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The Influence of Investor Sentiment, Investor Overconfidence, and Investor Attention on the Risk of Stock Price Fall with Analyst Herding as a Moderating Variable in Southeast Asia

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Abstract: This study aims to analyze the influence of investor sentiment, investor overconfidence, and investor attention on stock price crash risk, as well as to examine the role of analyst herding behavior as a moderating variable among technology sector companies listed on the Indonesia Stock Exchange (IDX), Singapore Exchange (SGX), Bursa Malaysia (KLSE), and the Stock Exchange of Thailand (SET) during the 2021–2025 period. The study employs a quantitative approach using secondary data obtained from financial statements, stock trading data, and corporate annual reports. The sample was determined using a saturated sampling technique, resulting in 468 observations. Stock price crash risk is proxied using Negative Conditional Skewness (NCSKEW) and Down-to-up Volatility (DUVOL). Data analysis was conducted using descriptive statistics, classical assumption tests, Moderated Regression Analysis (MRA), F-tests, t-tests, the coefficient of determination, and robustness tests. The research results indicate that investor sentiment, investor overconfidence, and investor attention do not significantly affect stock price crash risk, whether measured using the NCSKEW or DUVOL proxies. Furthermore, analyst herding does not moderate the relationship between these behavioral factors—investor sentiment, overconfidence, and attention—and stock price crash risk. Robustness tests employing both crash risk proxies and regression model comparisons yield consistent conclusions. These findings suggest that the examined investor behavioral factors fail to explain the variation in stock price crash risk among technology sector companies in Southeast Asia, implying the existence of other factors outside the research model that may influence such risk.

Keywords: investor sentiment, investor overconfidence, investor attention, analyst herding, stock price crash risk, NCSKEW, DUVOL.

INTRODUCTION

Stock price crash risk a stock price crash is the potential for a sudden and extreme decline in stock prices over a short period of time, typically triggered by the release of long-held negative information or by the market's emotional response to certain sentiments (Bashir et al.,

2024; Hutton et al., 2009). This phenomenon often occurs in emerging markets, which are prone to high volatility and limited market discipline mechanisms. GoTo Group experienced significant pressure in the capital market after its valuation plummeted by more than 70% since its IPO in 2022, while Sea Ltd. recorded unexpected losses in 2023, causing its shares to plummet. In 2024, funding for technology startups in Southeast Asia also fell by 59% compared to the same period the previous year (Currie & Shum, 2023; Daga, 2023; Mehta, 2023; Tnglobal, 2024).

This phenomenon reflects the principles of behavioral finance theory, which states that investment decisions are not always rational and are influenced by psychological, emotional, and social factors. The accumulation of these behaviors can delay the disclosure of negative information, accelerate the spread of rumors, and create information bias, thus increasing the potential for stock price crashes (Bashir et al., 2024; Cao et al., 2025; Chen & Haga, 2021; D. Yu et al., 2024; H. Yu, 2024).

Investor sentiment is the collective perception or attitude of investors toward market conditions, often influenced by emotions, news, or rumors, rather than economic fundamentals (H. Yu, 2024). Negative sentiment can trigger panic selling, while excessively positive sentiment can form a price bubble that is vulnerable to bursting when negative information emerges (Baker & Wurgler, 2006; Bashir et al., 2024; Fu et al., 2021; Nguyen & Nguyen, 2024). Research by Cao et al. (2025) and Maryam & Kaouther (2022) suggests that investor sentiment increases the risk of a crash, although some studies find different results depending on market conditions.

Besides sentiment, investor overconfidence is a psychological bias that leads investors to overestimate their ability to predict the market, leading to overly optimistic investment decisions (Bouteska et al., 2023). The relationship between overconfidence and stock price crash risk is explained through the mechanism of bad news hoarding, which is the tendency to delay the disclosure of negative information until it ultimately triggers an extreme stock price correction (Dao et al., 2023; Qiao et al., 2022). On the other hand, investor attention indicates the level of investor focus on limited market information, making investors more responsive to information with high exposure and potentially increasing overreaction to negative news (Chen & Chen, 2024; D. Yu et al., 2024).

The characteristics of Southeast Asian capital markets, dominated by retail investors, mean that investment behavior is more influenced by emotions, rumors, and trends than by fundamental analysis (BNI Sekuritas, 2025; Natalia, 2025; Nguyen & Nguyen, 2024). This situation has led to the emergence of analyst herding, the tendency of analysts to follow majority opinion when providing recommendations to the market (Bashir et al., 2024; Hudson et al., 2020). Under certain conditions, analyst herding can signal stability and reduce overreaction to negative information, although some studies have also shown that this behavior can actually increase crash risk (Bashir et al., 2024; Choi & Yoon, 2020; Messaoud & Ben Amar, 2024).

Previous research has shown inconsistent results regarding the influence of investor sentiment, overconfidence, investor attention, and analyst herding on stock price crash risk. Furthermore, most research focuses on developed markets, resulting in limited empirical evidence in Southeast Asia. Therefore, this study examines the influence of investor sentiment, investor overconfidence, and investor attention on stock price crash risk, with analyst herding as a moderating variable, in technology companies in Southeast Asia.

Literature Review

Behavioral Finance Theory

Behavioral finance theoryis a branch of finance that studies how psychological, emotional, and social factors influence the behavior of market players and investment decision

making (ST Chen & Haga, 2021). In contrast to traditional financial theory which assumes that investors are always rational and markets are efficient, behavioral finance emphasizes that investors often act irrationally due to cognitive limitations, imperfect information, and psychological biases (Mushinada, (2020);Chen & Haga, (2021). As a result, asset prices can deviate significantly from fundamental values, especially when investment decisions are based on market sentiment rather than objective economic information (Maryam & Kaouther, (2022);Cuong et al., (2019).

Herding Theory

Herding theoryexplains the tendency of individuals, including investors and analysts, to follow the majority decision, even when the information they have is different (Bikhchandani & Sharma, 2000). In the context of capital markets, herding occurs when market participants are reluctant to deviate from consensus due to psychological pressure, limited information, or reputational concerns (Trueman, 1994). This phenomenon can lead to homogeneity of opinion in the market, which in turn increases the risk of mispricing and increases vulnerability to price volatility.

Stock Price Crash

Stock price crash riskrefers to the possibility of a sharp and sudden decline in stock prices, usually caused by the release of bad information that has long been hidden by management (H. Yu, 2024). The main mechanism of this risk stems from the tendency of corporate managers to hold back bad news cumulatively, and when this negative information reaches a certain threshold, its simultaneous release to the market triggers an extreme price decline (Bashir et al., 2024). The risk of a stock price crash results from the interaction between managerial behavior that delays the disclosure of negative information, the limited information investors receive, and collective market sentiment that magnifies its impact.

Investor Sentiment

Investor sentiment refers to the collective perceptions, expectations, or feelings of investors regarding financial market conditions, whether in the form of optimism (bullish) or pessimism (bearish), which is often not entirely based on fundamental company information (Rawat, 2023)This sentiment can be influenced by various factors such as market trends, news, rumors, and the behavior of other investors (Hudson et al., 2020). Investor sentiment is often associated with noise trading behavior, namely trading activities that are not based on accurate or rational information.(De Long et al., 1990; El-Gayar et al., 2021). Negative sentiment is understood as a condition where investor perceptions and expectations are dominated by excessive pessimism about market or company prospects. In the context of this research, negative sentiment is generally triggered by bad news (bad news) such as disappointing financial performance releases, rumors regarding internal company problems, uncertainty over government regulations, and global macroeconomic turmoil that increases systemic risk.

InvestorOverconfident

Investor overconfidenceis a psychological bias that is widely discussed in behavioral finance literature, characterized by the tendency of individuals to overestimate their abilities and the accuracy of their knowledge in predicting the market (Bouteska et al., 2023)In financial decision-making, this bias is reflected in excessive confidence in personal judgment even though the information available is limited or incomplete (Dao et al., 2023). In general,overconfidencedivided into two main forms, name lyover estimation Andover precision Overestimation is an excessive assessment of one's own abilities, while overprecision

is excessive confidence in the accuracy of the estimates made, so that individuals tend to ignore the existence of uncertainty (Qiao et al., 2022).

Investor Attention

Investor attentiondefined as the level of cognitive focus of investors on various information circulating in the market, whether in the form of financial reports, economic news, political issues, or non-financial factors such as environmental, social, and governance (ESG)(T.-H. Chen & Chen, 2024). Due to cognitive limitations (limited attention), investors are unable to process all available information simultaneously, so they tend to only respond to the most prominent or most exposed information (D. Yu et al., 2024). Increased investor attention can accelerate the spread of information and increase market liquidity. However, excessive attention can potentially lead to irrational behavior, such as overreaction to negative news, which ultimately increases stock price volatility (T.-H. Chen & Chen, 2024).

Herding Analyst

Analyst herdingis part of the herding behavior phenomenon, namely the tendency of market players, including analysts, to follow the decisions or actions of the majority without conducting independent analysis based on the information they have themselves (Choi & Yoon, 2020). This behavior can be influenced by various factors such as reputational pressure, limited information, compensation incentives, and psychological biases (Messaoud & Ben Amar, 2024). Herding behavior, in the capital market, causes analysts and investors to act homogeneously, which ultimately can cause stock prices to move inconsistently with their fundamental value (Hudson et al., 2020). Herding theory distinguishes between rational herding and emotional herding. Rational herding occurs when market participants consciously follow the majority due to strategic considerations such as information signals from collective behavior, reputational pressures, or compensation schemes (Choi & Yoon, 2020).

METHODS

This study uses a quantitative approach with a historical method that utilizes secondary data in the form of financial reports, stock trading data, and annual reports of technology sector companies listed on the Indonesia Stock Exchange (IDX), Singapore Exchange (SGX), Bursa Malaysia (KLSE), and Stock Exchange of Thailand (SET) during the period 2021–2025. The study population includes all technology sector companies listed on the four exchanges, while the sample is determined using a saturated sampling technique with all companies that meet the criteria for completeness of the data being used as research samples. The research instrument is secondary data used to measure the stock price crash risk variable through the proxy Negative Conditional Skewness (NCSKEW) and Down-to-up Volatility (DUVOL), investor sentiment formed using Principal Component Analysis (PCA) of the Relative Strength Index (RSI), Williams %R Indicator (WRI), Psychological Line Index (PLI), and Share Turnover Velocity (VOL) indicators, investor overconfidence, investor attention, and analyst herding. Data collection techniques are carried out through literature studies and documentation from company reports and official stock exchange databases. Data analysis uses descriptive statistical analysis, classical assumption tests including normality, multicollinearity, heteroscedasticity, and autocorrelation tests, then continued with Moderated Regression Analysis (MRA), F test, t test, coefficient of determination (Adjusted R^2), and robustness test using NCSKEW and DUVOL as alternative measures of stock price crash risk.

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

Table 1. Results of Descriptive Statistical Analysis

Variables	N	Minimum	Maximum	Mean	Std. Error	Standard Deviation
NCSKEW	468	-82,155.00	35,579.75	-1,467.32	1,763,593	38,152.34
DUVOL	468	-0.60	3.50	0.0123	0.01055	0.22824
SENT	468	-60,401.00	89,590.00	239,0527	499,16850	10,798.67
OC	468	-0.95	18,784.00	112,7063	57.86207	1,251,748
ATT	468	0.00	8.31	6,2707	0.10253	2,21808
CSAD	468	0.02	0.07	0.0553	0.00055	0.01185

Source: Research Data, 2025

1. The NCSKEW value has a minimum value of -821551.00 and a maximum value of 35579.75, with an average value of -1467.32 and a standard deviation of 38152.34. The negative average NCSKEW value indicates that the companies in the sample generally have a left-skewed return distribution, indicating a potential risk of stock price declines. The relatively large standard deviation indicates that the level of crash risk varies significantly between companies.
2. DUVOLhas a minimum value of -0.60 and a maximum of 3.50, with an average value of 0.0123 and a standard deviation of 0.22824. The positive average DUVOL value, although relatively small, indicates that, in general, return volatility during periods of decline tends to be slightly greater than during periods of increase. This indicates the potential risk of stock price declines, although the degree varies across companies.
3. The investor sentiment variable (SENT) has a minimum value of -60,401.00 and a maximum of 89,590.00, with a mean value of 239.05 and a standard deviation of 10,798.67. The very wide range of values and high standard deviation indicate that investor sentiment levels vary significantly between companies and between periods. This reflects differences in investor perceptions and expectations for each stock.
4. The investor overconfidence (OC) variable showed a minimum value of -0.95 and a maximum of 18,784.00, with an average value of 112.71 and a standard deviation of 1,251.75. The positive average value indicates a general tendency towards investor overconfidence in the study sample, although with varying degrees of intensity across companies.
5. The investor attention (ATT) variable has a minimum value of 0.00 and a maximum of 8.31, with a mean value of 6.27 and a standard deviation of 2.22. The relatively high mean ATT value indicates that most companies in the sample receive significant investor attention, potentially impacting stock price volatility and the risk of falling prices.
6. The analyst herding variable, proxied by CSAD, has a minimum value of 0.02 and a maximum of 0.07, with an average value of 0.0553 and a standard deviation of 0.01185. The relatively small CSAD value and narrow range indicate that the level of dispersion of stock returns between companies tends to be low, indicating a tendency for herding behavior in the market. The limited variation in CSAD also indicates that herding intensity is relatively stable throughout the observation period.

Classical Assumption Test

Normality Test

Table 2. Normality Test Results

Regression Model	Kolmogorov Smirnov	Significant	Information
NCSKEW	9,501	0,000	Not Normally Distributed
DUVOL	2,507	0,000	Not Normally Distributed
NCSKEW*Z	9,788	0,000	Not Normally Distributed
DUVOL*Z	2,502	0,000	Not Normally Distributed

Source: Research Data, 2025

1. The normality test for the regression model with the dependent variable NCSKEW was performed using the One-Sample Kolmogorov–Smirnov Test on unstandardized residuals. Based on the test results, the Asymp. Sig. (2-tailed) value was 0.000, which is smaller than the 0.05 significance level. This indicates that the residuals in the NCSKEW model are not statistically normally distributed. The relatively high Kolmogorov–Smirnov Z value indicates a deviation in the residual distribution from a normal distribution. This condition reflects the characteristics of financial data, especially stock returns and the risk of stock price falls, which generally have an asymmetric distribution and tend to contain extreme values (outliers).
2. The normality test for the model with the dependent variable DUVOL was also performed using the One-Sample Kolmogorov–Smirnov Test. The test results showed an Asymp. Sig. (2-tailed) value of 0.000, which means the residuals of the DUVOL model are not normally distributed. However, the residual standard deviation value in the DUVOL model is relatively smaller than the NCSKEW model, indicating that the residual distribution is more concentrated. However, statistically, the residual distribution still deviates from the normal distribution.
3. The next normality test was conducted on the moderated regression model with the dependent variable NCSKEW and the interaction between the independent variable and the moderating variable (CSAD). Based on the results of the Kolmogorov–Smirnov test, the Asymp. Sig. (2-tailed) value was 0.000, indicating that the residuals in the NCSKEW moderation model were not normally distributed. This result indicates that the addition of interaction variables in the model did not significantly change the characteristics of the residual distribution. Deviations from normality were still found and are common in regression models involving interaction variables and capital market data.
4. The final normality test was conducted on a moderated regression model with the dependent variable DUVOL and the interaction of the independent variables with CSAD. The test results showed an Asymp. Sig. (2-tailed) value of 0.000, thus it can be concluded that the residuals in the DUVOL moderation model are not statistically normally distributed. This value indicates that despite the moderation modeling, the data characteristics still reflect fluctuating capital market conditions and do not follow a perfect normal distribution.

Multicollinearity Test

Table 3. Results of NCSKEW Multicollinearity Test

Regression Model	Tolerance	VIF	Information
SENT	0.994	1,006	No Symptoms of Multicollinearity
OC	0.979	1,021	No Symptoms of Multicollinearity
ATT	0.990	1,010	No Symptoms of Multicollinearity
CSAD	0.980	1,020	No Symptoms of Multicollinearity

Source: Research Data, 2025

Based on the results of the multicollinearity test on the regression model with the dependent variable NCSKEW, it is known that all independent variables, namely SENT, OC, ATT, and CSAD, have a Tolerance value above 0.10 and a Variance Inflation Factor (VIF) value below 10. In detail, the tolerance value ranges from 0.979–0.994, while the VIF value is in the range of 1.006–1.021. These values indicate that the independent variables are not highly correlated with each other. It can be said that the NCSKEW regression model does not experience symptoms of multicollinearity, so that all independent variables are suitable for use in regression analysis and the results of coefficient estimation can be interpreted reliably.

Table 4. Results of the DUVOL Multicollinearity Test

Regression Model	Tolerance	VIF	Information
SENT	0.994	1,006	No Symptoms of Multicollinearity
OC	0.979	1,021	No Symptoms of Multicollinearity
ATT	0.990	1,010	No Symptoms of Multicollinearity
CSAD	0.980	1,020	No Symptoms of Multicollinearity

Source: Research Data, 2025

The results of the multicollinearity test on the regression model with the DUVOL dependent variable show a similar pattern to the NCSKEW model. All independent variables, namely SENT, OC, ATT, and CSAD, have a Tolerance value greater than 0.10 and a VIF less than 10. The tolerance value is in the range of 0.979–0.994, while the VIF value ranges from 1.006–1.021. This indicates that there is no strong linear relationship between the independent variables in the model. The DUVOL regression model is free from multicollinearity symptoms, so the model meets one of the classical assumptions of linear regression and can be used for hypothesis testing.

Table 5. Results of NCSKEW*Z Multicollinearity Test

Regression Model	Tolerance	VIF	Information
SENT	0.024	41,723	There are symptoms of multicollinearity
OC	0.061	16,514	There are symptoms of multicollinearity
ATT	0.036	27,554	There are symptoms of multicollinearity
CSAD	0.082	12,252	There are symptoms of multicollinearity
SENT_CSAD	0.024	41,132	There are symptoms of multicollinearity
OC_CSAD	0.064	15,616	There are symptoms of multicollinearity
ATT_CSAD	0.028	35.7	There are symptoms of multicollinearity

Source: Research Data, 2025

In the NCSKEW regression model with a moderating variable (Z), the results of the multicollinearity test show different conditions compared to the model without moderation. All independent variables, both the main variables (SENT, OC, ATT, CSAD) and interaction variables (SENT_CSAD, OC_CSAD, ATT_CSAD), have a Tolerance value below 0.10 and a VIF well above 10. Very high VIF values, such as SENT (41.723), SENT_CSAD (41.132), ATT_CSAD (35.7), and ATT (27.554), indicate a very strong correlation between the independent variables in the model. It can be concluded that the NCSKEW regression model with moderation experiences symptoms of strong multicollinearity. This condition is common in moderated regression models due to the formation of interaction variables that are mathematically correlated with the constituent variables.

Table 6. Results of the DUVOL*Z Multicollinearity Test

Regression Model	Tolerance	VIF	Information
SENT	0.024	41,723	There are symptoms of multicollinearity
OC	0.061	16,514	There are symptoms of multicollinearity
ATT	0.036	27,554	There are symptoms of multicollinearity
CSAD	0.082	12,252	There are symptoms of multicollinearity
SENT_CSAD	0.024	41,132	There are symptoms of multicollinearity
OC_CSAD	0.064	15,616	There are symptoms of multicollinearity
ATT_CSAD	0.028	35.7	There are symptoms of multicollinearity

Source: Research Data, 2025

The results of the multicollinearity test on the DUVOL regression model with the moderating variable (Z) also indicate symptoms of multicollinearity. All independent variables, including SENT, OC, ATT, CSAD, as well as the interaction variables SENT_CSAD, OC_CSAD, and ATT_CSAD, have a Tolerance value of less than 0.10 and a VIF value greater

than 10. Very high VIF values, such as SENT (41.723) and SENT_CSAD (41.132), indicate that these variables are highly correlated with each other in the regression model. The moderating variable also experiences symptoms of multicollinearity. However, this condition is still tolerable in moderation research, because multicollinearity is often unavoidable due to the formation of interaction variables.

Heteroscedasticity Test

Table 7. Results of the NCSKEW Heteroscedasticity Test

Regression Model	Significant	Information
SENT	0.987	There is no heteroscedasticity symptom.
OC	0.665	There is no heteroscedasticity symptom.
ATT	0.734	There is no heteroscedasticity symptom.
CSAD	0,000	Heteroscedasticity Symptoms Occur

Source: Research Data, 2025

Based on Table 7, the results of the heteroscedasticity test in the regression model with the dependent variable NCSKEW show that the variables SENT, OC, and ATT have significance values of 0.987; 0.665; and 0.734, respectively, all of which are greater than 0.05. This indicates that the three variables do not experience symptoms of heteroscedasticity. However, the variable CSAD shows a significance value of 0.000, which is less than 0.05. Thus, it can be concluded that the NCSKEW model contains symptoms of heteroscedasticity originating from the variable CSAD. This condition indicates that the residual variance in the NCSKEW model is not completely homogeneous.

Table 8. Results of the DUVOL Heteroscedasticity Test

Regression Model	Significant	Information
SENT	0.755	There is no heteroscedasticity symptom.
OC	0.258	There is no heteroscedasticity symptom.
ATT	0.196	There is no heteroscedasticity symptom.
CSAD	0,000	Heteroscedasticity Symptoms Occur

Source: Research Data, 2025

Based on Table 8, the results of the heteroscedasticity test in the model with the DUVOL dependent variable show that the SENT, OC, and ATT variables have significance values of 0.755; 0.258; and 0.196, respectively, all of which are greater than 0.05. Thus, these three variables do not show any symptoms of heteroscedasticity. Meanwhile, the CSAD variable has a significance value of 0.000, which is less than 0.05. This indicates that the DUVOL model contains symptoms of heteroscedasticity originating from the CSAD variable. Thus, the DUVOL regression model also does not fully meet the assumption of homoscedasticity.

Table 9. Results of the NCSKEW*Z Heteroscedasticity Test

Regression Model	Significant	Information
SENT	0.981	There is no heteroscedasticity symptom.
OC	0.445	There is no heteroscedasticity symptom.
ATT	0.046	There is no heteroscedasticity symptom.
CSAD	0.659	There is no heteroscedasticity symptom.
SENT_CSAD	0.967	There is no heteroscedasticity symptom.
OC_CSAD	0.545	There is no heteroscedasticity symptom.
ATT_CSAD	0.057	There is no heteroscedasticity symptom.

Source: Research Data, 2025

Based on Table 9, the results of the heteroscedasticity test in the NCSKEW*Z model show that all independent variables, namely SENT, OC, ATT, CSAD, as well as the interaction variables SENT_CSAD, OC_CSAD, and ATT_CSAD, have a significance value greater than 0.05. It can be concluded that in the NCSKEW model with moderating variables there are no symptoms of heteroscedasticity. This indicates that the addition of interaction variables in the model can improve the heteroscedasticity problem that previously appeared in the basic model.

Table 10. Results of the DUVOL*Z Heteroscedasticity Test

Regression Model	Significant	Information
SENT	0.948	There is no heteroscedasticity symptom.
OC	0.791	There is no heteroscedasticity symptom.
ATT	0.489	There is no heteroscedasticity symptom.
CSAD	0.041	There is no heteroscedasticity symptom.
SENT_CSAD	0.23	There is no heteroscedasticity symptom.
OC_CSAD	0.818	There is no heteroscedasticity symptom.
ATT_CSAD	0.020	Heteroscedasticity Symptoms Occur

Source: Research Data, 2025

Based on Table 10, the results of the heteroscedasticity test in the DUVOL*Z model show that most of the independent variables, namely SENT, OC, ATT, CSAD, SENT_CSAD, and OC_CSAD, have a significance value greater than 0.05, thus showing no symptoms of heteroscedasticity. The interaction variable ATT_CSAD has a significance value of 0.020, which is smaller than 0.05. This indicates that in the DUVOL model with moderating variables there are still symptoms of heteroscedasticity originating from the interaction of ATT and CSAD.

Autocorrelation Test

Table 11. Durbin Watson Test Results

Regression Model	Durbin Watson
NCSKEW	2,009
DUVOL	2,157
NCSKEW*Z	2,015
DUVOL*Z	1,164

Source: Research Data, 2025

1. NCSKEW Regression Model
   Based on Table 11, the Durbin–Watson value for the regression model with the NCSKEW dependent variable is 2.009. This value is very close to 2, thus concluding that the NCSKEW model does not exhibit autocorrelation. Therefore, the residuals in this model are independent across observations.
2. DUVOL Regression Model
   The Durbin–Watson test results for the DUVOL regression model showed a value of 2.157. This value is within the acceptable range and is close to 2.0, thus concluding that the DUVOL model does not exhibit autocorrelation. Therefore, the assumption of residual independence in this model has been met.
3. NCSKEW Regression Model with Moderating Variables (NCSKEW*Z)
   The Durbin–Watson value for the NCSKEW*Z model is 2.015. This value is very close to 2, indicating the absence of autocorrelation in the regression model. Therefore, the addition of moderating variables does not cause autocorrelation problems in the NCSKEW model.
4. DUVOL Regression Model with Moderating Variables (DUVOL*Z)

In the DUVOL*Z model, the Durbin–Watson value was recorded at 1.164. This value is below 2 and relatively lower than other models, indicating a tendency for positive autocorrelation. Therefore, it can be concluded that the DUVOL model with moderating variables shows signs of autocorrelation.

Moderated Regression Analysis

Table 12. Results of NCSKEW Moderated Regression Analysis Test

Variables	Beta	Significant
SENT_CDAS	0.018	0.952
OC_CSAD	-0.081	0.658
ATT_CSAD	0.215	0.439

Source: Research Data, 2025

Based on Table 12, the results of the moderated regression analysis show that all interaction variables between the independent variables and CSAD do not have a significant effect on NCSKEW.

1. The interaction variable SENT_CSAD has a beta coefficient of 0.018 with a significance value of 0.952, well above the 5 percent significance level. This indicates that CSAD is unable to moderate the influence of investor sentiment on the risk of stock price declines as measured by NCSKEW.
2. The interaction variable OC_CSAD shows a beta coefficient of -0.081 with a significance value of 0.658. This value is also not statistically significant, thus it can be concluded that analyst herding does not moderate the relationship between investor overconfidence and NCSKEW.
3. The ATT_CSAD interaction variable has a beta coefficient of 0.215 with a significance value of 0.439. These results indicate that CSAD does not act as a moderating variable in the relationship between investor attention and NCSKEW.

Table 13. Results of the DUVOL Moderated Regression Analysis Test

Variables	Beta	Significant
SENT_CDAS	-0.038	0.899
OC_CSAD	0.077	-0.676
ATT_CSAD	-0.225	0.417

Source: Research Data, 2025

Based on Table 13, the results of the moderated regression analysis on the model with the dependent variable DUVOL also show that all interaction variables are not statistically significant.

1. The interaction variable SENT_CSAD has a beta coefficient of -0.038 with a significance value of 0.899, which indicates that CSAD does not moderate the influence of investor sentiment on DUVOL.
2. The interaction variable OC_CSAD has a beta coefficient of 0.077 with a significance value of 0.676, which means that analyst herding does not play a role in strengthening or weakening the influence of investor overconfidence on DUVOL.
3. The ATT_CSAD interaction variable shows a beta coefficient of -0.225 with a significance value of 0.417. This value is also not statistically significant, thus it can be concluded that CSAD does not moderate the relationship between investor attention and the risk of stock price falls as measured by DUVOL.

Hypothesis Testing
Simultaneous Significance Test (F Statistic Test)

Table 14. NCSKEW F Test Results

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7,2E+009	4	1809012644	1,245	,291[a]
	Residual	6,7E+011	463	1452548063		
	Total	6,8E+011	467			

a. Predictors: (Constant), CSAD, SENT, ATT, OC

b. Dependent Variable: NCSKEW

Source: Research Data, 2025

Based on Table 14 of the NCSKEW F Statistical Test Results, the F value was 1.245 with a significance level of 0.291. This significance value is greater than 0.05, so it can be concluded that the variables Investor Sentiment (SENT), Investor Overconfidence (OC), Investor Attention (ATT), and CSAD simultaneously do not have a significant effect on stock price crash risk as measured using NCSKEW.

These results indicate that the NCSKEW regression model is unable to adequately explain variations in stock price fall risk when viewed from the simultaneous influence of all independent variables used. Therefore, the SENT, OC, ATT, and CSAD variables collectively cannot be strong predictors of NCSKEW.

Table 15. Results of the DUVOL F Test

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,299	4	,075	1,442	,219[a]
	Residual	24,029	463	,052		
	Total	24,329	467			

a. Predictors: (Constant), CSAD, SENT, ATT, OC

b. Dependent Variable: DUVOL

Source: Research Data, 2025

Based on Table 15 of the DUVOL F-statistical Test Results, the F-value was 1.442 with a significance level of 0.219. This significance value is also greater than 0.05, so it can be concluded that the variables Investor Sentiment (SENT), Investor Overconfidence (OC), Investor Attention (ATT), and CSAD simultaneously do not have a significant effect on stock price crash risk as measured using DUVOL.

This indicates that the DUVOL regression model also does not meet the criteria for simultaneous model feasibility. In other words, the variation in DUVOL as a proxy for the risk of stock price declines cannot be optimally explained by the combination of independent variables used in this study.

Coefficient of Determination

Table 16. Results of NCSKEW Determination Coefficient

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	0.103a	0.011	0.002	38112,30855

Source: Research Data, 2025

Based on Table 16 of the NCSKEW Determination Coefficient Results, the R Square value was obtained at 0.011 and the Adjusted R Square at 0.002. These results indicate that the Investor Sentiment (SENT), Investor Overconfidence (OC), Investor Attention (ATT), and CSAD variables are able to explain 0.2% of the variation in the risk of falling stock prices measured using NCSKEW, while 99.8% of the other variations are explained by other factors outside the research model.

Table 17. Results of the DUVOL Determination Coefficient

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	0.111a	0.012	0.004	0.22781

Source: Research Data, 2025

Based on Table 17. Results of the DUVOL Determination Coefficient, the R Square value is 0.012 and the Adjusted R Square is 0.004. These results indicate that the Investor Sentiment (SENT), Investor Overconfidence (OC), Investor Attention (ATT), and CSAD variables are able to explain 0.4% of the variation in the risk of falling stock prices measured using DUVOL, while 99.6% of the other variations are explained by other factors outside the research model.

Although the Adjusted R-Square value for the DUVOL model is slightly higher than for the NCSKEW model, it is still relatively low overall. This indicates that the independent variables used are not strong enough to explain variations in stock price fall risk as measured by DUVOL.

Individual Parameter Significance Test (t-Statistic Test)

Table 18. Results of NCSKEW t-Test Analysis

Variables	Beta	Significant
SENT	0.001	0.984
OC	0.029	0.538
ATT	-0.025	0.592
CSAD	-0.097	0.038

Source: Research Data, 2025

Based on Table 18, the results of the t-test show that

1. Investor sentiment (SENT) has a beta coefficient of 0.001 with a significance value of 0.984. This value is greater than 0.05, thus concluding that investor sentiment does not significantly influence NCSKEW.
2. Investor Overconfidence (OC) has a beta coefficient of 0.029 with a significance value of 0.538, which is also greater than 0.05. These results indicate that investor overconfidence does not significantly influence the risk of stock price declines, as measured by NCSKEW.
3. Investor Attention (ATT) shows a beta coefficient of -0.025 with a significance value of 0.592. This significance value indicates that investor attention does not significantly influence NCSKEW.

4. Analyst Herding (CSAD) has a beta coefficient of -0.097 with a significance value of 0.038, which is less than 0.05. This indicates that CSAD has a negative and significant effect on NCSKEW. This means that the higher the level of analyst herding, the lower the risk of stock price decline, as measured by NCSKEW.

Table 19. Results of DUVOL t-Test Analysis

Variables	Beta	Significant
SENT	-0.014	0.765
OC	-0.054	0.251
ATT	-0.059	0.204
CSAD	-0.085	0.070

Source: Research Data, 2025

Based on Table 19, the results of the t-test show that

1. Investor sentiment (SENT) has a beta coefficient of 0.001 with a significance value of 0.984. This value is greater than 0.05, thus concluding that investor sentiment does not significantly influence NCSKEW.
2. Investor Overconfidence (OC) has a beta coefficient of 0.029 with a significance value of 0.538, which is also greater than 0.05. These results indicate that investor overconfidence does not significantly influence the risk of stock price declines, as measured by NCSKEW.
3. Investor Attention (ATT) shows a beta coefficient of -0.025 with a significance value of 0.592. This significance value indicates that investor attention does not significantly influence NCSKEW.
4. Analyst Herding (CSAD) has a beta coefficient of -0.097 with a significance value of 0.038, which is less than 0.05. This indicates that CSAD has a negative and significant effect on NCSKEW. This means that the higher the level of analyst herding, the lower the risk of stock price decline, as measured by NCSKEW.

Robustness Test

Robustness testing was conducted to ensure that the research results were consistent and insensitive to differences in variable measurements or regression model specifications. This testing was important given that the classical assumption test results indicated that the research data exhibited capital market characteristics, such as non-normally distributed residuals, heteroscedasticity in some models, and indications of limited autocorrelation.

The robustness test is carried out using an alternative approach that is commonly used in empirical research, namely:

1. The use of alternative proxies for the risk of falling stock prices, and
2. Comparison of regression model specifications.

The first robustness test was conducted using two different proxies to measure stock price crash risk: NCSKEW and DUVOL. Both proxies are widely used in the financial literature and have different measurement characteristics, making them suitable for testing the stability of the research results. The test results show that in the model with NCSKEW as the dependent variable, Investor Sentiment (SENT), Investor Overconfidence (OC), and Investor Attention (ATT) do not significantly influence stock price crash risk. Relatively consistent results were also obtained in the model with DUVOL as the dependent variable, where SENT, OC, and ATT remained insignificant. Although there were differences in the significance level of the Analyst Herding (CSAD) variable, where CSAD had a significant effect in the NCSKEW model but not in the DUVOL model, the CSAD coefficient remained negative in both models. This indicates that the differences in stock price crash risk proxy measurements do not alter the

main conclusions of the study. In conclusion, the research results can be considered robust to the use of alternative Stock Price Crash Risk proxies.

The next robustness test was conducted by comparing the estimation results between the regression model without moderating variables and the regression model with moderating variables (CSAD). This approach aims to ensure that the research conclusions are not influenced by differences in model specifications used. The analysis results show that the addition of interaction variables between CSAD and each independent variable (SENT, OC, and ATT) does not change the significance of the main variables, either in the NCSKEW or DUVOL models. All interaction variables also show no significant effect on the risk of stock price declines. Furthermore, the results of the simultaneous test (F test) on the base model and the moderated model indicate that the regression models are not yet significant overall. The consistency of these results indicates that the absence of a moderating effect is not due to a particular model specification, but rather reflects the empirical conditions of the research data.

Based on the robustness test results, it can be concluded that the research findings are robust and stable. The research conclusions remained unchanged despite the following:

1. use of alternative proxies for stock price fall risk (NCSKEW and DUVOL), and
2. comparison of regression model specifications, both without and with moderating variables.

The Influence of Investor Sentiment on the Risk of Falling Share Prices

The partial regression test results show that investor sentiment has no significant effect on the risk of stock price crashes, when measured using either the NCSKEW or DUVOL proxies. This finding indicates that changes in investor sentiment across the sample and study period are unable to explain variations in stock price crash risk. These results differ from those of Fu et al. (2021) and Nguyen and Nguyen (2024), which found that investor sentiment had a positive effect on the risk of stock price crashes. The difference in results is likely due to the characteristics of the Indonesian capital market, which is dominated by domestic investors, differing levels of liquidity, and the use of sentiment measurement indicators that differ from previous studies. Theoretically, Baker and Wurgler explain that high sentiment can encourage mispricing and bubble formation, thereby increasing the potential for crashes. However, the results of this study indicate that this mechanism has not been observed in the companies included in the study sample, so investor sentiment is not a primary factor influencing the risk of stock price crashes.

The Effect of Investor Overconfidence on the Risk of Falling Share Prices

The results of partial regression tests indicate that investor overconfidence does not significantly influence the risk of stock price crashes, using either the NCSKEW or DUVOL proxies. This finding suggests that investor overconfidence bias is unable to statistically explain variations in stock price crash risk. These results differ from the research by Han et al. (2024), which found that managerial overconfidence increases stock price crash risk through bad news hoarding. This difference can be explained because retail investor overconfidence is more reflected in overtrading behavior and increased short-term volatility, while the primary mechanism causing crash risk is more related to the delay in disclosure of negative information by management, as explained by Kim et al. (2016). Furthermore, the measurement of overconfidence in this study likely does not fully capture the psychological dimensions directly related to stock price crash risk. Thus, the results indicate that the influence of investor overconfidence on stock price crash risk is relatively limited to the market conditions and characteristics studied.

The Influence of Investor Attention on the Risk of Stock Price Fall

The regression test results show that investor attention has no significant effect on the risk of stock price crashes for both proxies used, namely NCSKEW and DUVOL. This finding indicates that investor attention has not been able to significantly increase the risk of stock price crashes during the study period. These results differ from the research by Da et al. (2011), which stated that investor attention increases trading activity and market volatility, and Wen et al. (2022), which found a positive relationship between investor attention and crash risk. The difference in results is thought to be due to the characteristics of investors in the Indonesian capital market, who are more oriented towards short-term trading, so investor attention has not yet resulted in the accumulation of mispricing that can trigger stock price crashes. In line with Guo et al. (2023), the effect of investor attention on stock price crash risk only appears at very high levels of attention. Therefore, the results of this study indicate that investor attention is not yet a dominant factor in explaining the risk of stock price crashes compared to other factors such as the quality of information disclosure, managerial behavior, and market structure.

The Role of Analyst Herding in Weakening the Influence of Investor Sentiment on the Risk of Stock Price Declines

The results of the moderated regression analysis indicate that analyst herding is unable to moderate the influence of investor sentiment on the risk of stock price crashes, using either the NCSKEW or DUVOL proxies. This finding indicates that analyst collective behavior neither strengthens nor weakens the relationship between investor sentiment and stock price crash risk. Theoretically, analysts act as information intermediaries, capable of reducing information asymmetry and stabilizing market expectations. However, research by Xu et al. (2013) and Li and Zhang (2020) shows that analyst herding can actually reduce information quality and increase crash risk when analysts follow market consensus. The insignificant results of this study are likely due to the characteristics of the Indonesian capital market, which has a lower level of competition and analyst reputation pressure compared to markets targeted by previous research. Therefore, analyst herding is unable to influence the relationship between investor sentiment and stock price crash risk in this study.

The Role of Analyst Herding in Weakening the Influence of Investor Overconfidence on the Risk of Stock Price Falls

The results of the moderated regression analysis indicate that analyst herding is unable to weaken the influence of investor overconfidence on the risk of stock price crashes. This finding indicates that the interaction between the two variables does not significantly influence stock price crash risk. From a behavioral finance perspective, overconfident investors tend to overestimate their information capabilities, while analysts are expected to act as independent information providers. However, when analysts also exhibit herding behavior, this function becomes less effective. Research by Kim et al. (2016) and Xu et al. (2013) indicates that both overconfidence and analyst herding can separately increase crash risk, but this study found no moderating effect. This condition is suspected because retail investor overconfidence is more influenced by psychological factors and speculative activity than analyst recommendations. Therefore, the mechanism of stock price crash risk formation in this study is more influenced by direct investor behavior than the interaction between investor overconfidence and analyst herding.

The Role of Analyst Herding in Weakening the Influence of Investor Attention on the Risk of Stock Price Declines

The results of the moderated regression analysis indicate that analyst herding is unable to weaken the influence of investor attention on the risk of stock price crashes for both proxies

used. This finding suggests that collective analyst behavior does not influence the relationship between investor attention and stock price crash risk. Theoretically, limited attention theory explains that investors have limited information processing capabilities, thus paying more attention to stocks that are widely reported or actively traded. On the other hand, analysts are expected to function as information intermediaries, helping investors make more rational decisions. However, research by Wen et al. (2022), Guo et al. (2023), and Xu et al. (2013) shows that both investor attention and analyst herding can increase crash risk under certain conditions. The insignificant results of these studies are likely because retail investors' attention is more influenced by social media, market rumors, and short-term price movements than analyst recommendations. Thus, analyst herding has not been able to weaken the influence of investor attention on the risk of stock price crashes in the companies included in the study sample.

CONCLUSION

This study aims to analyze the influence of investor behavioral factors, namely investor sentiment, investor overconfidence, and investor attention, on stock price crash risk, proxied by NCSKEW and DUVOL. It also examines the role of analyst herding as a moderating variable. Based on the data analysis and discussion outlined above, the following conclusions can be drawn.

1. Investor sentiment does not significantly influence the risk of stock price falls, whether measured using NCSKEW or DUVOL.
2. Investor overconfidence does not have a significant effect on the risk of stock price falls, either in the NCSKEW or DUVOL models.
3. Investor attention does not significantly influence the risk of stock price falls, whether measured using NCSKEW or DUVOL.
4. The results of the moderated regression analysis indicate that analyst herding is unable to moderate the influence of investor sentiment on the risk of stock price declines. In both the NCSKEW and DUVOL models, the interaction between investor sentiment and analyst herding does not show a significant effect.
5. Analyst herding is also unable to moderate the influence of investor overconfidence on the risk of falling stock prices.
6. Analyst herding was unable to moderate the effect of investor attention on the risk of stock price falls. This confirms that investor attention and the risk of stock price falls develop relatively independently of analyst herding behavior in the context of this study.

The results of the simultaneous test (F-test) and the coefficient of determination indicate that investor sentiment, investor overconfidence, investor attention, and analyst herding, collectively, are unable to adequately explain variations in stock price fall risk. The low Adjusted R-squared value indicates that most variations in stock price fall risk are influenced by factors outside this research model.

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