

Social media sentiment, behavioral biases, and abnormal returns: Evidence from Indonesian Non-Cyclical Consumer Stocks

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ABSTRACT

Social media has become an important source of information for investors, while stock price anomalies continue to challenge market efficiency. However, evidence on the combined role of social media sentiment, overconfidence, and herding behavior in the Indonesian stock market remains limited. This study examines the associations of social media sentiment and behavioral biases, particularly overconfidence and herding, with abnormal returns (AR) of Indonesia's non-cyclical consumer sector stocks listed on the Indonesia Stock Exchange (IDX) during 2021–2025. Through a quantitative approach, this study employs panel data gathered from 119 firms selected through purposive sampling, comprising daily abnormal returns, a social-media-based sentiment index, overconfidence and herding proxies, and firm size as a control variable. The proposed model is tested using fixed-effects panel regression selected through Chow and Hausman tests. The reported main model shows positive and statistically significant associations for social media sentiment and herding, while firm size is also significant while included as a control variable. In contrast, overconfidence shows no statistically significance results after the reported robust standard-error adjustment. An alternative treatment is provided which excludes no-comment days yields consistent positive directions for sentiment and herding, but reduces the sample from 129,457 to 3,955 firm-day observations. The findings indicate statistically significant associations between social media sentiment, the herding proxy, and abnormal returns; they do not establish causal effects or a ranking of economic importance.

Keywords: Abnormal returns, Behavioral finance, Herding, Overconfidence, Social media sentiment

JEL Classification: G14, G40, G41

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1. Introduction

The capital market offers a strategic financial instrument that functions as both a fund-raising mechanism and an investment medium, thereby supporting national economic growth. The increasing number of retail investors, macroeconomic shifts, fiscal and monetary policies, and various domestic and global events can influence investor responses and perceptions (Irawan, 2025; Irawan & Gurhanawan, 2024; Siska et al., 2025). The non-cyclical consumer sector plays an important role because

it relates to basic needs and economic stability (Enow, 2022; Irawan & Gurhanawan, 2024; Siska et al., 2021). However, persistent stock price fluctuations in this sector suggest that market behavior may be influenced by psychological biases and market sentiment alongside fundamental factors (Akin & Akin, 2026; Irawan, 2025; Wang et al., 2022)

The Efficient Market Hypothesis (EMH) assumes that stock prices rapidly and accurately incorporate all available information (Fama, 1970). However, a growing body of empirical evidence suggests that financial markets do not always respond in a fully rational manner (Enow, 2022; Khasawneh et al., 2024). Under certain circumstances, markets may exhibit underreaction, characterized by a delayed response to new information, or overreaction, where investors respond excessively, causing prices to deviate from their fundamental values (Enow, 2022; Khasawneh et al., 2024). Such anomalies are often associated with investor behavioral biases, including overconfidence, herding behavior, and other cognitive biases, which influence how information is interpreted and incorporated into investment decisions (Karki et al., 2024; Kresnawati et al., 2024; Madaan & Singh, 2019; Shukla et al., 2020).

Along with rapid advancement of information technology, social media has emerged as a crucial platform through which investors exchange information, express opinions, and react to market developments (Akin & Akin, 2026; Awad et al., 2025). These interactions contribute to the formation of collective sentiment that potentially influence investment decisions and market behavior. Prior studies have documented that social media sentiment is associated with stock returns and market volatility across various international markets (Dutta, 2024; Kaya et al., 2023; Wang et al., 2022). In Indonesian context, however, empirical research utilizing social media data to examine investor sentiment and its links to stock price anomalies and behavioral biases remains relatively scarce, particularly at the sectoral level and in the post-pandemic period (Irawan & Gurhanawan, 2024; Irawan, 2025).

Behavioral finance literature has extensively examined both underreaction and overreaction, particularly through the analysis of abnormal returns and their implications for market efficiency (Enow, 2022; Irawan & Gurhanawan, 2024; Khasawneh et al., 2024). Likewise, a growing body of research on overconfidence and herding behavior suggests that psychological biases can significantly influence investment decisions and stock price dynamics (Irawan, 2025; Kresnawati et al., 2024; Padmavathy, 2024; Siska et al., 2021). Despite these advances, prior studies do not establish how social media sentiment, overconfidence, and herding jointly relate to daily abnormal returns when examined together using firm-day observations for Indonesian non-cyclical consumer stocks. This study addresses that specific sectoral and firm-day evidence gap.

Methodologically, this study contributes to the literature by moving beyond survey-based assessments of investor sentiment and behavioral biases that dominate previous research (Dutta, 2024; Kresnawati et al., 2024; Padmavathy, 2024; Pujiati, 2025). The sentiment, overconfidence, and herding measures are constructed from observed market and social media data, enabling the analysis to capture daily firm-level behavioral dynamics while mitigating the limitations associated with self-reported responses. The approach is applied to a large unbalanced panel of 119 firms observed over the 2020–2025 period.

The COVID-19 pandemic provides an important setting for examining stock price anomalies and deviations from market efficiency. A growing body of evidence shows that the pandemic led to substantial disruptions in financial markets, leading to heightened volatility, abnormal return patterns, and heterogeneous market reactions across countries and asset classes (Jin et al., 2020; Loang, 2022; Syafitri et al., 2022; Vo et al., 2022). These findings suggest that periods of heightened uncertainty may amplify behavioral responses, resulting in underreaction or overreaction to new information rather than fully rationalized price adjustment. Within this context, Indonesia's non-cyclical consumer sector offers a particularly relevant setting for analysis.

While the sector is generally regarded as relatively defensive, stock prices, on the other hand, continued to exhibit considerable fluctuations during the post-pandemic period, indicating that apart from fundamental conditions, market dynamics may also be shaped by investor sentiment and behavioral biases. Accordingly, this study examines whether social media sentiment, overconfidence, and herding behavior contribute to the formation of abnormal returns beyond the influence of broader macroeconomic conditions.

This study aims to examine the associations between: (1) Social media sentiment and abnormal returns; (2) The overconfidence proxy and abnormal returns; and (3) The herding proxy and abnormal returns among Indonesian non-cyclical consumer stocks. Firm size is included as a control variable.

2. Theoretical Framework and Hypotheses Development

Efficient Market Hypothesis and Abnormal Return

This study adopts the Efficient Market Hypothesis (EMH) as the primary theoretical benchmark for assessing stock price behavior. According to EMH, security prices rapidly incorporate all publicly available information, leaving little opportunity for investors to consistently earn abnormal returns (Fama, 1970). Under efficient market conditions, stock prices adjust immediately to new information, causing abnormal returns to converge toward zero over time.

However, extensive empirical evidence indicates that financial markets do not always operate in a fully efficient manner. Market participants may respond slowly to new information, resulting in underreaction, or react excessively, generating overreaction and temporary price deviations from intrinsic value. Such deviations are commonly observed through abnormal returns, which serve as indicators of stock price anomalies and potential departures from market efficiency (Enow, 2022; Khasawneh et al., 2024).

Accordingly, abnormal return is employed as a proxy for stock price anomalies that arise when market prices deviate from values implied by available information and firm fundamentals. Persistent abnormal returns may indicate the presence of imperfect information processing, investor sentiment, and behavioral biases, particularly in emerging markets where information asymmetry and retail investor participation remain relatively high (Barberis et al., 1998; Daniel et al., 1998; Fama, 1970)

Social Media Sentiment and Abnormal Return

Information Diffusion Theory argues that information is disseminated unevenly across market participants, resulting in differences in the timing and manner in which investors respond to new information (Hong & Stein, 1999). With the rapid growth of digital communication, social media has become an important source of market information, enabling investors to exchange opinions, expectations, and reactions in real time. The collective sentiment reflected in online discussions may shape investors' perceptions and influence trading decisions before information is fully incorporated into stock prices. Consequently, optimistic or pessimistic sentiment circulating on social media can trigger temporary underreaction or overreaction, causing stock prices to deviate from their fundamental values and generating abnormal returns (Dutta, 2024; Wang et al., 2022)

Recent empirical evidence indicates that social media sentiment contains valuable information for explaining stock price movements, trading activity, and return predictability. Investor sentiment extracted from online platforms has been shown to influence stock returns, particularly during periods of heightened uncertainty when investors rely more heavily on informal sources rather than on fundamental

analysis (Agarwal et al., 2021; Fan et al., 2023; Gan et al., 2024). Similar evidence from emerging markets also suggests that digital investor sentiment contributes to short-term market inefficiencies because retail investors tend to respond more quickly to sentiment-driven information shared through social media (Irawan & Gurhanawan, 2024). Therefore, social media sentiment is expected to positively influence abnormal returns in Indonesia's non-cyclical consumer sector. Accordingly, H_1 is proposed.

H_1 : Social media sentiment has a positive effect on the abnormal returns of non-cyclical consumer stocks listed on the Indonesia Stock Exchange

Overconfidence and Abnormal Return

Behavioral finance theory suggests that investors do not always process information rationally when making investment decisions. One of the most widely recognized behavioral biases is overconfidence, which reflects investors' tendency to overestimate the accuracy of their knowledge, analytical abilities, and forecasting skills (Barber & Odean, 2001). Prospect Theory further argues that positive investment outcomes may strengthen investors' confidence, leading them to underestimate risks and place excessive trust in their own judgments (Kahneman & Tversky, 1979). Consequently, overconfident investors tend to trade more aggressively and respond more strongly to perceived investment opportunities, increasing the likelihood that stock prices deviate from their fundamental values.

Previous studies provide evidence that overconfidence is associated with excessive trading activity, mispricing, and abnormal stock returns (Glaser & Weber, 2007; Ikram et al., 2023). Recent studies also further indicates that the effects of overconfidence may be more pronounced in emerging markets characterized by information asymmetry and high retail investor participation, where decisions are often influenced by subjective beliefs rather than objective valuation measures (Awad et al., 2025; Bouteska & Regaieg, 2026). Given these arguments, overconfidence is expected to contribute to abnormal return formation in Indonesia's non-cyclical consumer sector. Therefore, H_2 is proposed.

H_2 : Overconfidence has a positive effect on the abnormal returns of non-cyclical consumer stocks listed on the Indonesia Stock Exchange.

Herding and Abnormal Return

Noise Trader Theory explains that stock prices may deviate from their fundamental values when trading is driven by investors who rely on sentiment rather than fundamental information (De Long et al., 1990; Shleifer & Summers, 1990). One manifestation of this behavior is herding, whereby investors imitate the actions of the majority instead of making independent investment decisions based on independent analysis. Herding is more likely to occur in markets characterized by high information asymmetry and a large proportion of retail investors, as individuals tend to infer information from the observed actions of others. Consequently, synchronized buying or selling can amplify price movements, resulting in temporary underreaction or overreaction and, ultimately, abnormal returns (Costa et al., 2024; De Long et al., 1990)

Recent empirical evidence confirms that herding behavior contributes to stock price deviations and market inefficiency, particularly during periods of heightened uncertainty and volatility. Studies have shown that intense herding can significantly influence subsequent stock returns and reinforce short-term price anomalies, while the effect becomes stronger when investors are exposed to sentiment-driven information and demonstrate limited reliance on fundamental analysis. Similar patterns have also been documented in emerging markets, where retail investors dominate trading activity and

information asymmetry remains relatively high (Ahn et al., 2024). Given these theoretical and empirical arguments, herding behavior is expected to increase abnormal returns in Indonesia's non-cyclical consumer sector. Therefore, H_3 is proposed.

H_3 : Herding behavior has a positive effect on the abnormal returns of non-cyclical consumer stocks listed on the Indonesia Stock Exchange.

Based on the proposed hypotheses, the conceptual framework of this study is presented in Figure 1. The framework illustrates the hypothesized relationships among the study variables, in which social media sentiment (X1), overconfidence (X2), and herding behavior (X3) are expected to positively influence abnormal returns (Y), while firm size (X4) is incorporated as a control variable to account for firm-specific characteristics that may affect abnormal returns.

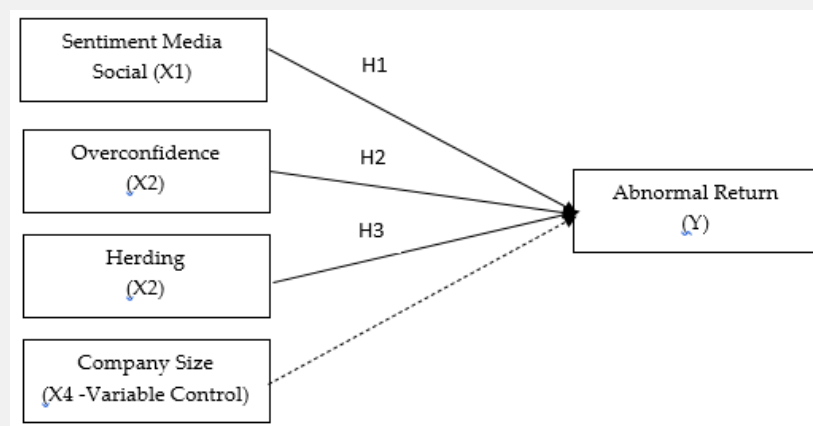


Figure 1. Conceptual framework

3. Methodology

Research Design, Population, and Sample

This study employs a **quantitative explanatory design** using daily panel data regression to examine the effects of **social media sentiment, overconfidence, and herding behavior** on the abnormal returns of non-cyclical consumer stocks listed on the Indonesia Stock Exchange (IDX), with **firm size** included as a control variable. The unit of analysis is the **firm-day**, resulting in a panel dataset that combines cross-sectional observations of listed firms with daily trading data. Daily observations are particularly required because investor sentiment and behavioral biases evolve rapidly and often generate immediate market responses that may not be adequately captured by data collected at longer intervals, such as monthly or quarterly observations (Divernois & Filipović, 2024). Appropriately, the use of daily panel data enables a more precise assessment of short-term price adjustments associated with changes in investor.

The study population consists of 122 non-cyclical consumer companies listed on the IDX. The sample was selected using purposive sampling based on the availability of consistent stock price and social media sentiment data throughout the observation period. Applying these criteria resulted in a final sample of 119 firms. Market data were collected for the 2020–2025 period; however, the baseline regression model was estimated over the 2021–2025 subperiod because social media sentiment data were available only from 2021 onward.

The baseline model contains 119 cross-sectional units, 1,205 trading days, and 129,457 firm-day observations in an unbalanced panel dataset. This data structure provides substantial variation across both firms and time, making it suitable for examining the dynamic relationships between social media sentiment, behavioral biases, and abnormal returns while controlling for firm-specific heterogeneity.

Data and Data Source

Daily stock market data, including stock prices, the Jakarta Composite Index (JCI), trading volume, and trading frequency, were obtained from the Indonesia Stock Exchange (IDX), IDX Statistics, and Yahoo Finance. Social media data including investor commentaries and discussions related to non-cyclical consumer stocks were collected from relevant online investment platforms using web-scraping techniques (Glez-Peña et al., 2013). Data on outstanding shares, used to calculate market capitalization as a proxy for firm size, were obtained from the IDX year-end Stock Summary.

The collected social media data were classified into positive, neutral, and negative sentiment categories and subsequently aggregated into a daily sentiment index. In the baseline dataset, firm-days without recorded comments during 2021–2025 were assigned a sentiment index value of zero to retain those dates in the panel; this coding represents the absence of observable social media discussion and should not be interpreted as verified neutral sentiment. To provide an alternative analysis, no-comment firm-days were treated as missing, restricting estimation to 3,955 observed-comment firm-days across 116 firms. Because this subsample may differ systematically in trading activity, investor attention, and market conditions, its estimates are interpreted as a selected-subsample comparison rather than as a directly comparable full-sample robustness test. Data from 2020 were retained for constructing market-based variables, while the baseline regression covers 2021–2025, when sentiment data are available.

The dependent variable in this study is abnormal return (AR01). The independent variables comprise social media sentiment (SENTIMENT), overconfidence (OVERCONFIDENCE), and herding behavior (HERDING), while firm size (LN_SIZE) is included as a control variable to account for firm-specific heterogeneity. The operational definitions and measurements of all variables are presented in Table 1.

Table 1. Variables and measurement

Variables	Code	Measurement	Source
Abnormal Return (Y)	AR01	$AR_{it} = R_{it} - E(R_{it})$	Enow (2022); Khasawneh et al. (2024)
Sentiment Index (X1)	SENTIMENT	(Positive sentiment – negative sentiment) / total daily comments	Agarwal et al. (2021); Kaya et al. (2023)
Overconfidence (X2)	OVERCONFIDENCE	Increase in daily trading volume and frequency following a positive return	Ikram et al. (2023); Irawan (2025); Madaan & Singh (2019)
Herding (X3)	HERDING	Simultaneous price and volume movement among stocks in the same sector	Ahn et al. (2024); Kresnawati et al. (2024)
Ln(Size) (X4, control)	LN_SIZE	$\ln(\text{stock price} \times \text{number of outstanding shares})$	Mustofa et al. (2022); Yunita et al. (2023)

Data Analysis Technique

The effect of social media sentiment and behavioral bias on abnormal return is tested using the panel regression model (Equation 1/ Eq. 1).

$$AR_{it} = \alpha + \beta_1 SENTIMENT_{it} + \beta_2 OVERCONFIDENCE_{it} + \beta_3 HERDING_{it} + \beta_4 LN-SIZE_{it} + \varepsilon_{it} \dots \dots \dots (\text{Eq. 1})$$

where AR_{it} denotes the abnormal return of firm i on day t ; $SENTIMENT$ represents the social media sentiment index; $OVERCONFIDENCE$ and $HERDING$ capture investor behavioral biases; $LN(SIZE)$ is included as a control variable; β_1 - β_4 is regression coefficient and ε_{it} is the error term.

The appropriate panel data specification was determined through a sequential model selection procedure by comparing the Common Effects Model (CEM), Fixed Effects Model (FEM), and Random Effects Model (REM). The Chow test was first employed to compare the CEM and FEM, followed by the Hausman test to determine whether the FEM or REM provided a more appropriate specification. The Breusch–Pagan Lagrange Multiplier (LM) test was subsequently used to compare the CEM and REM. The final model was selected based on the corresponding probability values at the 5% significance level.

After selecting the panel model, several diagnostic tests were performed to evaluate the validity of the regression estimates. Panel stationarity was first examined using the **Levin–Lin–Chu (LLC) unit root test** (Levin et al., 2002) to verify that the variables did not contain a common unit root across panel members. Establishing stationarity helps reduce the risk of spurious regression and provides a sound basis for subsequent panel data estimation.

The reported main model uses cross-section fixed effects and White cross-section (period cluster) standard errors and covariance with degrees-of-freedom correction, consistent with the EViews output reported in Table 7. This estimator is not described as two-way clustering by both firm and date. To address common shocks across trading dates, an additional specification was estimated with both cross-section and period fixed effects using White two-way cluster standard errors. In that additional specification, Sentiment remained positive and statistically significant ($\beta = 0.007332$, $p = 0.0109$) and Herding remained positive and statistically significant ($\beta = 1.565391$, $p < 0.001$), while Overconfidence ($p = 0.9469$) and Ln_Size ($p = 0.0707$) were not statistically significant at the 5% level. This additional specification is reported as a sensitivity check and does not replace the baseline model.

4. Results

Descriptive Statistics

Table 2 presents the descriptive statistics for the five variables included in this study over the 2021–2025 period.

On average, abnormal return (AR) is slightly positive (mean = 0.000392), indicating that non-cyclical consumer stocks generated modest excess returns during the observation period. Social media sentiment and overconfidence also indicate small positive mean values (0.000454 and 0.000752, respectively), while herding shows the highest average among the behavioral variables (0.001243). Firm size, measured as the natural logarithm of market capitalization, has a mean of 28.111, reflecting considerable variation in company size across the sample.

The relatively large standard deviations and wide ranges of AR, sentiment, and overconfidence indicate substantial variation across firms and trading days. Herding is especially right-skewed and

leptokurtic. To assess whether its extreme observations drive the estimated association, the herding proxy was winsorized at the 1st and 99th percentiles as a sensitivity analysis while retaining the original variable in the baseline model. Winsorization reduced herding skewness from 56.85 to 5.01 and kurtosis from 5610.82 to 31.35 without deleting observations.

Table 2. Descriptive statistics

	AR	Sentiment	Overconfidence	Herding	Ln_Size
Mean	0.000392	0.000454	0.000752	0.001243	28.11122
Median	-0.001436	0.000000	0.000000	0.0000980	28.13046
Maximum	1.001175	1.000000	1.000000	0.994702	33.40705
Minimum	-0.887941	-1.000000	-0.900000	0.0000000	21.78237
Std. Dev.	0.035968	0.067658	0.035916	0.008709	2.033504
Skewness	2.603426	1.348091	2.622725	57.38236	0.160056
Kurtosis	47.97524	206.6715	48.93969	5689.275	2.421771
Jarque-Bera	11,057,156	2.24E+08	11,532,298	1.74E+11	2356.227
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Observation	129,457	129,457	129,457	129,457	129,457

The Jarque-Bera test rejects normality for all variables ($p < 0.001$). With an immense daily panel, this test is highly sensitive to departures from normality. Statistical inference for the reported main model therefore relies on the White cross-section (period cluster) covariance estimator reported in Table 7, while the separate winsorization analysis evaluates whether the herding result is driven by extreme observations.

The fixed-effects panel regression model yields a Durbin-Watson statistic of 1.979 (Table 7), which is close to the benchmark value of 2 and suggests no substantial first-order autocorrelation in the residuals (Brooks, 2008; Gujarati, 2004). However, this statistic alone does not establish that the residuals are independent across observations. Since the empirical model is estimated using a cross-section fixed-effects specification with White cross-section robust standard errors, the validity of the statistical inference primarily relies on the robust estimation procedure rather than on the Durbin-Watson statistic alone. The use of robust standard errors ensures that the estimated coefficients and their significance tests remain reliable even in the presence of heteroscedasticity or other violations of conventional error-term assumptions (Brooks, 2008).

Panel Unit Root Test

The panel unit root test (Levin et al., 2002) with individual effects in Table 3 shows that all variables are stationary at level, except Ln(Size).

Table 3. Panel unit root test results

	t* Statistic	Probability	Cross-Sections	Remark
AR	-123.504	0.0000	119 (0 dropped)	Stationary
Sentiment	-45.524	0.0000	26 (93 dropped)	Stationary*
Overconfidence	-122.357	0.0000	117 (2 dropped)	Stationary
Herding	-73.125	0.0000	119 (0 dropped)	Stationary
Ln_Size	-0.094	0.4626	117 (2 dropped)	Non-Stationary

*Most cross-sections were dropped from the Sentiment test due to low variation (value of 0 on no-comment days).

Ln_Size was found to be non-stationary at the level ($p = 0.4626$), reflecting the persistent nature of firm size over time. As it functions solely as a control variable to capture firm-specific heterogeneity, Ln(Size) was retained in the regression model. Moreover, the stationary dependent variable and the use of fixed-effects estimation with cluster-robust standard errors help mitigate concerns regarding the validity of the estimated coefficients.

Correlation Test among Independent Variables

As an initial diagnostic procedure, pairwise correlation coefficients were calculated to examine the relationships among the independent variables before conducting formal multicollinearity testing. The results are reported in Table 4.

Table 4. Correlation matrix of independent variables

	Sentiment	Overconfidence	Herding	Ln_Size
Sentiment	1.000			
Overconfidence	0.014	1.000		
Herding	-0.003	0.045	1.000	
Ln_Size	0.003	0.004	-0.062	1.000

The pairwise correlation coefficients among the independent variables are relatively low, with the highest absolute correlation remaining well below 0.80. Because low pairwise correlations alone do not rule out multicollinearity, VIF values were also calculated using auxiliary regressions for each explanatory variable. The resulting VIFs were 1.0002 for Sentiment, 1.0023 for Overconfidence, 1.0060 for Herding, and 1.0040 for Ln_Size. All values are close to 1, indicating no evidence of problematic multicollinearity among the explanatory variables.

Model Selection (Chow and Hausman Tests)

The Chow test (Redundant Fixed Effects Test) reports a Cross-section F statistic of 2.8896 ($p < 0.001$) and a Cross-section Chi-square statistic of 340.8463 ($p < 0.001$), indicating that the Fixed Effects Model (FEM) is preferred to the Common Effects Model (CEM). The Hausman test further confirms this result, yielding a Chi-square statistic of 339.0617 ($df = 4$, $p < 0.001$), which favors the FEM over the Random Effects Model (REM). Furthermore, the estimated variance of the cross-sectional random effect is zero, providing additional support for selecting the Fixed Effects Model as the final specification for the empirical analysis. Table 5 presents the estimation results of the Common Effects Model (CEM), Fixed Effects Model (FEM), and Random Effects Model (REM).

Based on the model selection results, the Fixed Effects Model (FEM) was re-estimated using the White cross-section (period cluster) standard errors and covariance estimator with degrees-of-freedom correction shown in the EViews output. The estimation results of the reported main model are presented in Table 6.

After re-estimating the Fixed Effects Model using the reported White cross-section (period cluster) covariance estimator, Sentiment, Herding, and Ln(Size) remained positive and statistically significant at the 1% level. In contrast, Overconfidence became statistically insignificant ($p = 0.5060$), despite being significant at the 5% level in the initial estimation ($p = 0.0342$).

Table 5. Panel regression estimation results

	CEM	FEM	REM
C	-0.01481*** (0.00129)	-0.04809*** (0.00422)	-0.01481*** (0.00129)
Sentiment	0.00710*** (0.00137)	0.00694*** (0.00137)	0.00710*** (0.00137)
Overconfidence	0.00647** (0.00258)	0.00547** (0.00258)	0.00647** (0.00258)
Herding	1.55357*** (0.01067)	1.56997*** (0.01075)	1.55357*** (0.01066)
Ln_Size	0.00047*** (0.0000456)	0.00166*** (0.00015)	0.00047*** (0.0000456)
R-squared	0.1414	0.1436	0.1414
N	129,457	129,457	129,457
Chi-square	340.8463 (0.0000)		
F test (Chow)		2.8896 (0.0000)	
Chi-square (Hausman)			339.0617 (0.0000)

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Numbers in parentheses are standard errors

Herding is positively and statistically significantly associated with abnormal returns ($\beta = 1.56997$, $p < 0.001$). Its estimated coefficient is numerically larger than those of the other regressors; however, the variables are measured on different scales, so coefficient magnitudes should not be used to rank their relative economic importance.

Table 6. Final model: Fixed effect with Robust standard errors

Variable	Coefficient	Std. Error (Robust)	Probability
C	-0.04809***	0.00758	0.0000
Sentiment	0.00694***	0.00250	0.0056
Overconfidence	0.00547	0.00822	0.5060
Herding	1.56997***	0.22930	0.0000
Ln_Size	0.00166***	0.00027	0.0000
Mean dependent var	0.000392	SD dependent var 0.035968	
R-squared	0.141375	N 129,457	
F-test	5328.659	Durbin-Watson stat 1.97865	
Prob (F-statistic)	0.000000		

Note: *** significant at the 1% level.

As a sensitivity check for extreme herding observations, the baseline cross-section fixed-effects model was re-estimated after winsorizing Herding at the 1st and 99th percentiles while retaining the same White cross-section (period cluster) covariance specification. Winsorized Herding remained positive and statistically significant ($\beta = 5.368015$, $p < 0.001$), indicating that the positive herding association is not solely driven by the most extreme herding observations. Other coefficients changed in magnitude and, for Overconfidence, in sign and significance, so the sensitivity analysis is not interpreted as evidence that all coefficient estimates are invariant to outlier treatment.

In order to provide alternative treatment of no-comment days, the baseline specification is re-estimated after treating those observations as missing (Sentiment_Robust). This restricts the analysis to 3,955 firm-day observations across 116 firms, compared with 129,457 observations in the baseline model. Because this substantially smaller observed-comment subsample may differ systematically from the full sample, the comparison evaluates whether coefficient directions persist within observed-comment days rather than providing a direct full-sample robustness test. The results are presented in Table 7.

Table 7. Robustness check results (Sentiment_Robust)

Variables	Coefficient	Std. Error	Probability
C	-0.04093	0.05339	0.4435
Sentiment_Robust	0.00703***	0.00234	0.0028
Overconfidence	0.02609	0.03143	0.4067
Herding	3.33140***	0.23480	0.0000
Ln_Size	0.00140	0.00181	0.4398

Note: *** significant at the 1% level. $R^2 = 0.4176$; $N = 3,955$; cross-sections = 116.

Within the observed-comment subsample, the Sentiment and Herding coefficients remain positive and statistically significant. However, the sample falls from 129,457 to 3,955 firm-day observations and Ln(Size) is no longer statistically significant. These findings therefore provide evidence of directional consistency in a much smaller selected subsample, not an unqualified robustness confirmation for the full sample.

5. Discussion

The Effect of Social Media Sentiment on Abnormal Return

The results indicate that social media sentiment has a positive and statistically significant association with abnormal returns ($\beta = 0.00694$; $*p^* = 0.0056$), supporting H1. This finding suggests that more positive investor sentiment expressed through social media is associated with higher abnormal returns in non-cyclical consumer stocks. It also suggests that social media may serve as a source of market information that shapes investor expectations and trading decisions, potentially contributing to short-term deviations of stock prices from their fundamental values.

Furthermore, this finding is consistent with **Information Diffusion Theory**, which explains that information is disseminated unevenly among market participants, leading investors to react at different times. Social media further accelerates this process by facilitating the rapid exchange of opinions and interpretations, allowing collective sentiment to influence buying and selling decisions before all available information is fully reflected in stock prices. Consequently, positive sentiment may generate temporary price pressure that results in abnormal returns, reflecting short-term market inefficiencies.

The present findings are also in line with [Agarwal et al. \(2021\)](#), who reported that investor sentiment expressed on social media influences stock returns through its effect on market expectations. While also support the evidence of [Diveriois & Damir \(2024\)](#) and [Wang et al. \(2022\)](#) who found that social-media-based sentiment contains valuable information for predicting stock returns. In the Indonesian context, where retail investors dominate trading activity and actively exchange information through digital investment communities, market sentiment can spread rapidly and amplify investors' reactions. This evidence reinforces the view that social media sentiment has become an important behavioral factor in explaining abnormal returns beyond firm-specific fundamentals.

The Effect of Overconfidence on Abnormal Return

The empirical results indicate that **overconfidence does not have a statistically significant effect on abnormal returns** after correcting for heteroscedasticity using robust standard errors ($p = 0.5060$), thus leading to the rejection of **H2**. This finding suggests that investors' tendency to become more confident following positive returns does not necessarily translate into abnormal price movements in Indonesia's non-cyclical consumer sector. In other words, higher trading activity following favorable returns does not appear to reflect systematic overconfidence capable of driving stock prices away from their fundamental values.

This result differs from the findings of [Ikram et al. \(2023\)](#) and [Irawan \(2025\)](#), who reported that overconfidence contributes to stock price anomalies through excessive trading. A plausible explanation is the characteristics of the research setting. Previous studies primarily examined periods of heightened market uncertainty or highly volatile assets, where investors are more likely to overestimate their ability to interpret information and predict future price movements. By contrast, non-cyclical consumer stocks are generally regarded as defensive investments because demand for essential consumer goods tends to remain stable across economic cycles. Consequently, investment decisions in this sector are more likely to be driven by firms' fundamental performance than by excessive confidence in investors' own judgment, which is consistent with the behavioral finance perspective that suggests the influence of cognitive biases depends on market conditions and perceived risk.

The findings also suggest that the effect of overconfidence is context-dependent rather than universal across various market settings. Consistent with [Barber & Odean \(2001\)](#) and [Glaser & Weber \(2007\)](#), overconfidence primarily manifests through higher trading intensity, although it does not necessarily translate into superior returns or persistent price anomalies. In the present study, the insignificant relationship indicates that increased trading activity in the non-cyclical consumer sector is more likely to reflect rational responses to firm-specific information than excessive investor confidence. This result implies that trading-based proxies for overconfidence should be interpreted in light of the characteristics of the market and industry under investigation, as their explanatory power may vary across different investment environments.

The results indicate that herding behavior has a positive and statistically significant association with abnormal returns ($\beta = 1.56997$; $p < 0.001$), supporting **H3**. The coefficient remains positive and statistically significant in the smaller observed-comment subsample ($\beta = 3.33140$; $p < 0.001$). Since the explanatory variables are measured on different scales, these coefficients should not be interpreted as showing that herding is more influential than the other variables. The finding is consistent with prior evidence that synchronized trading behavior can be associated with stock-price deviations from fundamental values.

The positive and statistically significant herding association is observed further in the non-cyclical consumer sector, which is generally regarded as relatively defensive and supported by stable demand. This result is consistent with behavioral explanations of stock-price movements, but it does not establish that herding is the dominant or strongest determinant of abnormal returns. Common information shocks and the market-based construction of the herding proxy remain relevant considerations when interpreting the estimated association.

The Role of Firm Size (Size) as a Control Variable

The results indicate that firm size ($\text{Ln}(\text{Size})$) has a positive and statistically significant effect on abnormal returns in the main regression model ($\beta = 0.00166$; $p < 0.001$). This finding suggests that firms

with larger market capitalizations tend to exhibit higher abnormal returns, after controlling for social media sentiment, overconfidence, and herding behavior. However, the effect becomes insignificant in the robustness analysis based on a substantially smaller subsample, suggesting that the estimated relationship should be interpreted with appropriate caution.

From a theoretical perspective, **firm size** reflects fundamental corporate characteristics related to information transparency, stock liquidity, and the degree of attention received from investors and financial analysts. Firms with larger market capitalizations generally receive greater market coverage and disclose information more extensively, allowing new information to be incorporated into stock prices more efficiently. These characteristics may influence stock price dynamics and, consequently, abnormal returns, independent of the behavioral factors examined in this study. Therefore, controlling for firm size helps reduce potential estimation bias arising from differences in firm-specific characteristics and provides a more reliable assessment of the effects of social media sentiment and behavioral biases on abnormal returns.

Moreover, these findings are consistent with [Mustofa et al. \(2022\)](#) and [Yunita et al. \(2023\)](#), who identified firm size as an important firm characteristic in explaining variations in abnormal returns among companies listed on the Indonesia Stock Exchange, although the magnitude of its effect may vary across industries and observation periods. While firm size was not the primary focus of this study, its inclusion as a control variable strengthens the empirical model by accounting for firm-level heterogeneity. Consequently, the estimated relationships between social media sentiment, behavioral biases, and abnormal returns can be interpreted with greater confidence, as they are less likely to be confounded by differences in firm size.

6. Conclusion

In the reported 2021–2025 firm fixed-effects model, social media sentiment and the herding proxy are positively and statistically significantly associated with abnormal returns among Indonesian non-cyclical consumer stocks. Overconfidence is not statistically significant after applying the reported White cross-section (period cluster) covariance estimator, while firm size is significant in the baseline model. In the much smaller observed-comment subsample, sentiment and herding retain positive and significant coefficients, but the sample declines from 129,457 to 3,955 firm-day observations. This comparison therefore provides limited evidence of consistency within a selected subsample rather than an unqualified full-sample robustness test. The findings describe statistical associations and do not establish causal effects or a ranking of the variables' economic importance.

This study has several observed limitations. First, historical data on outstanding shares were not consistently available for firms that conducted initial public offerings (IPOs) during the observation period, requiring data reconciliation using official corporate disclosures. Second, the high proportion of no-comment days means that the observed-comment analysis uses a substantially smaller selected subsample and may be affected by sample-selection differences. Third, the herding proxy has an extreme distribution; although a 1–99 percent winsorization sensitivity analysis preserves a positive and significant herding coefficient, other coefficient estimates change under this treatment. Fourth, the additional two-way fixed-effects specification changes the significance of some control estimates, indicating sensitivity to time-effect specification. Lastly, the sentiment unit-root test includes only 26 of the 119 sample firms because of low variation on no-comment days.

Future research is encouraged to address these limitations by expanding the analysis to other industry sectors to assess the generalizability of the findings, incorporating additional social media platforms (e.g., X/Twitter, investor forums, and StockTwits) to improve sentiment coverage, and

utilizing machine learning to enhance the accuracy and scalability of sentiment classification. Examining interaction effects among behavioral variables, such as the moderating role of firm size in the relationship between investor sentiment and abnormal returns, across different market conditions and observation periods are also encouraged.

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