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Analysis of Optimal Stock Returns in the Banking Sector Using Stochastic RSI, MACD, and Bollinger Bands Indicators

Ahmad Abrori Zulfa[1], M. Yusuf[2], Claudya Nurcahaya[3]
[1]Business Management Study Program, Sriwijaya State Polytechnic, Indonesia

*Corresponding Author Email:
ahmadabrorizulfa97@gmail.com

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Abstract

Purpose – This study aims to examine the differences in stock returns generated by the Stochastic Relative Strength Index (Stochastic RSI), Moving Average Convergence Divergence (MACD), and Bollinger Bands indicators and to determine the optimal return for banking sector stocks included in the LQ45 Index during the period from March 2023 to February 2026 using the Geometric Mean method. **Methodology/Approach** – This study employed a descriptive quantitative research design. Secondary data consisting of daily closing prices of five banking sector stocks listed in the LQ45 Index were collected from the Stockbit platform. Buy and sell signals were generated using the Stochastic RSI, MACD, and Bollinger Bands indicators. The resulting stock returns were analyzed using descriptive statistics, normality and homogeneity tests, and the Kruskal–Wallis nonparametric test. The Geometric Mean method was subsequently applied to determine the optimal investment return. **Findings –** The results revealed a significant difference in stock returns generated by the Stochastic RSI, MACD, and Bollinger Bands indicators. Stochastic RSI demonstrated the highest relative performance based on the Mean Rank results, followed by Bollinger Bands and MACD. The Geometric Mean analysis showed that the Bollinger Bands–BBTN combination generated the highest optimal return, while BBNI generated the highest return among the stocks analyzed using Stochastic RSI. Overall, the findings indicate that the performance of technical indicators varies across banking stocks**. Novelty/Value** – This study contributes to the technical analysis literature by simultaneously comparing the performance of three widely used technical indicators and evaluating their optimal returns using the Geometric Mean method. The findings provide empirical evidence that may assist investors in selecting the most appropriate technical indicator based on the characteristics of banking sector stocks, thereby supporting more effective investment decision-making.

Keywords: Technical Analysis, Stochastic RSI, MACD, Bollinger Bands, Geometric Mean, Stock Return, Banking Sector, LQ45 Index.

INTRODUCTION

The capital market plays an important role in supporting economic growth while providing investment opportunities for the public. The development of the Indonesian capital market is reflected in the significant growth in investor participation. According to the Indonesia Central Securities Depository (KSEI), the number of capital market investors increased from 10,311,152 Single Investor Identifications (SID) in 2022 to 20,347,147 SID in 2025 and reached 21,066,415 SID in January 2026. Of this total, 21,011,388 SID were individual investors (KSEI, 2026).

[1]Corresponding Author: ahmadabrorizulfa97@gmail.com

This substantial increase indicates that investment activities are becoming increasingly relevant to the Indonesian public. At the same time, the growing number of investors increases the need for reliable analytical approaches to support investment decision-making, particularly in determining appropriate transaction timing and achieving optimal returns.

Stock prices continuously fluctuate in response to changes in market conditions and investor expectations. These fluctuations create opportunities to obtain returns but also expose investors to potential losses. Therefore, investors require analytical methods that can help identify potential price movements and determine appropriate buying and selling points. One commonly used approach is technical analysis, which analyzes historical market data to support investment decision-making (Putri & Mesrawati, 2020).

In the context of the Indonesian capital market, banking stocks are among the sectors represented in the LQ45 Index. The LQ45 Index measures the price performance of 45 stocks with high liquidity and large free-float market capitalization, supported by sound corporate fundamentals and compliance (IDX, 2026). Therefore, banking stocks included in the LQ45 Index provide a relevant setting for examining the performance of technical indicators in generating stock returns. However, each stock may exhibit different price movements and volatility characteristics, which may lead to varying trading signals and returns when technical indicators are applied. Therefore, selecting an appropriate technical indicator is important for investors seeking to make more informed investment decisions.

This study examines three technical indicators, namely the Stochastic Relative Strength Index (Stochastic RSI), Moving Average Convergence Divergence (MACD), and Bollinger Bands. These indicators represent different aspects of technical analysis. Stochastic RSI focuses on momentum and overbought or oversold conditions, MACD is primarily used to identify trends and momentum changes, while Bollinger Bands focuses on price volatility and potential reversals. The different characteristics of these indicators may result in varying trading signals and, consequently, different stock returns.

Previous studies have shown varying findings regarding the effectiveness of technical analysis indicators. Metghalchi et al. (2021) found that technical analysis strategies could generate higher returns than a conventional buy-and-hold strategy under certain market conditions. Meanwhile, Ridhallah et al. (2024) examined differences in stock returns based on technical analysis methods in the LQ45 Index. These findings indicate that technical analysis can provide useful information for investment decision-making. However, the effectiveness of technical indicators may differ depending on stock characteristics, market conditions, and the indicators applied.

This condition indicates a research gap, as limited empirical evidence has simultaneously compared Stochastic RSI, MACD, and Bollinger Bands within the same research setting, particularly for banking stocks included in the LQ45 Index. The theoretical problem concerns whether the different characteristics of these indicators result in statistically significant differences in the returns generated by their respective trading signals. From a practical perspective, investors may face difficulties in selecting an appropriate technical indicator, particularly amid the rapid growth of individual investor participation in the Indonesian capital market. Therefore, empirical evidence comparing these indicators is needed to provide a clearer basis for evaluating their return performance.

Based on the phenomenon, trend, research gap, and research problems described above, this study aims to examine whether there are significant differences in stock returns generated by the Stochastic RSI, MACD, and Bollinger Bands indicators for banking sector stocks included in the LQ45 Index during the period from March 2023 to February 2026. In addition, the Geometric Mean is employed to determine the optimal return generated by each indicator–stock combination, as it considers the cumulative growth of investment returns over time. The novelty of this study lies in the simultaneous comparison of the Stochastic RSI, MACD, and Bollinger Bands indicators within the same research setting, specifically banking sector stocks included in the LQ45 Index and observed over the same period. This approach provides a comparative perspective on the ability of the three indicators to generate stock returns and identifies the indicator–stock combination that produces the optimal return. The findings are expected to provide empirical evidence for the comparative application of technical analysis indicators and serve as a reference for investors in selecting technical indicators to support their investment decisions.

LITERATURE REVIEW

Technical Analysis

Technical analysis is a method used to analyze stock price movements by utilizing historical market data, such as price and trading volume. According to Lupikawaty (2025), technical analysis is used to predict future stock price movements through charts and various technical indicators. Similarly, Nti et al. (2020) explain that technical analysis uses historical price charts and technical indicators to help predict stock market movements. In its application, technical analysis uses trading systems and specific indicators to identify price patterns, trends, and signals. The use of these indicators can help investors make trading decisions based on market conditions.

The application of technical indicators is supported by the study of Ramadhan et al. (2026) on Sharia-compliant stocks included in the Jakarta Islamic Index. The study found that the Moving Average had a positive and significant effect on stock prices, while the Relative Strength Index did not have a significant effect. These findings indicate that the ability of each indicator to provide information about price movements may vary.

Metghalchi et al. (2021) also found that the effectiveness of technical indicator-based trading strategies may differ across market conditions. Several strategies generated positive annual net excess returns compared with the buy-and-hold strategy in the Small Cap Index, whereas similar results were not found in the All Share Index. This indicates that the results of using technical indicators may vary depending on stock characteristics and market conditions.

These differences provide a basis for comparing the performance of various technical indicators. Each indicator has a different calculation method and analytical focus, which may result in different trading signals and stock returns. In addition, Dey et al. (2024) found that the integration of multiple technical indicators within machine learning models can enhance trading strategies and improve the accuracy of investment and trading decisions, potentially generating greater financial returns. Their findings demonstrate the applicability of this approach in the Indian and Islamic stock markets. Therefore, this study uses technical analysis to compare the stock returns generated by the Stochastic RSI, MACD, and Bollinger Bands indicators. The discussion of each indicator is presented separately in the following subsections.

Stochastic Relative Strength Index (StochRSI)

The Stochastic Relative Strength Index (StochRSI) was developed by Tushar Chande and Stanley Kroll in *The New Technical Trader* (1994) to increase the sensitivity of the Relative Strength Index (RSI) in identifying overbought and oversold conditions. Unlike the RSI, which generally uses levels of 70 and 30 as thresholds for overbought and oversold conditions, the StochRSI uses levels of 80 and 20. The indicator applies the Stochastic Oscillator concept to RSI values to measure the position of the current RSI within a specific period, thereby producing a momentum indicator that is more responsive to price changes and can provide earlier signals of momentum changes.

Dey et al. (2024) explained that the StochRSI is a powerful oscillator used to measure the relative strength of recent stock prices. In their study, the StochRSI was employed as one of the indicators for generating trading signals and identifying trading opportunities. Consistent with this finding, Mehta and Anchan (2026) compared the performance of the RSI and StochRSI across a number of equities in the Indian stock market. Their findings showed that the performance of the two indicators differed across the stocks analyzed, with the StochRSI performing better than the RSI for certain equities. This finding indicates that the effectiveness of technical indicators may vary depending on the characteristics of the stock and prevailing market conditions.

Mathematically, the StochRSI is calculated by comparing the current RSI value with the highest and lowest RSI values over the observation period, as follows:

$$StochRSI = \frac{RSI - RSI_{Lowest}}{RSI_{Highest} - RSI_{Lowest}}$$

Where:

- Current RSI = the RSI value at period t;
- Lowest RSI (Lowest) over 14 periods = the minimum RSI value over the previous 14 periods;
- Highest RSI (Highest) over 14 periods = the maximum RSI value over the previous 14 periods;
- (n)= the RSI period, generally 14 periods.

The resulting StochRSI value ranges from 0 to 1, or equivalently from 0 to 100. A value above 80 indicates an overbought condition, whereas a value below 20 indicates an oversold condition. These conditions can provide information for evaluating momentum strength and the possibility of a change in price direction.

Based on the above discussion, the StochRSI is a responsive momentum indicator that can be used to identify changes in the position of the RSI and overbought or oversold conditions. In this study, the StochRSI is used as one of the technical analysis indicators to generate stock returns, which are subsequently compared with the returns generated by the MACD and Bollinger Bands indicators.

Bollinger Bands

Bollinger Bands is a technical analysis indicator developed by John Bollinger in the 1980s to measure price volatility and identify potential price movements. The indicator consists of three main components: the middle band, upper band, and lower band. The commonly used setting is a 20-period moving average with two standard deviations (20,2). The upper band is calculated by adding two standard deviations to the moving average, while the lower band is calculated by subtracting two standard deviations from the moving average (Ong, 2016).

According to Lupikawaty (2025), stock prices moving toward or above the upper band may indicate an overbought condition and the potential for a downward correction, whereas prices moving toward or below the lower band may indicate an oversold condition and the potential for an upward movement. The width of the bands also reflects market volatility, with wider bands indicating higher volatility.

Su (2024) demonstrated that Bollinger Bands can be used to identify price movements, trading opportunities, and potential entry and exit points. However, its effectiveness may vary across different markets and securities. Meanwhile, Daniswara et al. (2022) found that Bollinger Bands can be used to predict the direction of stock price movements among companies listed in the LQ45 Index.

Mathematically, Bollinger Bands can be expressed as follows:

$$Middle\ Band = MA_n$$
$$Upper\ Band = MA_n + (K \times SD_n)$$
$$Lower\ Band = MA_n - (K \times SD_n)$$

Where:

- MA_n= moving average over n periods;
- SD_n= standard deviation over n periods;
- K= standard deviation multiplier, generally 2;
- n= observation period, generally 20 periods.

Based on the above discussion, Bollinger Bands is an indicator that combines information on price trends and market volatility to generate trading signals. In this study, Bollinger Bands is used to generate stock returns, which are subsequently compared with the returns generated by the Stochastic RSI and MACD indicators.

Moving Average Convergence Divergence (MACD)

Moving Average Convergence Divergence (MACD) is a technical analysis indicator developed by Gerald Appel in the 1970s to identify trend direction and changes in price momentum. MACD uses two *Exponential Moving Averages* (EMAs) with different periods, namely EMA 12 and EMA 26. The difference between these two EMAs is used to identify changes in the direction and strength of price movements (Ong, 2016).

Wang and Kim (2018) explain that MACD is a momentum indicator that uses EMAs to respond to changes in price movements. In the standard setting, MACD is calculated as the difference between the 12-period EMA and the 26-period EMA. The *signal line* is then calculated using a 9-period EMA of the MACD, while the *histogram* represents the difference between the MACD line and the *signal line*. These three components are used to help identify changes in momentum and provide trading signals.

MACD consists of three main components: the *MACD line*, *signal line*, and *histogram*. The crossover between the MACD line and the *signal line* can provide a signal of a potential change in price direction or momentum. Meanwhile, the histogram shows the distance between the two lines, so changes in its size can provide additional information about changes in momentum strength.

The use of MACD in market analysis is supported by Vaidya (2020) through a study of the Nepalese stock market (*NEPSE*). The study found that MACD can be used to identify *bullish* and *bearish* trends, while the MACD histogram can help identify changes in trend direction. This finding indicates that MACD can be used as a tool to analyze trend changes and support trading decisions. Kang (2023) showed that the results of using MACD can also be influenced by the parameters applied. By testing various parameter combinations on the Nikkei 225, Dow Jones, and Nasdaq indices, the study found that models with optimal parameters generated higher returns than the *buy-and-hold* and random strategies. These findings indicate that parameter selection should consider market characteristics because optimal parameters may differ across markets.

Mathematically, MACD can be expressed as follows:

$$MACD = EMA_{12} - EMA_{26}$$
$$Signal\ Line = EMA_9(MACD)$$
$$Histogram = MACD - Signal\ Line$$

Where:

- EMA_{12}= 12-period *Exponential Moving Average*;
- EMA_{26}= 26-period *Exponential Moving Average*;
- $EMA_9(MACD)$= 9-period EMA of the MACD line.

Based on the above discussion, MACD is an indicator used to identify trends and changes in price momentum through the relationship between short-term and long-term EMAs. MACD can provide trading signals, but its results may vary depending on market conditions and the parameters used. In this study, MACD is used to generate stock returns, which are then compared with the returns generated by the Stochastic RSI and Bollinger Bands indicators.

Geometric Mean

The Geometric Mean is a statistical measure used to determine the average compound growth rate of an investment over multiple periods. Unlike the arithmetic mean, which calculates the simple average of periodic returns, the Geometric Mean incorporates the cumulative effect of successive returns and therefore provides a more representative measure of investment growth over time. Petukhina and Sprünken (2021) explain that the Geometric Mean is appropriate for estimating investment growth rates because returns represent changes in asset values across successive periods. The measure accounts for the compounding effect of returns and can therefore be applied to evaluate investment performance over multiple periods.

The application of the Geometric Mean is also relevant in investment performance evaluation. Levy (2026)

demonstrates that the Geometric Mean can be used as a criterion for evaluating and ranking investment alternatives because it reflects the compounded growth of wealth over time. Similarly, Siregar et al. (2025) state that the Geometric Mean provides a representative measure of investment growth by considering the cumulative effect of returns across successive periods. Sibarani (2025) further reported that the use of the Geometric Mean in return calculations provides a realistic representation of historical investment performance.

The Geometric Mean Return can be calculated using the following formula:

$$GM = [(1 + R_1)(1 + R_2) \cdots (1 + R_n)]^{\frac{1}{n}} - 1$$

Where:

- GM= Geometric Mean Return;
- $R_1, R_2, \ldots, R_n$= return for each observation period;
- n= number of observation periods.

A higher Geometric Mean Return indicates a higher compounded return over the observation period. Therefore, in this study, the Geometric Mean is used to measure and compare the returns generated by the Stochastic RSI, MACD, and Bollinger Bands indicators. The indicator that produces the highest Geometric Mean Return is considered to generate the most optimal return for banking-sector stocks included in the LQ45 Index.

HYPOTHESES DEVELOPMENT

The differences in the characteristics and mechanisms of these indicators provide a basis for comparing the stock returns generated by Stochastic RSI, MACD, and Bollinger Bands. Therefore, this study examines whether there is a significant difference in stock returns generated by the three technical indicators in banking sector stocks included in the LQ45 Index.

Based on the research problem, previous studies, and the underlying theoretical framework, the hypotheses of this study are formulated as follows:

H_0: There is no statistically significant difference in stock returns generated by the Moving Average Convergence Divergence (MACD), Stochastic Relative Strength Index (Stochastic RSI), and Bollinger Bands indicators.

H_1: There is a statistically significant difference in stock returns generated by the Moving Average Convergence Divergence (MACD), Stochastic Relative Strength Index (Stochastic RSI), and Bollinger Bands indicators.

Research Framework

The research framework illustrates the stages of the study in analyzing banking sector stocks included in the LQ45 Index using technical analysis. The study applies three technical indicators, namely Stochastic RSI, MACD, and Bollinger Bands, to identify buy and sell signals through descriptive analysis. The resulting data are then tested for normality and data distribution to determine the appropriate statistical analysis. Since the data are not normally distributed, the Kruskal-Wallis test is used to determine whether there are significant differences in stock returns generated by the three technical indicators. Finally, the Geometric Mean is used to calculate and compare the returns generated by each indicator to determine the optimal return.

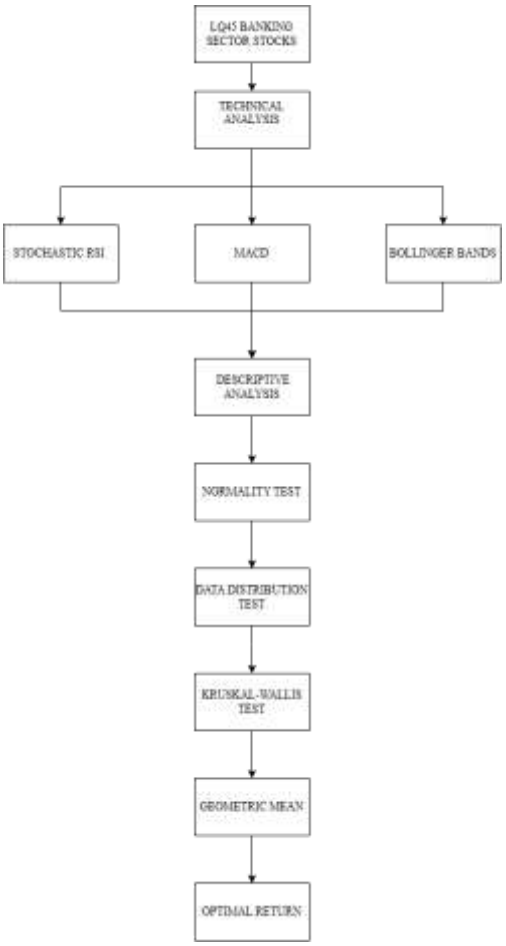

Figure 1. Research Framework

Based on figure 1, the study examines whether there are significant differences in stock returns generated by the Stochastic RSI, MACD, and Bollinger Bands indicators.

METHOD

This study employed a descriptive quantitative research design to examine the differences in stock returns generated by three technical analysis indicators, namely the Stochastic RSI, Moving Average Convergence Divergence (MACD), and Bollinger Bands, and to determine the optimal return using the Geometric Mean method. The study focused on banking sector companies listed in the LQ45 Index during the period from March 2023 to February 2026.

The population consisted of all banking sector companies included in the LQ45 Index during the observation period. The sample was selected using a purposive sampling technique based on the criterion that the companies remained listed in the LQ45 Index throughout the study period and had complete daily stock price data. Based on these criteria, five banking companies were selected as the research sample: BBCA, BBRI, BMRI, BBTN, and BBNI.

This study used secondary data in the form of daily closing stock prices obtained from the Stockbit platform. The closing price data were processed to generate buy and sell signals using the Stochastic RSI, MACD, and Bollinger Bands indicators. Subsequently, stock returns generated by each indicator were calculated, and the Geometric Mean (GM) method was employed to estimate the optimal investment return by measuring the compound growth of returns over the observation period.

The collected data were analyzed using IBM SPSS Statistics version 26. Descriptive statistical analysis was first conducted to summarize the characteristics of the return data. The normality of the data was then assessed using

the Kolmogorov–Smirnov and Shapiro–Wilk tests, while the homogeneity of variances was evaluated using Levene's Test. Since the return data were not normally distributed and did not satisfy the assumption of homogeneity of variances, the Kruskal–Wallis nonparametric test was employed to examine differences in stock returns among the three technical indicators. Finally, the Geometric Mean method was applied to identify the optimal return generated by each indicator–stock combination.

RESULT AND DISCUSSION

This study analyzes five banking sector stocks included in the LQ45 Index over the period from March 2023 to February 2026. The research data consist of daily closing stock prices obtained from the Stockbit platform as secondary data. The data were systematically processed to generate buy and sell signals using the Stochastic RSI, Moving Average Convergence Divergence (MACD), and Bollinger Bands indicators. The stock returns generated by each technical indicator were calculated using the Geometric Mean method to determine the optimal investment growth rate. The stock returns generated by each indicator for the five banking stocks are presented in Table 1.

Table 1. Stock Returns Over the Study Period

INDICATOR	**Issuer**	***RETURN* (%)**
Stochastic RSI	BBCA	141%
	BBRI	183%
	BMRI	182%
	BBNI	229%
	BBTN	250%
MACD	BBCA	59%
	BBRI	89%
	BMRI	83%
	BBNI	63%
	BBTN	135%
Bollinger Bands	BBCA	125%
	BBRI	213%
	BMRI	193%
	BBNI	248%
	BBTN	283%

Source: Processed SPSS Version 27 Data (2026).

The collected data were further analyzed using descriptive statistical analysis, normality testing, and hypothesis testing. The results of the descriptive statistical analysis are presented in Table 2.

Descriptive Statistics

Table 2. Descriptive Statistics Analysis

		Statistic	*Bootstrap*			
			Bias	*Std. Error*	*95% Confidence Interval* *Lower*	*Upper*
Stoch RSI	*N*	180	0	0	180	180
	Min	.9961				
	Max	1.2293				
	Mean	1.0532				
	td. Dev	.0541				
MACD	*N*	180	0	0	180	180
	Min	.9186				
	Max	1.4343				
	Mean	1.0247	0000	.0044	1.0171	1.0344
	td. Dev	.0554	-0007	.0092	.0394	.0764
Bollinger Bands	*N*	180	0	0	180	180
	Min	1.0000				

		Statistic	Bootstrap			
			Bias	Std. Error	95% Confidence Interval Lower	Upper
	Max	1.5741				
	Mean	1.0589	-0005	.0063	1.0456	1.0697
	td. Dev	.0832	-0017	.0086	.0668	.1001
Valid N (listwise)	N	180	0	0	180	180

Source: Processed SPSS Version 27 Data (2026).

Based on the results of the descriptive statistical analysis presented in Table 2, the Stochastic RSI indicator generated a mean return of 1.0532 with a standard deviation of 0.0541. This finding indicates that the returns produced by the indicator were relatively stable, with a low level of data dispersion. During the study period, the minimum return was 0.9961, while the maximum return reached 1.2293, based on 180 observations.

The MACD indicator generated a mean return of 1.0247 with a standard deviation of 0.0554. The minimum and maximum returns were 0.9186 and 1.4343, respectively. Based on the 95% confidence interval, the mean return of the MACD indicator ranged from 1.0171 to 1.0344, indicating that the estimated average return was statistically reliable.

The Bollinger Bands indicator produced the highest mean return, 1.0589, with a standard deviation of 0.0832. The minimum return was 1.0000, while the maximum return reached 1.5741. The 95% confidence interval ranged from 1.0456 to 1.0697, suggesting that the true mean return of the Bollinger Bands indicator is expected to fall within this interval with a 95% level of confidence.

Overall, all three technical indicators generated mean returns greater than 1.0, indicating that each indicator was capable of producing positive investment returns throughout the study period. Among the three indicators, Bollinger Bands achieved the highest average return. However, the Stochastic RSI indicator exhibited lower data dispersion than Bollinger Bands, indicating more consistent return performance over the observation period.

Normality Test

Table 3. Normality Test of the Indicators

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
STOCHASTIC_ RSI	.157	180	.000	.879	180	.000
MACD	.242	180	.000	.692	180	.000
BOLLINGER BAND	.255	180	.000	.732	180	.000

a. *Lilliefors Significance Correction*

Source: Processed SPSS Version 27 Data (2026).

Based on Table 3, the normality test was conducted to determine whether the return data generated by the Stochastic RSI, Moving Average Convergence Divergence (MACD), and Bollinger Bands indicators were normally distributed. The Kolmogorov–Smirnov and Shapiro–Wilk tests were used to assess normality. All indicators had significance (p) values of 0.000, which were below the 0.05 significance level. Therefore, the return data generated by the three technical indicators were not normally distributed.

Based on these findings, differences in returns among the indicators were analyzed using the Kruskal–Wallis nonparametric test. This statistical method was selected because it does not require the assumption of normality and is appropriate for comparing more than two independent groups.

Homogeneity Test

Table 4. Homogeneity of Variance Test Results

	Levene Statistic	*df1*	*df2*	*Sig.*
STOCHASTIC_RSI	2.928	4	175	.022
MACD	4.306	4	175	.002
BOLLINGER BAND	5.177	4	175	.001

Source: Processed SPSS Version 27 Data (2026).

The next analysis involved a test of homogeneity of variances using Levene's Test to examine whether the return variances of the three technical indicators were equal. The results presented in Table 4 showed that the significance (p) values for all groups were below 0.05, indicating that the data did not satisfy the assumption of homogeneity of variances. Therefore, the return data generated by the Stochastic RSI, Moving Average Convergence Divergence (MACD), and Bollinger Bands indicators exhibited unequal variances.

The findings of the normality test, which indicated that the data were not normally distributed, together with the results of Levene's Test showing that the assumption of homogeneity of variances was not met, further justified the use of the Kruskal–Wallis nonparametric test to examine differences in returns among the three technical indicators.

Hypothesis Testing

Table 5. Results of the Kruskal–Wallis Test

	Indicator	N	*Mean Rank*
Total Return	*Stochastic RSI*	180	310.46
	MACD	180	219.31
	Bollinger Bands	180	281.73
	Total	540	

	Total *Return*
Chi-Square	34.546
Df	2
Asymp. Sig	.000

a. Kruskal Wallis Test
b. Grouping Variable: INDICATOR

Source: Processed SPSS Version 27 Data (2026).

The Kruskal–Wallis test was performed to examine whether the Stochastic RSI, Moving Average Convergence Divergence (MACD), and Bollinger Bands indicators produced significantly different stock returns. As presented in Table 5, the test yielded a Chi-square statistic of 34.546, with 2 degrees of freedom (df) and an Asymptotic Significance (Asymp. Sig.) value of 0.000. Since the significance value was below the 0.05 threshold, the results indicate a statistically significant difference in stock returns among the three technical indicators. Therefore, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted.

The Mean Rank values in Table 5 show that the Stochastic RSI indicator achieved the highest rank (310.46), followed by Bollinger Bands (281.73), while MACD obtained the lowest rank (219.31). A higher Mean Rank indicates that the corresponding indicator tended to generate higher stock returns compared with the other indicators. These findings suggest that Stochastic RSI demonstrated the best relative performance during the study period, followed by Bollinger Bands, whereas MACD exhibited relatively lower performance.

Overall, the findings indicate that the choice of technical indicator significantly influences the stock returns obtained by investors. Therefore, selecting an appropriate technical indicator is essential for supporting investment decisions involving banking sector stocks listed in the LQ45 Index.

Geometric Mean

Table 7. Optimal Returns Based on the Geometric Mean Method

Indicator	Emiten	*Return* Relatif (1+ *Return*)	GM	GM-1	Result %
Stochastic RSI	BBCA	3,503	1,035	0,035	3,54%
	BBRI	5,676	1,049	0,049	4,94%
	BMRI	5,728	1,049	0,049	4,97%
	BBTN	8,615	1,061	0,061	6,16%
	BBNI	9,152	1,063	0,063	6,34%
MACD	BBCA	2,045	1,020	0,0200	2,01%
	BBRI	2,354	1,024	0,024	2,41%
	BMRI	2,215	1,022	0,022	2,23%
	BBTN	3,333	1,034	0,034	3,40%
	BBNI	1,805	1,016	0,016	1,65%
BB	BBCA	3,296	1,033	0,033	3,37%
	BBRI	7,182	1,056	0,056	5,63%
	BMRI	5,887	1,050	0,050	5,05%
	BBTN	12,697	1,073	0,073	7,31%
	BBNI	10,209	1,066	0,066	6,67%

Source: Processed SPSS Version 27 Data (2026).

As shown in Table 7, the Geometric Mean (GM) calculations revealed differences in the optimal returns generated by each combination of technical indicators and banking sector stocks. The GM was used to measure the cumulative growth of investment returns over the study period and was subsequently converted into percentage form using the expression (GM − 1). For the Stochastic RSI indicator, the highest return was achieved by BBNI, with a return of 6.34%. For the Moving Average Convergence Divergence (MACD) and Bollinger Bands indicators, the highest returns were generated by BBTN, amounting to 3.40% and 7.31%, respectively. Compared with the other indicators, MACD consistently produced relatively lower returns across all stocks included in the analysis.

Overall, the Geometric Mean results indicate that BBTN and BBNI tended to generate higher investment returns than the other banking stocks examined. Among all indicator–stock combinations, the Bollinger Bands–BBTN combination produced the highest optimal return of 7.31%, suggesting that this combination demonstrated the greatest potential for generating investment returns during the study period.

Optimal Returns Using the Geometric Mean

The Geometric Mean calculations showed differences in the optimal returns generated by the combinations of technical indicators and banking sector stocks. As presented in Table 7, BBTN generated the highest return when combined with the Bollinger Bands indicator, with a Geometric Mean Return of 7.31%. For the Stochastic RSI indicator, the highest return was generated by BBNI at 6.34%, while BBTN also recorded the highest return under the Moving Average Convergence Divergence (MACD) indicator at 3.40%. These findings indicate that the optimal return varied depending on both the technical indicator and the stock analyzed, with the highest overall return obtained from the combination of BBTN and Bollinger Bands.

The findings are consistent with Petukhina and Sprünken (2021), who explained that the Geometric Mean is relevant for evaluating investment growth over multiple periods because it accounts for the compounding effect of successive returns. Their study also showed that the geometric mean return can represent the growth rate of wealth in a multi-period investment framework. Similarly, Levy (2026) stated that the Geometric Mean is useful for evaluating and ranking investment alternatives because it reflects the compounded growth of wealth over time. These findings support the use of the Geometric Mean in the present study to compare investment returns generated by different technical indicators over the study period.

However, the results of the present study differ in their specific return outcomes because the highest Geometric Mean Return was obtained from the Bollinger Bands–BBTN combination, whereas the Kruskal–Wallis results in Table 5 showed that Stochastic RSI had the highest Mean Rank among the three indicators. This difference indicates that the indicator with the highest statistical Mean Rank does not necessarily produce the highest Geometric Mean Return for a particular stock. Therefore, the results in Table 7 provide additional information by identifying the specific indicator–stock combination that generated the highest compounded return during the study period.

CONCLUSION

The Geometric Mean calculations showed differences in the optimal returns generated by the combinations of technical indicators and banking sector stocks. As presented in Table 7, BBTN generated the highest return when combined with the Bollinger Bands indicator, with a Geometric Mean Return of 7.31%. For the Stochastic RSI indicator, the highest return was generated by BBNI at 6.34%, while BBTN also recorded the highest return under the Moving Average Convergence Divergence (MACD) indicator at 3.40%. These findings indicate that the optimal return varied depending on both the technical indicator and the stock analyzed, with the highest overall return obtained from the combination of BBTN and Bollinger Bands. The findings are consistent with Petukhina and Sprünken (2021), who explained that the Geometric Mean is relevant for evaluating investment growth over multiple periods because it accounts for the compounding effect of successive returns. Their study also showed that the geometric mean return can represent the growth rate of wealth in a multi-period investment framework. Similarly, Levy (2026) stated that the Geometric Mean is useful for evaluating and ranking investment alternatives because it reflects the compounded growth of wealth over time. These findings support the use of the Geometric Mean in the present study to compare investment returns generated by different technical indicators over the study period. However, the results of the present study differ in their specific return outcomes because the highest Geometric Mean Return was obtained from the Bollinger Bands–BBTN combination, whereas the Kruskal–Wallis results in Table 5 showed that Stochastic RSI had the highest Mean Rank among the three indicators. This difference indicates that the indicator with the highest statistical Mean Rank does not necessarily produce the highest Geometric Mean Return for a particular stock. Therefore, the results in Table 7 provide additional information by identifying the specific indicator–stock combination that generated the highest compounded return during the study period.

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