market value of equity.
<i>Tobin's Q</i>	Asset minus book value of equity plus market share of equity divided by total assets.
<i>R&D</i>	R&D expenditure divided by beginning assets.
<i>Intangible</i>	Intangible assets divided by beginning total assets.
<i>KOSDAQ</i>	An indicator variable that equals 1 if the firm is listed on the KOSDAQ, and 0 otherwise.
<i>Market</i>	Monthly market returns in the month prior to the firm's response.

Table 1. Net Purchase by Investor Type

Dependent Variable	(1)	(2)	(3)
	Net Individual Purchase	Net Institutional Purchase	Net Foreign Purchase
<i>Internet Article Coverage</i>	0.011** (2.06)	-0.003 (-0.79)	-0.004 (-1.40)
<i>ROA</i>	0.022 (0.34)	0.020 (0.65)	-0.037 (-1.34)
<i>std(ROA)</i>	-0.058 (-0.68)	0.062 (1.55)	-0.030 (-0.80)
<i>Leverage</i>	-0.092** (-2.01)	-0.025 (-0.98)	0.029 (1.35)
<i>Log(MV)</i>	-0.031*** (-5.59)	0.006* (1.79)	-0.002 (-0.52)
<i>TobinQ</i>	-0.005 (-0.54)	0.000 (0.06)	0.009* (1.75)
<i>R&D</i>	0.003 (0.02)	-0.000 (-0.00)	-0.034 (-0.59)
<i>Intangible</i>	-0.183 (-0.34)	-0.052 (-0.18)	0.033 (0.12)
<i>KOSDAQ</i>	-0.029 (-1.23)	0.005 (0.42)	-0.019* (-1.89)
<i>Market</i>	-0.315* (-1.72)	0.112 (1.05)	0.192** (2.19)
<i>Intercept</i>	0.771*** (6.71)	-0.139** (-2.03)	-0.015 (-0.26)
Observations	4,126	4,126	4,126
Adjusted R ²	0.017	0.004	0.008
Fixed Effects	Year, Ind	Year, Ind	Year, Ind

Difference in coefficients on *Internet Article Coverage*

Investor type	Coefficient on <i>Internet Article Coverage</i>	Test for difference in coefficients on <i>Internet Article Coverage</i>	
[1] Individual	0.011	[1] – [2]	0.014* (3.04)
[2] Institutional	-0.003	[2] – [3]	0.001 (0.07)
[3] Foreign	-0.004	[1] – [3]	0.015** (4.86)

Table 1 reports regression results of Equation (1) for net purchase of individual, institutional, and foreign investors as the dependent variables. Columns (1), (2), and (3) use net purchase of individual, institutional, and foreign investors, respectively, as the dependent variable. t -statistics based on robust standard error are reported in the parenthesis for the regression analyses and χ^2 statistics are reported in the parenthesis for the tests for equality of coefficients. ***, **, * indicate significance at 1, 5, and 10 percent levels for the two-tailed test. Appendix A shows variable definitions.

Table 2. Return Consequences of Internet Article Coverage

Panel A. Investors' net purchase and post-response return

Dependent Variable	(1)	(2)	(3)
	15-day Post-response Return		
<i>Net Individual Purchase</i>	-0.976* (-1.71)		
<i>Net Institution Purchase</i>		2.225*** (2.71)	
<i>Net Foreign Purchase</i>			-0.702 (-0.74)
Controls	Yes	Yes	Yes
Observations	4,126	4,126	4,126
Adjusted R ²	0.022	0.023	0.021
Fixed Effects	Year, Ind	Year, Ind	Year, Ind
Difference in coefficient on net purchase variables			
Dependent variable	Investor type	Coefficient on <i>Net Purchase</i>	Test for difference in coefficients
15-day post-response return	[1] Individual	-0.976	[1] – [2] -3.196*** (13.16)
	[2] Institutional	2.225	[2] – [3] 2.927** (6.49)
	[3] Foreign	-0.702	[1] – [3] -0.274 (0.71)

Panel B. Investors' net purchase and post-response return by internet article coverage

Dependent Variable	<i>Internet Articles Coverage = 0</i>			<i>Internet Articles Coverage > 0</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
	15-day post-response return					
<i>Net Individual Purchase</i>	0.103 (0.08)			-1.532** (-2.44)		
<i>Net Institution Purchase</i>		1.039 (0.52)			2.723*** (3.11)	
<i>Net Foreign Purchase</i>			-1.636 (-0.80)			-0.210 (-0.19)
Control	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,294	1,294	1,294	2,831	2,831	2,831
Adjusted R ²	0.006	0.006	0.006	0.031	0.031	0.029
Fixed Effects	Year, Ind	Year, Ind	Year, Ind	Year, Ind	Year, Ind	Year, Ind

Difference in coefficients on net purchase variables					
Dependent variable	<i>Internet Article Coverage</i>	Investor type	Coefficient on <i>Net Purchase</i>	Test for difference in coefficient	
15-days post-response return	<i>Internet Article Coverage = 0</i>	[1] Individual	0.103	[1] – [2]	-0.936 (0.10)
		[2] Institutional	1.039	[2] – [3]	2.675 (0.88)
		[3] Foreign	-1.636	[1] – [3]	1.739 (0.44)
	<i>Internet Article Coverage > 0</i>	[1] Individual	-1.532	[1] – [2]	-4.255*** (9.63)
		[2] Institutional	2.723	[2] – [3]	2.933** (4.26)
		[3] Foreign	-0.210	[1] – [3]	-1.322 (0.90)

Panel A of Table 2 reports regression results of Equation (2). Column (1), (2), and (3) uses *Net Individual Purchase*, *Net Institutional Purchase*, and *Net Foreign Purchase* as main explanatory variable, respectively. Panel B of Table 2 reports regression results of Equation (2) for subsamples based on whether there is at least one internet article coverage, and tests for equality of coefficients across columns. Columns (1), (2), and (3) use subsample of firms with no internet article coverage, and columns (4), (5), and (6) use the subsample of firms with at least one internet article coverage. *t*-statistics based on robust standard error are reported in the parenthesis for the regression analyses and χ^2 statistics are reported in the parenthesis for the tests for equality of coefficients. ***, **, * indicate significance at 1, 5, and 10 percent levels for the two-tailed test. Appendix A shows variable definitions.