Studying investor rationality on stock price: A case of Bank Syariah Indonesia

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Abstract

Purpose – This study aims to analyze the behavior of investors' investment decisions, as reflected in the volatility of stock prices, especially at PT Bank Syariah Indonesia Tbk (BSI). The analysis here compares aspects of rationality and irrationality as well as their relationship with the stock prices of Bank Syariah Indonesia.

Methodology – This study uses the Autoregressive Distributed Lag (ARDL) method to test aspects of rationality proxied by Price-to-Book Value (PBV) and Price-to-Earnings Ratio (PER), while aspects of irrationality proxied by mood sentiment (SWAV). Data were collected from February 2021 to February 2024 on a monthly basis, resulting in 37 research samples.

Findings – The results show that PBV, PER, and mood sentiment have a significant effect on BSI stock prices. In the long term, PBV has a positive effect, while PER and mood sentiment have negative effects on BSI stock prices. In this situation, mood sentiment has the greatest influence on BSI stock prices, indicating that the volatility of BSI stocks is driven by irrationality.

Implications – As the stock price is driven mostly by irrationality, investors must have fundamental and macroeconomic analysis skills as well as expertise when buying and selling stocks in order to minimize losses due to the irrational behavior. In addition, regulators and companies must provide transparent and accurate information to investors to reduce the irrational behavior.

Originality – This study modifies the objective of Islamic banks' stock prices in Indonesia by elaborating rational and irrational factors as the determinants of stock prices.

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Introduction

The number of Islamic investors will increase by 2023. Based on data from the Indonesia Stock Exchange, as of December 2023, there were 136,418 Sharia investors. This number will increase by 18,476 people (15.66%) compared to 2022. The growth in the number of investors is supported by increased financial literacy and investment education, which are important factors that influence investor interest and participation (Parvin & Panakaje, 2022). Another reason is that the awareness of people in Indonesia about investing in the Islamic capital market is increasing. Halal investment instruments can provide investors with a sense of security. The increasing interest in Islamic investment, coupled with the potential of the world's largest Muslim population, presents opportunities to expand the Islamic capital market (Masrizal et al., 2021).

In line with this potential, the government is trying to increase Islamic financial inclusion in Indonesia, one of which is to merge three Islamic banks, BNI Syariah, BRI Syariah, and Bank Syariah Mandiri, into PT Bank Syariah Indonesia Tbk (BSI) on February 1, 2021. The company is anticipated to experience improved performance following the merger, such as improved quality of Islamic financial services, more efficient management, profitability, and company liquidity (Salman & Nawaz, 2018). In line with this expectation, BSI's net profit showed a positive trend (Figure 1). According to data obtained from the Indonesia stock exchange (IDX), the BSI's net profit will increase by 102.67% during 2021–2023. An increase in net profits reflects health and positive performance. Thus, increased net profit can boost stock prices, as investors have confidence in a company capable of generating more profits (Nawangwulan et al., 2018).
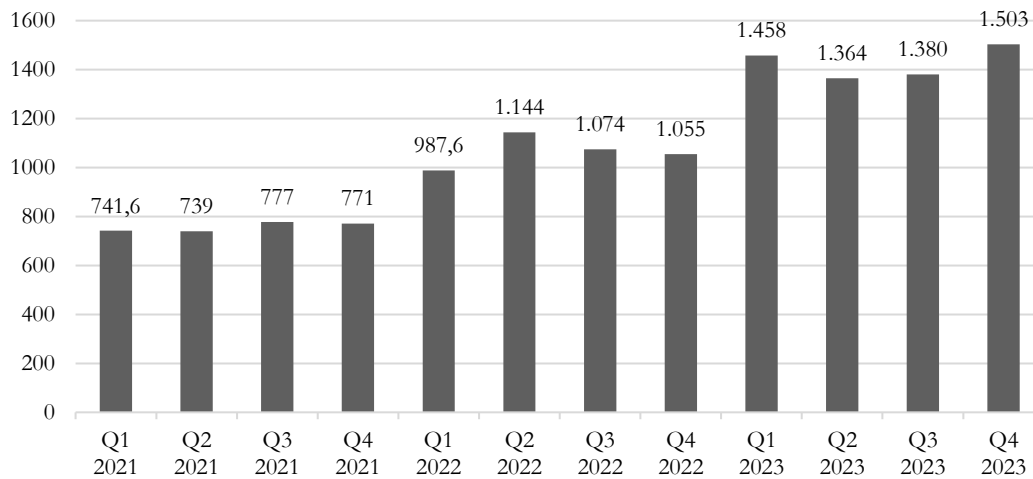

Figure 1. BSI's net profit in 2021 – 2023 (in Trillion IDR)
Source: Indonesia stock exchange (2023)

However, the increase in net profit of PT Bank Syariah Indonesia Tbk is inversely related to stock price movement. Based on data obtained from the Indonesia Stock Exchange (IDX), the BSI's stock price at the time of the merger on February 1, 2021, closed at 2,730 (Figure 2). As of February 29, 2024, the BSI's stock had closed at 2,470. This means that there has been a decrease in stock price by 9.52 percent over the 37 months post-merger. This negative trend has also been validated by the trend regression results, which show significant and negative coefficients.
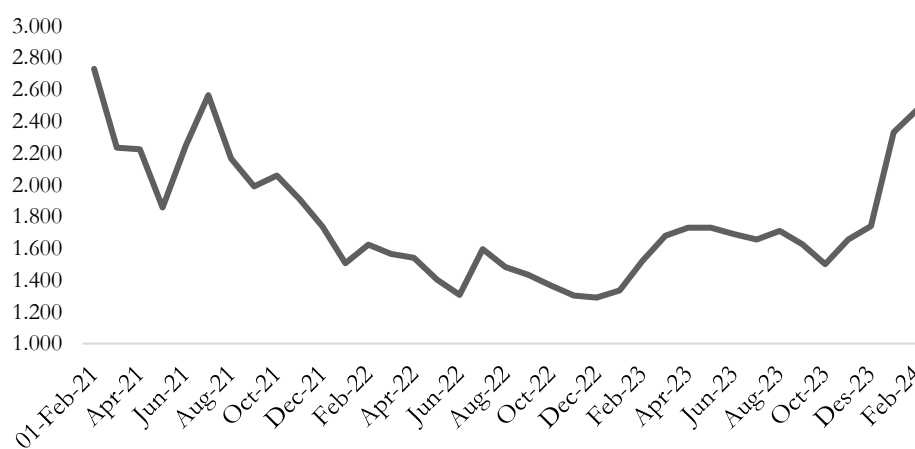

Figure 2. BSI's stock price movement after merger
Source: Indonesia stock exchange (2024)

Efficient market hypothesis theory explains that the causes of rising and falling stock prices are influenced by the emergence of new information or news related to the company's stocks

(Bacha & Mirakhor, 2013). When new information appears, investors respond according to good or bad information, which can affect stock price movements (Supino et al., 2024). This implies that positive information influences investors to buy stocks, thereby encouraging an increase in stock prices. Conversely, negative information will influence investors to sell stocks, so it will suppress the decline in stock prices. This theory states that the market is efficient by assuming that investors make rational decisions based on available information (Kumar & Goyal, 2016). Pražák (2018) explains that rational investors make decisions based on economic factors consisting of the company (fundamental) and market (macroeconomic) variables.

However, numerous studies demonstrate that investors do not act rationally when making decisions (Kumar & Goyal, 2016). Bondt and Thaler (1985) proved the existence of "overreaction", "irrationality, and "loss aversion" among investors. On this basis, the psychology-based behavioral finance theory emerged to explain investor behavior (Bacha & Mirakhor, 2013). In this theory, the assumption of rationality is substituted by the idea that each investor has distinct cognitive and emotional biases (Ahmad, 2024). These biases are in the form of a person's sentiments, feelings, emotions, and moods (Ahmad et al., 2017), which causes investors' estimates of the value of a stock to be inaccurate and not supported by facts (Lee & Koshoev, 2023). Under this condition, investors make stock transactions based on sentiments influenced by daily moods and are not based on rational analysis (Truong et al., 2021). Investor mood significantly affects stock market returns (Shu, 2010; Goetzmann et al., 2014; Kaustia & Rantapuska, 2016; Truong et al., 2021).

In this study, the use of music as a mood proxy is based on Edmans et al. (2022) and Can et al. (2023) who found that music sentiment affects stock price returns and volatility. Music measures investor mood through the degree of positivity (valence) of the song one chooses to listen to (Edmans et al., 2022). Therefore, this study includes irrational factors in the form of mood sentiment variables elaborated with rational factors in the form of fundamental variables as independent variables and macroeconomic variables as control variables.

Literature Review

Efficient market hypothesis

Generally, a rational person makes decisions using systematic logic by focusing on maximizing expected returns (Robbins & Judge, 2022). In this case, rational investors consider making investment decisions both logically and analytically (Shavit & Adam, 2011). Investor rationality is the foundation for making wise investment decisions to achieve a financial goal. Therefore, the assumption of rationality is the basis for developing efficient market hypothesis theory (Bouteska & Regaieg, 2020).

The efficient-market hypothesis (EMH) theory was proposed by Fama (1970) who developed the random-walk theory. The philosophy of this theory is to explain changes in stock prices caused by the emergence of new information or news at random (Bacha & Mirakhor, 2013) so that changes in stock prices cannot be predicted (Nyakurukwa & Seetharam, 2023). According to this theory, rational investors make decisions based on the information available in the market (Fama, 1970). This information is in the form of economic factors, which allow investors to make rational decisions (Pražák, 2018). These factors include the firm and market variables that influence investment decisions (Prasad et al., 2021).

Rational investors conduct a fundamental analysis to understand the conditions of the company and a macroeconomic analysis to understand external factors. Sood et al. (2024) explained that investors' decision-making behavior can be influenced by company performance, revealed through the company's financial statements, corporate profit expectations, operational risk, and financial ratios, such as price to book value (PBV) and price–earnings ratio (PER). Rational investors analyze this fundamental information to assess the intrinsic value of a stock.

Although stock price is included in the calculation of PBV and PER, both ratios also play a role in investors' decisions to buy or sell stocks. In this case, high PBV and PER values reflect investors' expectations of better company performance, which can affect market dynamics. Investors tend to be willing to pay more for the stocks of companies with high PBV and PER

because they believe that the company will be able to create greater value and profits in the future. Appealing PBV and PER values can encourage buying, which increases the stock price, while unreasonable values can trigger selling, which depresses stock prices. As such, PBV and PER are not only valuation ratios that depend on stock prices but also play a role in long-term stock price movements through investor decisions.

Behavioral finance

Behavioral finance emerged in the 1990s as a reaction to the shortcomings of the efficient market hypothesis and other models that explain anomalies in the stock market (Nyakurukwa & Seetharam, 2023). Kahneman and Tversky developed this theory as a modern finance theory that combines the fields of psychology, sociology, economics, and classical finance to explain why individuals make irrational decisions (Kaur et al., 2023). Therefore, behavior in psychological factors is the object used to explain the concept of financial decision making (Ahmad, 2024).

Irrational investors, who behave spontaneously and unpredictably, are called noise traders (De Long et al., 1990). This behavior deviates from rational and logical decision-making and tends to be influenced by emotions. This causes market volatility and price movements to be irrational, resulting in inaccurate analysis. A condition in which investors take irrational actions and perform illogical, inaccurate analysis is called behavioral bias (Ahmad et al., 2017). This bias affects investors' rationality in their investment decisions.

Baker and Wurgler (2007) prove that investor sentiment can influence investment decision-making, thus affecting stock returns. Investor sentiment assumes that investors incorrectly gauge a stock's value based on their assessments of future growth on criteria that lack factual support (Lee & Koshoev, 2023). In this case, investors have an optimistic or pessimistic view of the prospects of an investment, which may lead to a deviation of the asset price from its fair value (Lee & Koshoev, 2023). Optimistic investors tend to have a strong belief in the potential growth of investment value in the future; therefore, higher demand will increase stock prices. Conversely, pessimistic investors are more concerned about potential losses than about potential gains, so high selling pressure will cause stock prices to fall.

Investor sentiment can be identified using mood proxy indicators (Baker & Wurgler, 2007). Mood can cause decision making to deviate from the optimal or rationality (Shu, 2010). Fernandez-Perez et al. (2020), Edmans et al. (2022), and Can et al. (2023) innovated by studying music as a new source of investor sentiment. The research explains that music can measure investor mood through the valence of the song to which one chooses to listen. According to Spotify's application programming interface (API), valence serves as a measure to gauge whether a song creates a feeling of happiness (with high valence) or sadness (with low valence) for the listener. The valence scale ranges from 0.0 1.0 (Can et al., 2023). Then, valence is computed by including the total song streams based on the top 10 songs listened to each month in Indonesia. Therefore, proxy mood can be measured through the calculation of the stream-weighted average valence (SWAV) as follows:

$$SWAV_{it} = \sum_{i=1}^{10} \left(\frac{Streams_{it}}{\sum_{i=1}^{10} Streams_{it}} \ Valence_{it} \right) \tag{1}$$

The idea of music as a mood-proxy draws from psychological research that states that individuals reflect their mood on the choice of music they listen to and is supported by psychological studies that examine "emotion congruence" by using music to validate emotions (Edmans et al., 2022). In addition, this approach is based on the understanding that mood and emotions significantly influence economic decision-making processes and market behavior.

Previous study

The previous studies in this research are divided into two aspects: rationality and irrationality. The rationality aspect addresses the fundamental variable and the irrationality aspect addresses investor sentiment.

Based on fundamental variables, research conducted by Bustani et al. (2021) shows that a higher PBV value provides hope and confidence for investors to obtain greater profits in the future.

Meanwhile, the research of Mutiarani and Dewi (2019) shows that PBV has no effect on stock prices because investor judgements tend to focus on company performance rather than market valuations. Research Mariana (2016) shows that a high PER ratio indicates investors' expectations that a company will have higher earnings in the future, so investors are willing to pay more for the shares of companies with a higher PER. However, research conducted by Surjanto and Sugiharto (2021) shows that the PER value does not ascertain whether a company's performance is favorable or unfavorable for investment.

Based on investor sentiment variables, research on music sentiment on stock prices was first conducted by Edmans et al. (2022), who stated that music sentiment has a positive effect on stock prices in the same week but a negative effect in the following week. This is because the sentiment effect causes mispricing, but the existence of arbitrage cancels the mispricing. Along these lines, research conducted by Fernandez-Perez et al. (2020) provides evidence that the existence of arbitrage limits supports the mispricing caused by sentiment with a negative effect. Meanwhile, research has Can et al. (2023) confirmed that music sentiment significantly affects stock returns due to arbitrage restrictions, with a positive effect.

Hypotheses

Price to book value
Price to book value (PBV) is calculated by taking the stock's market price and dividing it by the book value of each share. A higher PBV ratio indicates a higher stock price, which mirrors an increased company valuation. Conversely, a lower PBV indicates a more affordable stock price, reflecting a diminished company value. Therefore, a higher PBV ratio indicates that a company is more successful in creating value for shareholders (Mariana, 2016). Previous research conducted by Bustani et al. (2021) stated that PBV has a positive and significant effect on stock prices. Based on this, the researcher determines the research hypotheses are as follows:
H_1: Price to book value has a positive and significant effect on BSI stock prices.

Price to earnings ratio
Price to earnings ratio (PER) represents the relationship between a company's stock price and its earnings per share. The PER value gives an idea of how many times investors are willing to purchase company stocks from the earnings per share generated, as well as the market's expectations of the company's future performance. A high PER value indicates investors' expectations of the company's future earnings; therefore, investors are willing to buy stocks at a high price (Mariana, 2016). Research shows Mariana (2016) that PER has a positive and significant effect on stock prices. Based on this, the researcher determines the research hypotheses are as follows:
H_2: Price to earnings ratio has a positive and significant effect on BSI stock price.

Mood sentiment
Music choice reflects a person's mood, which is measured using valence. Music with high valence reflects a positive mood (happiness) for the listener. Investors with a happy mood will feel optimistic, thus pushing stock prices up. Conversely, music with low valence reflects the negative (sad) mood of the listener. Investors with a sad mood feel pessimistic, thus causing a decrease in demand and stock prices. Goetzmann et al. (2014) stated that the mood proxied by weather sentiment has a positive effect on stock prices. Edmans et al. (2022) also stated that music sentiment has a positive effect on stock prices in the first week but changes to a negative effect in the following weeks. Based on this, the researcher determines the research hypotheses are as follows:
H_3: Mood sentiment has a positive and significant effect on BSI stock prices.

Research Methods

The variables in this research consisted of the stock price (SP) of PT Bank Syariah Indonesia Tbk as the dependent variable; price to book value (PBV), price to earnings ratio (PER), and mood

sentiment (SWAV) as independent variables; and trade balance (TB) and USD/IDR exchange rate (EXC) as control variables.

The trade balance and USD/IDR exchange rate were chosen as control variables because no research uses these two variables as control variables. In line with the theory used, these two control variables aim to consider macroeconomic variables as external factors, in addition to internal factors from companies that can affect stock prices. In the regression model, these two control variables were used to increase the validity and accuracy of the research results to minimize multicollinearity and autocorrelation (Gujarati & Porter, 2008).

This research used monthly data for the period February 2021 to February 2024, so the sample in this study totalled 37 observations. SP, PBV, and PER data were obtained through the Indonesia Stock Exchange, SWAV data were obtained through Spotify Charts and Spotify for Developers, trade balance data were obtained from the Central Bureau of Statistics (Badan Pusat Statistik, 2023), and USD/IDR exchange rate data in real time were obtained through the *Investing.com* site. Please note that SWAV data are the result of data processing from valence, so the method to obtain valence is as follows:

1. At the Spotify Charts site, researchers selected the Weekly Top Songs menu and selected the top 10 songs with the highest number of music streams listened to by Spotify users in Indonesia.
2. Each of these songs is searched for its URL ID by displaying the code on the embedded track menu and then copying it.
3. Open the Spotify for Developers site, then go to the Web API menu (ReferencesTracksGet Track's Audio Features). Paste the copied URL ID in the search menu.
4. The valence value is successfully obtained.

Furthermore, the basic econometric model equation is prepared as follows:

$$lnSP_t = \beta_0 + \beta_1 lnPBV_t + \beta_2 lnPER_t + \beta_3 lnSWAV_t + \beta_4 lnTB_t + \beta_5 lnEXC_t + \varepsilon_t. \tag{2}$$

All variables are expressed as natural logarithms (ln). where PBV, PER, SWAV, TB, and EXC are defined as above: (β_0) is a constant, while $(\beta_1, \beta_2, \beta_3, \beta_4, \beta_5)$ are the model parameter estimates. (t) indicates the time-series data, and (ε_t) is the residual term.

This study uses Autoregressive Distributed Lag (ARDL) bound-testing to analyze the gathered data. The sample criteria for ARDL testing were 30–80 observations (Narayan 2005). Therefore, the study sample met the ARDL criteria.

The augmented Dickey (ADF) test is used in the stationarity test to detect the presence of unit roots. Determination of the optimum lag using the Akaike Information Criterion (AIC), Schwarz's Bayesian Criterion (SIC), and Hannan-Quinn Information Criterion (HQ).

The next step after passing both tests is to test for short- and long-term cointegration using the ARDL Bound-Testing method. Pesaran (2015) stated that time-series data can be said to be cointegrated if the variables have a combination of linear movement patterns that are stationary in the long term; however, in the short term, the variables are random walk. The ARDL cointegration equation used in this study was as follows:

$$\Delta lnSP_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta lnSP_{t-i} + \sum_{i=0}^{p} \beta_{2i} \Delta lnPBV_{t-i} + \sum_{i=0}^{p} \beta_{3i} \Delta lnPER_{t-i} +$$
$$\sum_{i=0}^{p} \beta_{4i} \Delta lnSWAV_{t-i} + \sum_{i=0}^{p} \beta_{5i} \Delta lnTB_{t-i} + \sum_{i=0}^{p} \beta_{6i} \Delta lnEXC_{t-i} + \beta_7 lnSP_{t-1} + \beta_8 lnPBV_{t-1} +$$
$$\beta_9 lnPER_{t-1} + \beta_{10} lnSWAV_{t-1} + \beta_{11} lnTB_{t-1} + \beta_{12} lnEXC_{t-1} + \varepsilon_t. \tag{3}$$

Where Δ is the change in t - t-1 and p is the optimum lag length. β1, β2, β3, β4, β5, and β6 are changes in variables in the short term, whereas β7, β8, β9, β10, β11, and β12 are changes in variables in the long term. According to Pesaran (2015), the equation relies on the Wald statistic, which examines the null hypothesis of no cointegration as follows:

$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$ and $\beta_7 = \beta_8 = \beta_9 = \beta_{10} = \beta_{11} = \beta_{12} = 0$

The requirement to reject the null hypothesis (of no cointegration) is that the F-statistic value be greater than the upper critical bound value. Although there is an equilibrium between variables in a long-term relationship, in reality, an economic variable often shows turmoil (shock) in the short term that causes an imbalance. Therefore, this phenomenon can be anticipated by using an Error Correction Model (ECM) to integrate short-term dynamics with long-term equilibrium(Chopra, 2022). The long-term and short-term models can be formulated in Equations 4 and 5, as follows:

$$lnSP_t = \beta_0 + \sum_{i=1}^{p}\beta_{1i} lnSP_{t-i} + \sum_{i=0}^{p}\beta_{2i} lnPBV_{t-i} + \sum_{i=0}^{p}\beta_{3i} lnPER_{t-i} + \sum_{i=0}^{p}\beta_{4i} lnSWAV_{t-i} +$$
$$\sum_{i=0}^{p}\beta_{5i} lnTB_{t-i} + \sum_{i=0}^{p}\beta_{6i} lnEXC_{t-i} + \varepsilon_t. \qquad (4)$$

$$\Delta lnSP_t = \beta_0 + \sum_{i=1}^{p}\beta_{1i} \Delta lnSP_{t-i} + \sum_{i=0}^{p}\beta_{2i} \Delta lnPBV_{t-i} + \sum_{i=0}^{p}\beta_{3i} \Delta lnPER_{t-i} +$$
$$\sum_{i=0}^{p}\beta_{4i} \Delta lnSWAV_{t-i} + \sum_{i=0}^{p}\beta_{5i} \Delta lnTB_{t-i} + \sum_{i=0}^{p}\beta_{6i} \Delta lnEXC_{t-i} + \lambda ECT_{t-1} + \varepsilon_t \qquad (5)$$

λ indicates the speed of adjustment to return to equilibrium in the long term (Saji, 2021). Hence, the coefficient of λ should be negative and statistically significant to signify that any short-run deviation returns to long-run equilibrium (Chopra, 2022).

To produce a good estimation, diagnostic and stability tests were also conducted. The diagnostic tests included normality, multicollinearity, heteroscedasticity, autocorrelation, and Ramsey RESET test. The stability test included CUSUM and CUSUM SQ.

Results and Discussion

Stationary test

This study employs the augmented Dickey (ADF) test to conduct stationarity tests. Table 1 presents the results of the stationarity test are given in Table 1:

Table 1. Stationary test

Variables	Level		First difference	
	Intercept	Intercept and trend	Intercept	Intercept and trend
LN_SP	-2.064088	-1.124431	-5.673619***	-6.153497***
LN_PBV	-3.726780***	-2.996625	-6.394728***	-7.258621***
LN_PER	-3.432355**	-1.848751	-4/458237***	-6.132075***
LN_SWAV	-2.335200	-3.112965	-5.834853***	-5.723588***
LN_TB	-4.169094***	-4.100129**	-9.492278***	-9.530569***
LN_EXC	-1.189099	-2.534095	-6.394851***	-6.361572***

Note: Significant at: *10, **5 and ***1 percent levels
Source: Researchers estimation using Eviews (2024)

Based on Table 1, all variables are integrated order I*(0)* or I*(I)* with the intercept, intercept, and trend. In addition, as none of the variables are I*(2)* from the unit-root test results, this study fulfilled the requirements of the ARDL method.

Lag length criteria

The next step was to determine the optimum lag length. Using the VAR approach, the values of the Akaike information criterion (AIC), Schwartz information criterion (SC), Hannan Quinn criterion (HQ), and likelihood ratio (LR) show 4 as the optimum lag length. Therefore, this study uses an optimum lag length of 4 to estimate the ARDL model.

Cointegration test

The presence of cointegration can be stated if the F-statistic value is more than the upper critical value bound I(1) to reject the null hypothesis of "no long-run cointegration." Equation 3 was used

to perform the cointegration test. With an optimum lag length of 4 and a restricted constant, the ARDL cointegration test results in Table 2 show that the F-statistic value is greater than the upper critical value bound at 1% significance, namely 12.07564 > 4.15. This indicates the presence of long-term cointegration among the variables, thus allowing the rejection of the null hypothesis.

Table 2. ARDL Bound-testing for cointegration

F-Statistic value	Numbers of variables	Significance level	I(0)	I(1)
12.07564	5	10%	2.08	3
		5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Researchers estimation using Eviews (2024).

Long-term and short-term estimation

After identifying the existence of cointegration, the next step is to estimate the long-term and short-term models. The results are presented in Table 3 .

Table 3. Long run and short run estimation results

Long run estimation results				
Variables	Coefficient	Std. error	t-Statistic	Prob.
Ln Stock price – Depedent variable				
LN_PBV	0.946206	0.149182	6.342640	0.0079
LN_PER	-0.264970	0.108431	-2.443670	0.0922
LN_SWAV	-2.418812	0.449221	-5.384454	0.0125
LN_TB	0.054398	0.044462	1.223459	0.3085
LN_EXC	-8.143449	3.012661	-2.703075	0.0736
C	82.74561	28.79738	2.873373	0.0639
Short run estimation results				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
LN_PBV	1.662553	0.062163	26.74494	0.0001
LN_PER	0.077000	0.009173	8.394158	0.0035
LN_SWAV	-0.828099	0.049777	-16.63633	0.0005
LN_TB	0.100354	0.007669	13.08650	0.0010
LN_EXC	2.342057	0.188441	12.42861	0.0011
CointEq(-1)	-0.658358	0.041343	-15.92446	0.0005
Diagnostic tests				
Normality	Probabilty 0.8041			
Multicollinearity	Independent variables have VIF < 10			
Heteroscedasticity	Probability Chi-Square 0.4453			
Autocorrelation	Probability Chi-Square 0.1158			
Ramsey RESET	Probability F-statistic 0.9993			

Source: Researchers estimation using Eviews (2024).

The estimations above pass several diagnostic tests, such as heteroscedasticity, autocorrelation, and multicollinearity. The data also show a normality distribution and pass from Ramsey RESET for linearity. The long-term estimation results show that the PBV, PER, and mood sentiment variables have a significant influence on BSI stock prices. Based on the elasticity coefficient, without considering control variables, music sentiment (SWAV) has the highest influence on BSI's stock price with a coefficient of -2.418812, meaning that in the long run, the movement of BSI stock price is mostly determined by investors' irrational behavior.

In the short run, an error correction term (ECT) coefficient of -0.658358 and is significant at the 5% significance level. This shows that the deviation in the BSI stock price readjust to the

long-term equilibrium after a short-term shock. 65.8% of deviation will be adjusted in the next period. According to Nguyen and Ngoc (2020), deviation adjustment takes from about 1.5 months $(1/I\lambda I)$.

Stability test

The CUSUM test identifies structural adjustments in the model, whereas the CUSUM SQ test identifies abrupt adjustments to the stability of the model (Brown et al., 1975).

Figure 3 and Figure 4 show that the CUSUM and CUSUM SQ plots remained between the critical lines at 5% significance. This confirmed that the model used was stable throughout the study period.
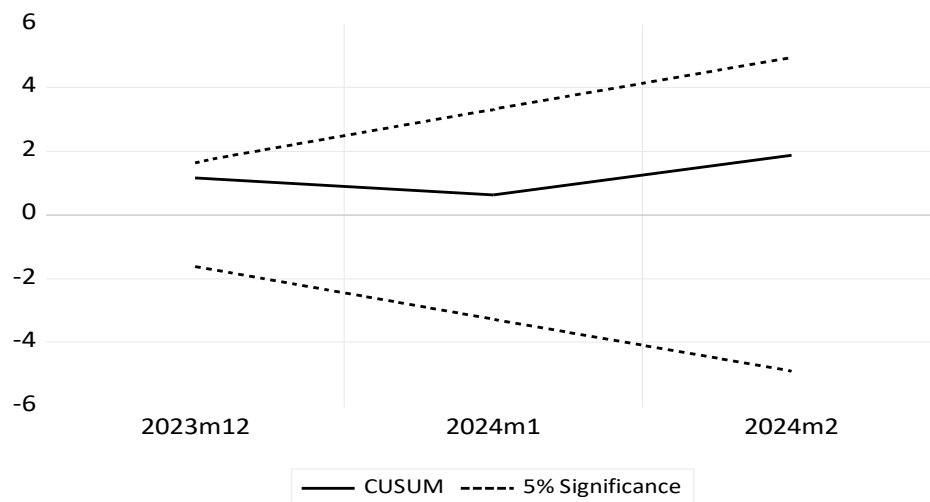

Figure 3. CUSUM test for stability
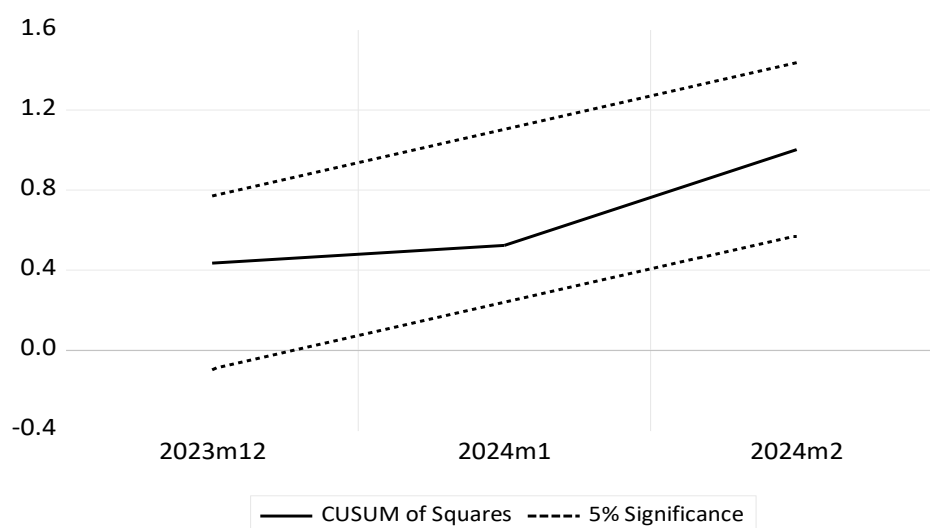Source: Researchers estimation using Eviews (2024)

Figure 4. CUSUM of squares for stability
Source: Researchers estimation using Eviews (2024)

Non-linear analysis

The finding of the positive impact of PBV aligns with studies carried out by Mariana (2016) and, Siagian et al. (2020) which state that PBV has a positive and significant effect on stock prices. This consistently positive relationship illustrates investors' favorable perceptions of BSI's value and

prospects. An increasing PBV ratio indicates that the BSI's stock price exceeds its book value per share. A stock price that exceeds book value indicates that investors are willing to pay a premium to buy BSI stocks. This is because investors believe that a high PBV ratio indicates a company's achievement in delivering value and fostering trust among shareholders (Mariana, 2016). The increase in the PBV ratio can reflect the BSI's good asset quality, dominant market position, and stable performance growth. Therefore, the increase in the BSI's stock price along with the increasing PBV ratio reflects investors' positive beliefs and expectations of the BSI's long-term performance.

However, the positive relationship between the PBV ratio and BSI stock price has an optimal point, where a further increase in the PBV ratio causes the BSI stock price to fall. At this point, the BSI stock price reaches its maximum value, according to a certain PBV ratio. If the BSI stock price exceeds the optimal point, the BSI stock price is overvalued. The optimal point can be calculated using linear regression analysis with a quadratic function using the following equation:

$$SP = \alpha + \beta_1 PBV + \beta_2 PBV^2 \tag{6}$$

After regressing Equation 6, the estimated coefficient β_1 is 1.418127, whereas β_2 is -0.313916. To generate the maximum point, the derivation of sp is required. Then, $\frac{\Delta SP}{\Delta PBV} = \beta_1 + \beta_2 . 2\, PBV$. Optimal point can be generated when $\frac{\Delta SP}{\Delta PBV} = 0$, making equation $0 = \beta_1 + \beta_2 . 2\, PBV$. Then, the optimal point of the PBV can be obtained by the following equation: $\mathrm{PBV_{opt}} = \frac{\beta_1}{-\beta_2 . 2}$, Lastly, as all data are in natural logarithm (ln), an exponential is needed to generate the optimal PBV; therefore, the equation becomes

$$PBV_{opt} = EXP\left(\frac{\beta_1}{-\beta_2 . 2}\right) \tag{7}$$

After computing the optimal point of the PBV, the acquired value was 9.57. This means that if the PBV ratio is greater than 9.57, the BSI stock price will be overvalued. An overvalued stock price is considered a stock price that exceeds its intrinsic value. Based on the efficient-market hypothesis theory, stock prices will not move beyond their intrinsic value. Therefore, if the PBV ratio exceeds the optimal point, rational investors decide to sell BSI stocks with the aim of returning the BSI stock price to its intrinsic value. Thus, the BSI stock price that has touched and passed the PBV optimum point of 9.57 will fall to re-adjust to its intrinsic value.

Furthermore, the findings of the negative relation between PER and stock prices in the long run align with studies carried out by Hulu (2023). However, in the short term, the PER ratio has a positive and significant effect on BSI's stock price where the same with Januardin et al. (2020) and Budiyarno and Prasetyoningrum (2019)'s study.

In the long term, the rising PER ratio accompanied by a decline in stock price is a response from investors who assess that the company's performance is not as expected. In the short term, investors have expectations and believe in the earnings per share generated by BSI; thus, the demand for BSI stocks increases. When demand increases, the prices of BSI stocks increase. However, this condition changes when BSI issues a financial report that makes investors feel disappointed and dissatisfied because it does not match their expectations. In this situation, investors feel that the stock valuation is too high compared to the company's actual performance. Thus, rational investors respond to this information by selling their stocks, causing a decrease in the BSI's stock price. This decline aims to adjust the stock valuation to the company's fundamentals. This aligns with the efficient-market hypothesis, which proposes that stock prices adjust to reflect their intrinsic values.

The positive relationship between the PER ratio and the BSI stock price in the short term is optimal, where a further increase in the PER ratio causes the BSI stock price to fall. At this point, the BSI stock price reaches its maximum value, according to a certain PER ratio. If the PER exceeds the optimum point, the BSI stock price is overvalued. The optimum point of the PER

ratio can be calculated using linear regression analysis with a quadratic function using the following equation:

$$SP = \alpha + \beta_1 PER + \beta_2 PER^2 \tag{8}$$

After regressing Equation 8, the estimated coefficient β_1 is 0.948538, whereas β_2 is -0.122760. The same logic used to generate the maximum point is shown in Equation 7. After computing the optimal point of the PER, the acquired value is 47.62. This means that if the PER ratio is greater than 47.62, the BSI stock price will be overvalued. An overvalued stock price is considered a stock price that exceeds its intrinsic value. Based on the efficient-market hypothesis theory, stock prices will not move beyond their intrinsic value. Therefore, if the PER ratio exceeds the optimal point, rational investors decide to sell BSI stocks with the aim of returning the BSI stock price to its intrinsic value. Therefore, the negative relationship between the PER ratio and stock price in the long run can also be caused by a PER ratio exceeding 47.62.

The Effect of mood sentiment on stock price of PT Bank Syariah Indonesia Tbk

The results of long-term and short-term model testing show that mood sentiment has a negative and significant effect on the stock price of PT Bank Syariah Indonesia Tbk (BSI). Mood sentiment is proxied using Stream-Weighted Average Valence (SWAV). In the long run, a 1% increase in the SWAV will decrease the BSI's stock price by 2.41%. Meanwhile, in the short term, a 1% increase in the PBV ratio reduces the BSI's stock price by 0.82%. These findings align with studies conducted by Fernandez-Perez et al. (2020), and Kaustia and Rantapuska (2016) which state that the mood sentiment ratio has a negative and significant effect on stock prices.

The negative relationship between mood sentiment and stock prices is due to individual investors' trading patterns associated with the holiday time each weekend (Hong & Yu, 2002). Holidays reflect investors' moods. Holiday timing can change individuals' financial behavior. Before and during holiday periods, many individual investors tend to sell their stocks to obtain cash to meet holiday needs (Kaustia & Rantapuska, 2016). A pattern of spikes in stock sales often occurs when approaching weekends or national holidays. In addition to weekend holidays, the stock sales pattern intensifies during seasonal holidays, such as at the end of the year during school holidays. This is evidenced by the BSI's average stock price falling by -0.015% and the average SWAV value rising by 0.001% in December on a monthly basis.

This condition reflects that a good mood makes investors choose to go on holidays by withdrawing money from investment returns. Nailul Huda, an economist at the Center of Economic and Law Studies (Nugroho, 2023), stated that Indonesians will spend more time on holidays and staycations in 2023 than in 2022. This statement is based on data from Badan Pusat Statistik, which show that restaurant and hotel consumption is the fastest growing consumption in 2023 at 0.09%. According to Nailul, the increase in consumption was due to the easing of people's activities after the Covid-19 pandemic. In this case, investors took money from savings and investments that had been collected during the pandemic.

Conclusion

This study analyzes how investor behavior in making investment decisions is influenced by aspects of rationality or irrationality. The results show that the PBV, PER, and mood sentiment variables have a significant effect on BSI stock prices in the long and short terms. In the long term, PBV has a positive effect on BSI stock prices, while PER and mood sentiment have negative effects. In this situation, mood sentiment has the greatest influence on BSI stock prices, with a coefficient of -2.418812. This finding indicates that BSI stocks are driven by irrationality in the long term. When investors feel happy, they tend to sell their stocks, which causes the prices of BSI stocks to fall. Selling stocks when the investor mood is good can be due to investors' profit-taking for consumption or holidays. Therefore, the results of this study align with the research objectives, which prove that investors' investment decisions are influenced by irrationality factors.

Based on these findings, investors must have fundamental and macroeconomic analysis skills and knowledge when buying and selling stocks to minimize losses due to irrational investor behavior. In addition, regulators and companies must provide transparent and accurate information to investors to reduce irrational investor behavior. This study was limited to music as a mood proxy. This is because there is limited literature that discusses investors' psychological factors in stock prices. Therefore, future research should develop other variables to directly measure investor moods. In addition, future research should add relevant control variables to strengthen the validity and accuracy of research results.

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