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Investor attention and price crash risk of real estate stocks in Vietnam: Approaching at firm level

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Abstract: This paper aims to investigate the impact of investor attention on stock price crash risk for 80 listed real estate stocks over the period from 2014 to 2023. Instead of focusing on investor attention for the whole real estate industry, this paper measures investor attention at firm level by using Google Search Volume Index. Moreover, the multiple multivariate regression method is used to analyze 435 observations measured from audited financial statements, daily transaction data, and macro data in the FiinPro Platform. As a result, there is no impact of investor attention on stock price crash risk among real estate stocks examined, while macroeconomic conditions such as inflation, interest rate and GDP growth rate and liquidity are the major factors that influence the price crash risk of real estate stocks in Vietnam.

Keywords: Investor attention, stock price crash risk, real estate stocks, real estate market.

1. Introduction

A stock price crash is a speedy and unforeseen drop in stock prices, which can have far-reaching long-term effects on future investments (Chauhan et al., 2017). Enterprises face significant difficulties in raising funds, making them tighten their budget for new activities. Thus, understanding the stock price crash risk can contribute greatly toward protecting shareholder value (Habib et al., 2018). A stock price crash might be caused by macroscopic events such as an economic crisis (Bhuiyan et al., 2023) or the collapse of a long-term speculative-bubble (Kaizoji, 2020). Besides, there are some firm-related-factors leading to stock price crash risk, such as debt cost (Lou et al., 2023), financial leverage (Benkraiem, 2023), trade credit provision (Wang et al., 2023), corporate fraud (Wen et al., 2023), and corporate social responsibility (Zhang et al., 2023).

In Vietnam, the real estate industry plays an important role for the national economy. According to the General Statistics Office of Vietnam, the real estate market has accounted for a large proportion of GDP (6.20% in 2023). However, real estate stocks dramatically

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declined in the range of 80-90% over the period from 2020 to 2023, which results from different reasons. First, there are about 400 projects stalled due to legal problems in Hanoi and Ho Chi Minh City. Second, there are strict regulations about bank credit for real estate businesses. Third, housing transactions have declined very sharply. In particular, violations by real estate corporations in issuing bonds and mobilizing capital have caused manipulation of the financial market such as in the cases of Tan Hoang Minh Group and Van Thinh Phat Group. Therefore, there are many scholars turning their minds to topics related to real estate stocks. Vo and Dang (2016) are interested in the relationship between the macroeconomics factors and real estate stocks. Moreover, determinants of real estate stock price also attract attention from Nguyen (2019), To and Nguyen (2021), Nguyen et al. (2021), Nguyen et al. (2022), and Tran et al. (2023). So, it can be obviously seen that none have focused on the investor attention and price crash risk of the real estate sector in Vietnam, particularly during the period from 2014 to 2023.

To address this research gap, authors concentrate on assessing the influence of investor attention on stock price crash risk at firm level for Vietnamese real estate firms from 2014 to 2023. This paper investigates 80 Vietnamese real estate firm-level annual databases with 435 observations measured from audited financial statements and daily transaction data in the FiinPro Platform. Moreover, the research uses regression analysis to reach the research objectives. This paper makes the following two contributions. First, this paper adds to the research on the impact of investor attention on stock price crash risk in the real estate sector by showing that the attention of investors for individual firms totally has not impacted stock price crash risk among all real estate stocks in Vietnam. Instead, macroeconomic factors such as interest rates, inflation, GDP growth rates, and firm size as well as share turnover have affected the stability of real estate stocks. Furthermore, this paper suggests policy recommendations for investors to get rid of stock price crashes.

2. Literature review

In line with the development of behavioural finance, investor attention attracts many scholars. Ozdamar et al. (2022) argue that retail investor attention has a negative impact on cryptocurrency returns and exacerbates idiosyncratic risks, while the attention of institutional investors has a positive impact on cryptocurrency profits and limits specific risks. Birindelli et al. (2023) indicate that investor attention has a strong predictive power on the European financial markets over the period from 2019 to 2022, mainly during bearish and normal market conditions. Ming et al. (2023) show that investor attention is positively and significantly related to corporate environmental performance of all listed Chinese companies from 2010 to 2019.

In addition, there are many studies about the relationship between investor attention and the stock market. Dong et al. (2022) show that continuously attentive investors have negative impacts on stock returns, while the opposite effect is found for newly attentive investors and inattentive investors. Chen and Craig (2023) argue that in the US stock market from May 2018 to August 2020, active retail investor attention positively impacts retail investor base, then affects demand for stocks and stock returns. Besides, Ballinari et al. (2022) argue that retail investor attention leads to an increase in stock return volatility, while the attention of institutional investors negatively affects the stock market some days after the information was announced. For the Chinese stock market, investor attention to the Russia-Ukraine conflict contains more valuable information to predict Chinese stock market volatility than some popular predictors such as leverage, leapfrogging, and geopolitical risk (Zhou & Lu, 2023).

In terms of the relationship between investor attention and stock price crash risk, greater attention from investors can help improve the process of determining prices, thus leading to a more efficient market overall (Hu et al., 2021) and a reduction in information disparities. Due to constraints such as costs, retail investors cannot fully educate themselves about stocks (Ying et al., 2015) but effective distribution of attention can narrow information gaps, leading to decreased disagreement among investors and lower chances of stock price collapses (Wen et al., 2019).

However, stocks experiencing frequent positive price jumps often capture investor attention, leading to market perceptions of overvaluation. Consequently, investors typically divest from these stocks, causing price bubbles to deflate, potentially heightening the risk of stock price crashes (Yin & Tian, 2017). Chen and Chen (2024) provide evidence suggesting that heightened attention from investors could elevate firms' stock price crash risk. According to Hsieh et al. (2020), the level of investor attention on a specific company is strongly correlated with retail investors' herding behaviour. Furthermore, investors are more inclined to pay attention to equities that are experiencing a rapid price increase or are the subject of excitement and speculation. Buying or

selling stocks based on projected price movements rather than on underlying variables like business performance or economic indicators is known as speculation (Zuo et al., 2023). There has been evidence on the stronger price pressure effect of ASVI on small stocks in Turkey (Tan & Tas, 2019) or more significant impact of retail attention on companies facing high information uncertainty during optimistic market conditions in China (Cheng et al., 2021). Recently, Tzomaskas et al. (2023) highlight the significant role of crisis sentiment as the "transmission mechanism" of stock price crash risk of 74-euro banks in 12 countries from 2004 to 2020. Similar conclusions are given by Chen and Chen (2024) when the authors indicate that higher investor attention is associated with an increased risk of future stock crashes.

3. Methodology

3.1. Measuring variables

3.1.1. Dependent variable: Stock price crash risk (NCSKEW)

Following Chauhan et al. (2017), this working paper uses the negative conditional skewness of daily stock returns (NCSKEW). A greater NCSKEW indicates a higher probability of a stock price crash. This paper calculates the idiosyncratic daily returns as the natural log of (1 + residual returns) as the following equation:

$$R_{i,t} = \alpha_i + \beta_{1i}R_{m,t-2} + \beta_{2i}R_{m,t-1} + \beta_{3i}R_{m,t} + \beta_{4i}R_{m,t+1} + \beta_{5i}R_{m,t+2} + \varepsilon_{i,t}$$

Where: $R_{i,t}$ is the weekly return on stock i in week t; $R_{m,t}$ is the market return in week t; $\varepsilon_{i,t}$ is the residual return.

Then, the firm specific weekly returns are calculated as $W_{i,t}$ through the following formula:

$$W_{i,t,} = ln(1 + \varepsilon_{i,t})$$

Then NCSKEW is computed as the negative of the third moment of a firm's stock weekly returns divided by the standard deviation raised to the third power for each year and each firm given in the following formula where n is the number of observations on weekly returns in fiscal year t.

$$NCSKEW_{i,T} = -\frac{(n(n-1)^{\frac{3}{2}}\sum W_{it}^3)}{((n-1)(n-2)(\sum W_{it}^2)^{\frac{3}{2}})}$$

Where: n is the total number of observations of the weekly returns of stock i in year T.

3.1.2. Independent variable: Investor attention (IAT)

This article follows the method called the Search Volume Index (SVI) proposed by Da et al. (2011) to assess investor attention. However, the original SVI is not feasible due to its dependence on the time period of data retrieval. Therefore, this research uses an Abnormal Search Volume Index (ASVI). The Google SVI is constructed from search data with the keyword "Stock Ticker", "Brief Firm Name" and "Full Firm Name"[1]. The detailed formula of ASVI is described as following:

$$ASVI_{i,t} = logSVI_{i,t} - log[Median\ (SVI_{i,t-1,}, \dots, SVI_{i,t-12})]$$

Where: $ASVI_{i,t}$: abnormal SVI of firm i in month t; $SVI_{i,t}$: SVI of firm i in month t, calculating by average of SVI by 3 keywords for a firm.

And the ASVI for a stock i in a year T is calculated by totaling the number of 12 ASVI of 12 months as following: $ASVI_{i,T} = \sum ASVI_{i,t}$

3.1.3. Control variables

Beside investor attention, there are many factors influencing stock price crash risk, including: financial leverage (LEV), return on asset (ROA), price to book ratio (PB), market capitalization volume (SIZE), detrended share turnover (DTURN), inflation (INF), interest rate (INR) and gross domestic product (GDP), which is presented in Table 1.

Table 1: Description of control variables

No.	Variables	Formula	Previous studies
1.	Financial leverage (LEV)	$LEV = \frac{Total\ liabilities}{Total\ assets}$	Lin et al. (2013), Hutton et al. (2009)
2.	Return on Asset (ROA)	$ROA = \frac{Net\ Income}{Total\ assets}$	Hutton et al. (2009)
3.	Price-to-book value ratio (P/B)	$PB = \frac{The\ market\ value's\ closing\ price}{The\ book\ value\ of\ the\ shareholder's\ equity}$	Chen et al. (2001), Yin and Tian (2017)

[1] This paper translates this keyword into several Vietnamese related terms such as "mã chứng khoán", "tên doanh nghiệp đầy đủ", "tên doanh nghiệp viết tắt", among others. Then, an average of the Google trend index for those terms is taken in order to derive the investors 'attention for a specific real estate stock (IAT).

4.	Market capitalization (SIZE)	$SIZE = log\ (market\ capitalization)$	Chen et al. (2001), Chauhan (2017)
5.	Turnover ratio (DTURN)	$DTURN = \frac{Total\ trading\ volume\ of\ stocks}{Total\ outstanding\ of\ stocks}$	Chen et al. (2001), Chauhan et al. (2017), Zhang et al. (2023)
6.	Inflation (INF)	The inflation index of Viet Nam at the end of each year.	Chiang and Chen (2023)
7.	Interest rates (INR)	Average interbank interest rates for one year.	Uddin (2009)
8.	GDP growth rate (GDP)	The difference between the most recent year's real GDP and the prior year's real GDP, then divided by the prior year's real GDP.	Vo and Dang (2016)

Source: Authors.

3.2. Data collection

Samples of data of 80 listed real estate stocks in Vietnam were gathered from their trading data, audited financial statements, as well as financial indicators for the 10-year-period of 2014 to 2023 on Finpro platforms.

3.3. Data analysis

Following the studies of Chen and Chen (2024), this paper uses the following regression model to examine how investor attention affects the stock price crash risk:

$$NCSKEW_{i,T+1} = \beta_0 + \beta_1 * NCSKEW_{i,T} + \beta_2 * IAT_{i,T} + \sum_{T=1}^{8} \beta_{i,t} * CONTROL_{i,T} + \varepsilon_{i,T}$$

Where:

- The subscripts i and T refer to stock i and year T, respectively.
- $NCSKEW_{i,T+1}$ is the dependent variable measuring the risk of stock price crash in the year T+1 of stock i.
- $NCSKEW_{i,T}$ is the independent variable measuring the risk of stock price crash in the year T of stock i.
- $IAT_{i,T}$ is the investor's attention for stock i at year T.
- $CONTROL_{i,T}$ includes LEV (Leverage ratio), ROA (Return on asset), DTURN (Detrended turnover), PB (price to book ratio), SIZE (market capitalization), INF (inflation), INR (interbank interest rate) and GDP (gross domestic product) of stock i in year T.

4. Results

4.1. Descriptive statistics

Table 2 gives information about descriptive statistics of data. It can be observed that the mean value of $NCSKEW_T$ is 0.187. ROA_T displays a mean of 0.036 and a relatively low standard deviation of 0.051, with values between -0.483 and 0.183. LEV_T averages at 0.481 with a standard deviation of 0.189, spanning from 0.001 to 0.863. The PB ratio (PB_T) has a mean of 1.029 and a standard deviation of 1.306, with a minimum of 0.062 and a maximum of 17.164. $SIZE_T$, which measures firm size, has a mean of 27.751 and a standard deviation of 1.866, ranging from 23.306 to 33.522. $DTURN_T$, representing daily turnover, has a mean of 1.595 and a standard deviation of 1.814, varying from 0.006 to 10.131. The macroeconomic variables, INF_T, INR_T, and GDP_T, show relatively low variability with means of 0.033, 0.057, and 0.057, and standard deviations of 0.011, 0.021, and 0.015, respectively, indicating relatively stable economic conditions during the period examined.

Table 2: Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
$NCSKEW_{T+1}$	416	0.067	0.997	-3.3	2.772
$NCSKEW_T$	508	0.187	1.056	-3.3	3.06
IAT_T	508	0.164	2.262	-15.769	7.671
ROA_T	508	0.036	0.051	-0.483	0.183
LEV_T	508	0.481	0.189	0.001	0.863
PB_T	508	1.029	1.306	0.062	17.164
$SIZE_T$	508	27.751	1.866	23.306	33.522
$DTURN_T$	508	1.595	1.814	0.006	10.131

Variables	Obs	Mean	Std. Dev.	Min	Max
INF_T	508	0.033	0.011	0.018	0.063
INR_T	508	0.057	0.021	0.01	0.076
GDP_T	508	0.057	0.015	0.02	0.074

Source: Results extracted from Stata17.

4.2. Pairwise correlations and other data diagnostic

Table 3 shows that the correlation values rule out the possibility of high multicollinearity between the study variables. Moreover, the VIF has an average of 1.404 and a maximum of 2.548, indicating that multicollinearity is unlikely to occur. Additionally, Table 4 shows that the p-value is less than 0.05, indicating that the model has heteroskedasticity and autocorrelation defects. Therefore, the Robust Standard Errors Model is proposed to address these issues.

Table 3: Matrix of correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	VIF
(1) $NCSKEW_{T+1}$	1.000											
(2) $NCSKEW_T$	-0.008	1.000										1.059
(3) IAT_T	0.011	0.014	1.000									1.038
(4) ROA_T	-0.041	0.068	0.122*	1.000								1.089
(5) LEV_T	0.014	0.057	0.083	-0.065	1.000							1.066
(6) PB_T	-0.071	0.143*	0.028	0.117*	0.148*	1.000						1.488
(7) $SIZE_T$	-0.020	0.097*	-0.006	0.192*	0.094*	0.502*	1.000					1.484
(8) $DTURN_T$	-0.143*	-0.004	0.011	-0.076	-0.149*	-0.027	0.046	1.000				1.097
(9) INF_T	0.046	0.015	-0.018	-0.055	-0.006	-0.275*	-0.271*	-0.099*	1.000			1.713
(10) INR_T	0.145*	0.239*	-0.056	0.068	0.027	-0.187*	-0.246*	-0.138*	0.272*	1.000		2.548
(11) GDP_T	-0.199*	-0.040	0.035	0.005	-0.057	-0.134*	-0.093*	-0.045	0.103*	0.360*	1.000	1.455

Note:* shows significance at $p < 0.05$. Mean VIF = 1.404.

Source: Results extracted from Stata 17.

Table 4: Other data diagnostic tests

Test	Statistic	p-value	Results
White's test for heteroskedasticity	91.51	0.0136	Accepted
Wooldridge test for autocorrelation	39.923	0.0000	Accepted

Source: Results extracted from Stata 17.

4.3. Impact of investor attention on the price crash risk of real estate stocks in Vietnam

Table 5 reveals that the coefficient for IAT is 0.0159 with a standard error of 0.0181, indicating that it does not have a statistically significant impact on future price crash risk. Additionally, the lagged NCSKEW variable has a coefficient of -0.0383 with a standard error of 0.0433, which is also not statistically significant. This finding implies that past price crash risk does not significantly predict future crash risk within the scope of this model.

Regarding firm-related factors, ROA has a coefficient of -1.467 with a standard error of 1.038, indicating that ROA does not significantly affect price crash risk. LEV exhibits a coefficient of -0.145 and a standard error of 0.246, suggesting that the level of debt relative to equity does not substantially influence crash risk. Similarly, PB has a coefficient of -0.0303 with a standard error of 0.0186, implying that valuation ratios do not impact price crash risk significantly. In contrast, SIZE has a positive and statistically significant coefficient of 0.0540 with a standard error of 0.0298 ($p < 0.1$). In addition, DTURN shows a negative and significant coefficient of -0.0526 with a standard error of 0.0276 ($p < 0.1$).

In terms of macroeconomic variables, INF has a negative and highly significant coefficient of -15.18 with a standard error of 5.778 ($p < 0.01$), while INR exhibit a positive and highly significant coefficient of 44.67 with a standard error of 7.284 ($p < 0.01$). Additionally, GDP growth has a negative and highly significant coefficient of -24.49 with a standard error of 2.934 ($p < 0.01$). Furthermore, the regression model explains a moderate portion of the variance in stock price crash risk, with an R-squared value of 0.154.

This indicates that the model accounts for approximately 15.4% of the variability in price crash risk for real estate stocks.

Table 5: The result of multivariate regression

Variables	$NCSKEW_{T+1}$
$NCSKEW_T$	-0.0383
	(0.0433)
IAT_T	0.0159
	(0.0181)
ROA_T	-1.467
	(1.038)
LEV_T	-0.145
	(0.246)
PB_T	-0.0303
	(0.0186)
$SIZE_T$	0.0540*
	(0.0298)
$DTURN_T$	-0.0526*
	(0.0276)
INF_T	-15.18***
	(5.778)
INR_T	44.67***
	(7.284)
GDP_T	-24.49***
	(2.934)
Constant	-2.153**
	(0.943)
Observations	416
R-squared	0.154

Note: Robust standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1

Source: Results extracted from Stata 17.

5. Discussion

Using a sample of 80 listed real estate firms on the HoSE and HNX between 2014 and 2023, the research indicates there is no evidence to substantiate the hypothesis that investor attention would have an impact on the likelihood of real estate stock crashes in Vietnam between 2014 and 2023. Moreover, stock price crash risk is affected significantly by macroeconomic factors such as inflation, interest rate and GDP growth rate. Besides, SIZE and DTURN also have effects on stock price crash risk.

Firstly, there is no evidence on the impacts of investor attention on stock price crash risk. This finding is not consistent with results of previous studies, such as the negative impact of investor attention on stock price crash risk (Wen et al., 2019), or the positive effect found by Chen and Chen (2024). About the Vietnamese real estate industry over the period examined, a lot of negative information was being spread, and illegal market manipulation operations caused the real estate sector to fluctuate between 2019 and 2022, leading to big problems and barriers for the real estate industry and real estate stocks. For example, in the second half of 2022, the corporate bond market underwent a widespread psychological shock as investors learned about the events at Tan Hoang Minh Group and Van Thinh Phat.

Secondly, SIZE and DTURN have impacts on the crash risk of real estate stocks in Vietnam. To be precise, SIZE has a positive impact on real estate stocks crashes in Vietnam, indicating that larger real estate firms are more likely to experience higher stock price crash risk, potentially due to their increased visibility and market scrutiny. Moreover, the result of this study illustrates that DTURN has a negative correlation with stock price crash risk, which is different from the conclusions of Chauhan et al. (2017) and Zhang et al. (2023). This finding indicates that higher liquidity can reduce the risk of real estate stocks' price crashes.

Thirdly, stock price crash risk is also affected by macro factors, including inflation, interest rate, and GDP growth rate. To be precise, stock price crash risk is negatively affected by inflation, which is consistent with findings of Chiang and Chen (2023). Obviously, when inflation increases, the value of real estate assets of companies also increase, but along with that comes an increase in the prices of different types of costs, which can stabilize stock prices. In addition, there is a positive effect of the interest rate on real estate stock price crash risk. In fact, many real estate companies have high leverage ratios, putting them in difficult situations when the market interest rate goes up. When the interest rate increases, creditors such as banks or investors will have many less risky investment options than investing in real estate companies. As a result, real estate companies' capital resources are reduced. Besides, since housing prices in Vietnam are too high, compared to the average income of citizens, an increase in interest rate can lead to a decrease in loans to buy houses, consequently affecting the business results of real estate companies. Furthermore, the growth of GDP has a negative effect on the stock price crash risk, showing that higher GDP growth reduces the risk of price crashes. In fact, in

case of an increase in GDP, the real estate industry will have a lot of potential opportunities, leading to an increase in the real estate stock price.

Fourthly, some variables do not have any effect on the crash risk of real estate stocks in Vietnam. To be precise, there is no evidence on the impact of the leverage ratio on stock price crash risk, which is not similar to findings of Hutton et al. (2009). In addition, price to book ratio does not show any correlation with the probability of stock price crashes, which is different from the conclusions of Chauhan (2017) about stock price crash risks in Turkey and India. In fact, the real estate market in Vietnam is subject to various factors such as government policies, economic conditions, and market sentiment. Consequently, the PB ratio may not accurately reflect the true value of a real estate development company's assets. Moreover, this study shows that stock price crash risk is not affected by the market capitalization, which is inconsistent with the results of Chauhan (2017). Furthermore, ROA has no impact on real estate stocks crashes in Vietnam, which does not support previous study of Kim et al. (2014) who confirm a negative impact of ROA on stock crash risk.

6. Conclusions

By using data collected from audited financial statements of 80 listed real estate firms and daily market data over the period from 2014 to 2023 in Vietnam, this study has made significant contributions in terms of theory and practice. *Firstly*, this research adds to the literature about the role of investor attention by showing that the attention of investors for individual firms totally does not impact real estate stock crashes in Vietnam. *Secondly*, this working paper gives evidence on the impacts of some firm-related and macroeconomic factors on stock crash risk. *Thirdly*, the research results give implications that in Vietnam, firm-related factors and or macroeconomic indicators should be considered by investors and policy makers when they evaluate real estate stock crash risk.

However, this study still has some limitations. *Firstly*, this working paper uses the yearly data of real estate stocks, leading to a small number of observations. *Secondly*, to measure investor attention, this article uses the SVI instead of other modern approach, due to difficulties in collecting secondary data. *Thirdly*, this paper tries to achieve research purposes by using the regression method, instead of other techniques. These limitations can be solved in future research.

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