Is Foreign Investors' behavior Involved in Investor Sentiment? Evidence Based on the Korean Stock Crashes

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Abstract

This study investigates whether foreign investors' behavior is involved in firm-specific investor sentiment. Because the mixed role of foreign investors on investor sentiment formation seems to exist in the Korean stock market, it needs to examine the moderate or incremental effect of foreign investors on the stock price crash risk which is due to investor sentiment. The analysis results using Korea Stock Exchanges - listed firms for the period of 2011-2019 show the increased future stock price crash risk which is attributable to high investor sentiment is mitigated for firms with the high foreign ownership, indicating the moderate effect. This study expands the literature on the foreign investors' behavior in the Korean stock market, by showing foreign investors are not involved in firm-specific investor sentiment, which improves market's efficiency in the Korean stock market. Also, the paper is valuable to the academic and practice field in that the findings shed light on the foreign investors' mitigating role in stock price crashes in the behavioral finance perspective.

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1. Research Background

This study investigates whether foreign investors' behavior is involved in firm-specific investor sentiment. Stock price crash is defined as the sudden and extreme fall of stock price in firm-specific returns dimension (Hutton et al. 2009). Since Jin and Myers (2006) has argued that the stock price crash is attributed to the information opacity due to the managerial behavior for their own benefits, many researchers have linked the stock price crashes with the principal-agency problem. Accordingly, they emphasize the corporate governance role to reduce the stock price crash risks (Hutton et al. 2009; Kim et al. 2011a; Kim et al. 2011b). Specifically, they demonstrate that the stock price crashes in particular context of firm characteristics are weakened by internal / external monitoring mechanisms relying on high institutional ownership, board size, and so on.

However, since the stock price crashes eventually occur in the process of corporate valuation, external investors' behaviors as well as internal firm characteristics including corporate governance would influence on the stock price crashes. For example, the difference opinions among investors, high investor sentiment, or the lower retail investor attention would incur the stock price crashes (Chen et al. 2001; Yin and Tian 2017; Fu et al. 2021; Wen et al. 2019). This means that the investors' trading behavior which is noisy or rational in corporate valuation may play a critical role on the future stock price crashes. In this context, Fu et al. (2021) argue that the stock price crash risk is positively associated with firm-specific investor sentiment as a proxy for investors' trading behavior in asset pricing (Brown and Cliff 2005). This confirms the high sentiment works as a sort of disrupter which does allow the investors not to eliminate the risk underlying over-valued price and consequently lead the stock price crashes.

In this study, I further investigates the effect of foreign investors' behavior on the relation between the investor sentiment and stock price crash risk. Given the mixed arguments on foreign investors' trading behavior, which is noisy / contrarian or not, I examine whether foreign investors act as the promoter of investor sentiment and provide the implication of finding based on the stock price crashes. Prior studies document that foreign investors are not only the sophisticated who have information superiority in asset pricing when picking stocks but also a strict corporate monitor who prevents managers from pursuing their private benefits that have corporate values undermined.

However, as external investors, foreign investors are likely involved in the firm-specific

investor sentiment, promoting the mispricing through their noisy trading. When foreign investors play as the noisy traders for the hot money by short-term trading, they come to the investor sentiment promoter or stock price crash trigger. Hence, I suggest how the foreign investors act in the relationship between the investor sentiment and stock price crash risk is open question. Then, I expect the empirical finding that when foreign investors' investment behavior has an effect on forming firm-specific sentiment, the relationship between the investor sentiment and stock crashes would be weakened or strengthen.

This study is organized as follows. Section II provides research question. Section III describes variable measurement and model specification including sample criteria. Section IV shows the empirical results. Finally, the conclusion is stated in Section V.

2. Hypothesis

Foreign investors are reported to have information superiority in asset pricing when picking stocks since they are readily able to access the information and thus sophisticated in assessing corporate valuation. Most foreign investors in the Korean stock market do, as the institutional investors who has an enormous financial power, enhance market's efficiency and overall firm values by affecting positively the Korean individual investors. Also, they are known for the strict corporate monitor who prevents managers from pursuing their private benefits that have corporate values undermined.

While foreign investors are regarded to be the sophisticated who are superior in asset pricing and enhance the trading efficiency (Morck et al. 2000; Fan and Wong 2002; Boehmer and Kelley 2009; He and Shen 2014), they may be engaged in forming the market sentiment which disrupts the rational arbitrage. This is because the foreign investors may be the noisy contrarian for profits in a short period of time. Moreover, the herding trading or the positive feedback strategy known as foreign investors' favorable behavior serves as the sentiment promoter in practice field. The effect of uninformed or noisy traders underlying high sentiment which corresponds to valuation error would lead to the stock price crash (Barberis and Thaler, 2003; Pojarliev and Levich, 2011; Sias et al. 2016; Stein, 2009). Taken together, when foreign investors' investment behavior has an effect on forming firm-specific sentiment, the relationship between the investor sentiment and stock crashes would be weakened or strengthen.

Thus, the null hypothesis is formed as follows.

H: The foreign investors are not associated with the relationship between the investor sentiment and the stock price crash risk.

3. Variable Measurement and Model Specification

3.1 Variable Measurement

3.1.1. Firm-specific investor sentiment

Firm-specific investor sentiment measurement follows Ryu et al. (2018). They employ Yang and Zhou (2015, 2016), Ryu et al. (2017), and Yang et al. (2017) to measure daily firm-level sentiment. They suggested a firm-specific investor sentiment index created by using information such as the volume and price of individual shares so that the index can directly reflect investor's transaction sentiment and transaction type. The measures representing information used in creating the sentiment index are the daily relative strength index (RSI), psychological line index (PLI), adjusted turnover rate (ATR), the logarithm of trading volume (LTV), and individual buy-sell imbalance (IBSI) for each firm. Please refer to Ryu et al. (2018) for the specific calculations for each component and firm-specific sentiment estimation.

3.1.2 Stock price crash risk

Stock price crash is referred to the state of extremely low returns compared to market-based normal returns. Hutton et al. (2009) defined stock price crash as the event which firm-specific weekly returns belongs to less than 0.1% of their distribution occurs if firm-specific weekly returns follow normal distribution. We use the returns skewness (NCSKEW) and the returns volatility (DUVOL) accordign to Hutton et al. (2009) as a proxy for the stock price crashes. Where the higher negative skewness (NCSKEW) or volatility (DUVOL) means the higher stock price crash risks. Please refer to Hutton et al. (2009) on the process of creating stock crash risk measurements.

3.2 Model Specification

Since stock price reflects a value-weighted average consensus of all investors who estimate

corporate value, this study takes foreign investor ownership as a proxy for foreign investors' trading behavior which affects their valuation process. The test model is designed as follows.

$$CRASH_t(NCSKEW_t \text{ or } DUVOL_t)$$
$$= Const. + \beta_1 SENT_{t-1}^{Firm} + \beta_2 FOR_{t-1}^{Own} + \beta_3 SENT_{t-1}^{Firm} \times FOR_{t-1}^{Own} + \beta_4 SENT_{t-1}^{Mkt}$$
$$+ \Sigma Control\ Variables + \varepsilon \qquad\qquad Eq.(1)$$

Variable Definitions:

Dependent Variables

$NCSKEW_t$: Stock crash risk, measured as negative skewness in firm-specific returns distribution at year t;

$DUVOL_t$: Stock crash risk, measured as relative volatility for upward /downward returns at year t;

Independent Variables

$SENT_{t-1}^{Firm}$: Firm-specific investor sentiment, as the composite index that is based on five proxies for investor sentiment: the daily relative strength index (RSI), psychological line index (PLI), adjusted turnover rate (ATR), the logarithm of trading volume (LTV), and individual buy-sell imbalance (IBSI);

FOR_{t-1}^{Own} : Foreign investor ownership at the end of year t-1;

Control Variables

$SENT_{t-1}^{Mkt}$: Market-wide sentiment, measured as the market-based arithmetic average of firm-specific investor sentiments () at year t-1;

$SIZE_{t-1}$: Firms size, measured as the natural log value of total assets at year t-1;

LEV_{t-1} : Firms leverage, measured as total liabilities to total assets ratio at year t-1;

ROA_{t-1} : Return on assets, measured as net income divided by average total assets at year t-1;

CFO_{t-1} : Cash flows from operation based on the cash flow statement at year t-1;

MTB_{t-1} : Firm growth, measured as market value to book value ratio at year t-1;

$\Delta SALES_{t-1}$: Sales growth, measured as the percentage change in sales at year t-1;

$LOSS_{t-1}$: Financial loss, the indicator 1 if net income at year t-1 is less than 0 and 0 otherwise;

$|DA|_{t-1}$: Accounting information opacity, measured as the accumulation of absolute

$\qquad$ value of accruals for prior three- consecutive years following Hutton et al. (2009);

$SIGMA_{t-1}$: The standard deviation of firm-specific weekly returns;

RET_{t-1} : The average firm-specific weekly returns at year t-1;

$TURN_{t-1}$: The detrended share turnover, measured as the change of share turnover between year t and t-1;

$NCSKEW_{t-1}$: Negative skewness in firm-specific returns distribution at year t-1.

The equation (1) estimates the effect foreign ownership on the relationship between firm-specific investor sentiment and future stock price crashes. Firm-specific investor sentiment, $SENT_{t-1}^{Firm}$ and foreign investor ownership, FOR_{t-1}^{Own} are the interesting variables in the equation. If firm-specific investor sentiment has significant influence on future stock price crash, β_1 of $SENT_{t-1}^{Firm}$ would be significantly positive. Also, if foreign investors play as a moderator or promoter in forming investor sentiment only to have influence on such relationship, the coefficient of the interaction term $SENT_{t-1}^{Firm} \times FOR_{t-1}^{Own}$ would show the significantly negative or positive sign.

The market-wide sentiment, $SENT_{t-1}^{Mkt}$ is included to control the impact of unobservable common sentiment in stock market (Yin and Tian 2017) and several factors that affect stock price crash risk are controlled. Based on prior studies, firm risk (i..e, firm size, firm leverage, firm growth), profitability (return on assets, operating cash flows, sales growth, loss), accounting information opacity, returns' behavior (average returns and volatility), and previous stock crash experiences are considered. In all regressions, industry - and year fixed effects are controlled. The test statistical significance of all estimates by regression analysis is calculated based on firm-clustered standard error. This methodology helps address the cross-sectional and time-serial dependence of panel data (Petersen 2009).

3.3 Sample

3.3 Sample Criteria

The sample of this study starts with 7,083 firm-year observations on KSE-listed firms with December-year end excluding the financial industry for the period from 2011 to 2019, the final sample consists of 5,308 firm-year observations after excluding missing data in the process of

variable measurement.

4. Empirical Analysis Results

4.1 Descriptive Statistics

<Table 1> presents the descriptive statistics of variables. Although both as a proxy for stock price crashes (i.e., $NCSKEW_t$ and $DUVOL_t$) show negative mean values, $NCSKEW_t$ has a more wide range in distribution. $SENT_{t-1}^{Firm}$ ranges from -0.657 to 0.608. $SENT_{t-1}^{Mkt}$ is lower variant in distribution. FOR_{t-1}^{Own} as a main independent variable has the mean value of 0.102, which indicates about 10.2% of total shares is assigned to foreign investors on average. Also, it shows minimum value of 0% and maximum one of 60.8%.

<Table1> Descriptive Statistics (n=5,308)

Variable	Mean	Std. dev.	Med	Min	Max
$NCSKEW_t$	-0.306	1.035	-0.245	-3.281	2.313
$DUVOL_t$	-0.177	0.802	-0.148	-2.244	1.766
$SENT_{t-1}^{Firm}$	0.003	0.261	0.010	-0.657	0.608
$SENT_{t-1}^{Mkt}$	0.002	0.002	0.002	-0.003	0.004
FOR_{t-1}^{Own}	0.102	0.133	0.045	0.000	0.893
$SIZE_{t-1}$	20.190	1.587	19.972	17.208	24.625
LEV_{t-1}	0.472	0.199	0.476	0.090	0.934
ROA_{t-1}	0.021	0.075	0.027	-0.326	0.200
CFO_{t-1}	0.050	0.075	0.047	-0.183	0.280
MTB_{t-1}	1.237	1.198	0.854	0.182	7.225
$\Delta SALES_{t-1}$	0.066	0.243	0.038	-0.529	1.367
$LOSS_{t-1}$	0.228	0.420	0.000	0.000	1.000
$|DA|_{t-1}$	0.038	0.037	0.027	0.000	0.194
$SIGMA_{t-1}$	0.056	0.027	0.050	0.017	0.161
RET_{t-1}	0.002	0.008	0.001	-0.015	0.029
$TURN_{t-1}$	0.000	0.014	0.000	-0.063	0.060

Please refer to Eq. (1) in section 3.2 for definitions of variables.

4.2 Correlation Analysis

<Table 2> presents the Pearson correlation matrix. Stock price crashes, firm-specific investor sentiment, and foreign investors measures are shown as inter-correlated each other. It is interesting that both $NCSKEW_t$ and $DUVOL_t$ as a proxy for stock price crash risks are positively correlated with not only $SENT_{t-1}^{Firm}$ but also FOR_{t-1}^{Own}. The correlation coefficient of $NCSKEW_t$ with $SENT_{t-1}^{Firm}$ is 0.122 and significant at 1% level. This is consistent with prior document that stock price crash occurs due to firm-specific investor sentiment.

However, it seems doubtful that $NCSKEW_t$ and FOR_{t-1}^{Own} are positively correlated, showing the correlation coefficient of 0.128 because it is expected that the foreign investors' behavior itself does not have an impact on stock price crash risk. This result is the same as $DUVOL_t$ as well. More important, FOR_{t-1}^{Own} as the proxies of foreign investor's behavior has positive coefficient of 0.147 in correlation with $SENT_{t-1}^{Firm}$, implying the foreign investors as the sentiment promoter. However, simple correlation analysis has a limit in estimating in statistically unbiased manner. The implemented regressions in section 4.3 would elaborate the role of foreign investors in the relation between the investor sentiment and stock price crash risks.

<Table 2> Pearson correlation matrix (n=5,308)

	(1) $NCSKEW_t$	(2) $DUVOL_t$	(3) $SENT_{t-1}^{Firm}$	(4) $SENT_{t-1}^{Mkt}$	(5) FOR_{t-1}^{Own}
(1) $NCSKEW_t$		0.915 (<.0001)***	0.122 (<.0001)***	-0.028 (0.039)**	0.128 (<.0001)***
(2) $DUVOL_t$			0.112 (<.0001)***	-0.020 (0.152)	0.109 (<.0001)***
(3) $SENT_{t-1}^{Firm}$				0.005 (0.725)	0.147 (<.0001)***
(4) $SENT_{t-1}^{Mkt}$					0.014 (0.311)
(5) FOR_{t-1}^{Own}					

This table presents the Pearson correlation analysis results. The figures in parentheses are p-values. The notations *** and ** denote the statistical significance at 1% level and 5% level, respectively. Please refer to Eq. (1) in section 3.2 for definitions of variables.

4.3 Regression Analysis

The evidence from the Korean stock market on the relationship between the investor sentiment and stock price crash risk is absent. Hence, I implement a regression of the equation which does not include the foreign investor measurements. <Table 3> provides the analysis results, which show that firm-specific investor sentiment is positively related to the future stock price crashes. $SENT_{t-1}^{Firm}$ shows the coefficient of 0.309 (robust t-statistics=3.74) and 0.261 (robust t-statistics=4.23), for $NCSKEW_t$ and $DUVOL_t$, respectively. $SENT_{t-1}^{Mkt}$ does not show statistically significant coefficients in any regressions.

<Table 3> Regression Analysis for the Test of Relation between Firm-specific Investor Sentiment and Stock Crash Risk

$$CRASH_t(NCSKEW_t \text{ or } DUVOL_t) = Const. + \beta_1 SENT_{t-1}^{Firm} + \beta_2 SENT_{t-1}^{Mkt} + \Sigma Control\,Variables + \varepsilon$$

Variables	Dep. Var. = NCSKEW		Dep. Var. = DUVOL	
	Coef.	t-stat.	Coef.	t-stat.
Const.	-3.543	-9.93 ***	-2.480	-8.93 ***
$SENT_{t-1}^{Firm}$	0.309	3.74 ***	0.261	4.23 ***
$SENT_{t-1}^{Mkt}$	48.339	0.81	29.229	0.64
$SIZE_{t-1}$	0.157	12.98 ***	0.114	11.9 ***
LEV_{t-1}	-0.364	-3.95 ***	-0.299	-4.50 ***
ROA_{t-1}	-0.420	-1.22	-0.283	-1.12
CFO_{t-1}	-0.595	-2.72 ***	-0.635	-3.70 ***
MTB_{t-1}	0.091	5.93 ***	0.068	5.72 ***
$\Delta SALES_{t-1}$	-0.058	-1.00	-0.095	-2.01 **
$LOSS_{t-1}$	-0.056	-1.22	-0.036	-1.02
$|DA|_{t-1}$	0.618	1.60	0.665	2.24 **
$SIGMA_{t-1}$	-2.579	-2.87 ***	-1.253	-1.88 *
RET_{t-1}	6.104	1.57	2.629	0.97
$TURN_{t-1}$	4.015	2.88 ***	3.015	2.88 ***
$NCSKEW_{t-1}$	0.045	2.42 **	0.029	2.17 **
Year fixed effects	Yes		Yes	
Industry fixed effects	Yes		Yes	
Firm clustered S.E.	Yes		Yes	
Adj.R^2	0.08		0.07	
N	5,308		5,308	

The t-statistics are calculated based on firm-clustered standard errors. The notations ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Please refer to Eq. (1) in section 3.2 for definitions of variables.

<Table 4> presents the regression results of Eq. (1). If foreign investors play a role in reducing (increasing) the future stock price crash risks attributable to firm-specific investor sentiment, $SENT_{t-1}^{Firm} \times FOR_{t-1}^{Own}$ would show significant negative (positive) coefficient. Then should be significantly positive so that the positive relationship between the future stock price crash risks attributable to the investor sentiment is ensured in this analysis.

<Table 4> The Regression Analysis for Test of Moderate Effect of Foreign Investors

$$CRASH_t(NCSKEW_t \text{ or } DUVOL_t) = Const. + \beta_1 SENT_{t-1}^{Firm} + \beta_2 FOR_{t-1}^{Own} + \beta_3 SENT_{t-1}^{Firm} \times FOR_{t-1}^{Own} + \beta_4 SENT_{t-1}^{Mkt} + \Sigma Control\ Variables + \varepsilon$$

Variables	Dep. Var. = NCSKEW		Dep. Var. = DUVOL	
	Eq. (1)		Eq. (1)	
	Coef.	t-stat.	Coef.	t-stat.
Intercept	-3.597	-10.13 ***	-2.521	-9.17 ***
$SENT_{t-1}^{Firm}$	0.405	4.34 ***	0.332	4.77 ***
FOR_{t-1}^{Own}	-0.064	-0.16	-0.078	-0.24
$\mathbf{SENT_{t-1}^{Firm} \times FOR_{t-1}^{Own}}$	**-0.994**	**-2.79 *****	**-0.742**	**-2.62 *****
$SENT_{t-1}^{Mkt}$	58.602	0.98	36.878	0.81
$SIZE_{t-1}$	0.157	13.07 ***	0.114	12.02 ***
LEV_{t-1}	-0.361	-3.93 ***	-0.297	-4.48 ***
ROA_{t-1}	-0.403	-1.17	-0.270	-1.07
CFO_{t-1}	-0.577	-2.64 ***	-0.622	-3.64 ***
MTB_{t-1}	0.094	6.11 ***	0.070	5.92 ***
$\Delta SALES_{t-1}$	-0.061	-1.06	-0.097	-2.06 **
$LOSS_{t-1}$	-0.050	-1.08	-0.031	-0.88
$|DA|_{t-1}$	0.638	1.65 *	0.680	2.30 **
$SIGMA_{t-1}$	-2.597	-2.88 ***	-1.266	-1.89 *
RET_{t-1}	5.988	1.54	2.533	0.93
$TURN_{t-1}$	3.848	2.75 ***	2.893	2.74 ***
$NCSKEW_{t-1}$	0.044	2.36 **	0.028	2.10 **
Year fixed effects	Yes		Yes	
Industry fixed effects	Yes		Yes	
Firm clustered S.E.	Yes		Yes	
Adj.R^2	0.08		0.07	
N	5,308		5,308	

The t-statistics are calculated based on firm-clustered standard errors. The notations ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively. Please refer to Eq. (1) in section 3.2 for definitions of variables.

I find that the interaction term $SENT_{t-1}^{Firm} \times FOR_{t-1}^{Own}$ show the significantly negative coefficient with $SENT_{t-1}^{Firm}$ positive, supporting the foreign investors as the sentiment controller who is engaged in rational stock trading. For $NCSKEW_t$, the coefficients of $SENT_{t-1}^{Firm}$ and $SENT_{t-1}^{Firm} \times FOR_{t-1}^{Own}$ are 0.405 (robust t-statistics=4.34) and -0.994 (robust t-statistics=-2.79), respectively. These results are consistent even with the case of $DUVOL_t$. Overall, foreign investors mitigate the effect of firm-specific investor sentiment which is responsible for the future stock price crashes.

5. Conclusion

I investigate whether foreign investors' behavior is involved in firm-specific investor sentiment. Postulating foreign investors as external investors who are influential to firm-specific sentiment, I hypothesize foreign investors moderate or intensify the stock price crash risk which is due to investor sentiment. Using Korea Stock Exchanges - listed firms for the period of 2011-2019, I find that the future stock price crash risk increases in the investor sentiment and that relationship is weakened for high foreign ownership- engaged firms. This indicates the moderate effect of foreign investors who are not involved in the firm-specific investor sentiment which is responsible for the future stock price crashes.

This study expands the literature on the foreign investors' behavior in the Korean stock market, by showing the role of foreign investors in market efficient in respect to firm-specific investor sentiment, which improves market's efficiency in the Korean stock market. Also, the paper is valuable to the academic and practice field in that the findings shed light on the foreign investors' mitigating role in stock price crashes in the behavioral finance perspective. However, there is a limitation in that the analysis does not show the direct effect of foreign investors on firm-specific investor sentiment, while this study assumes foreign investors foreign investors as external investors who are influential to firm-specific sentiment. Also, this study overlook foreign investing form such as short-term or long-term horizon investment, which can explain foreign investors' investment incentives. Thus, I suggest the topic on the relation between firm-specific investor sentiment and foreign investors' behavior that takes foreign investment horizon as well into consideration as the future research.

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