

# Technical Analysis of Stock Price Movements with Stochastic and Moving Average Indicators on the LQ45 Index

Stanislaus Lim\*, Asrid Juniar

*Prodi Manajemen, FEB, ULM, Indonesia*

*\*Corresponding author. E-mail: stanis2003lim@gmail.com*

## ABSTRACT

This research aims to analyze the differences in buy and sell signals produced by the Stochastic Oscillator and Moving Average indicators on the share prices of mining companies in the LQ45 index for 5 and 10 days before and after the announcement of the Fed's interest rate cut on September 19, 2024. Population of 45 companies listed on the LQ45 index, 6 companies were selected as samples using a purposive sampling technique. Data analysis was carried out using different tests, namely the paired T test and the Wilcoxon test using the SPSS 21. The result of this research found that there were differences in residual data results in the form of the Stochastic Oscillator having a normal residual and the Moving Average having an abnormal residual, and there were differences of buy and sell signals produced by the Stochastic Oscillator and Moving Average indicators on the shares of mining companies included in the LQ45 index during the period 5 days before after and 10 days before after the announcement of the Fed's interest rate cut on 19 September 2024. In addition, the research results also showed that there were differences between the use of the Stochastic Oscillator and Moving Average in identifying buy signals and moving averages. selling is related to share price movements.

**Keywords:** *Stock Price Movements, Technical Analysis, Stochastic Oscillator, Moving Average.*

## 1. INTRODUCTION

Investment in Indonesia is growing rapidly. According to Mahendra et al. (2022), investing is a strategy to grow and protect capital. One popular form of modern investment is stock trading in the capital market, where long-term financial instruments like shares are bought and sold. These instruments can include equity or debt issued by the government, public entities, or private companies as stock price.

The total of single identity investor in 2021 of the stock market experienced a very significant spike during the period 2020 to 2024. During that time, an increase of 229.4% was recorded. where the number of investors grew from 3,880,753 to 12,782,965. This figure reflects the extraordinary development in public participation in the capital market, which indicates a growing interest in investment among Indonesian society. This rapid growth shows that more and more individuals see the capital markets as an attractive alternative for managing and growing their wealth, either through long-term investments or share trading.

The Fed's interest rate cut by 50 basis points on September 19, 2024 to 4.7%-5% has an impact on the global stock market. According to Yang (2023), interest rate cuts often increase stock prices as investors shift capital from low-yielding bonds to riskier assets such as stocks and commodities. While low interest rates can support long-term global economic growth, they also carry the risk of inflation and over-reliance on loose monetary policy, which can affect all sectors due to the systemic nature of interest rate cuts.

The interest rate cut policy not only aids global economic recovery but also creates strategic opportunities for the mining sector, leading to volatility and spikes in stock prices. This requires thorough analysis, such as technical analysis, to identify the right buy and sell signals for mining companies. According to Hidayat (2022), technical analysis using historical data, like price movements of stock and trading volume, to predict future trends, helping investors determine the best time to buy or sell. In fast-moving markets like Indonesia, technical analysis is a crucial tool for making informed investment decisions.

The author aims to research the use of technical indicators to provide investors with clearer guidances in selecting the right tools amidst many options. The Moving Average and Stochastic Oscillator were chosen because they are widely

used and easily understood by investors. These indicators represent different categories, such as Trend Following, Momentum, and Volatility Indicators, making them suitable for various analysis needs.

According to Cahyani & Mahyuni (2020) moving average (MA) is a technical indicator used to identify and predict stock price trends by calculate the average price over a certain time, such as 5, 10, 20, or 50 days. This indicator can help filter price fluctuations that occur in the short term to provide a clearer picture of the direction of the overall market trend, be it an uptrend (bullish) or a downtrend (bearish). There are two types of MA that are often used, namely Simple Moving Average (SMA), which gives equal weight to each price data, and Exponential Moving Average (EMA), which gives greater weights to the latest prices, making it more responsive to recent price changes. Apart from that, Weighted Moving Average (WMA) is also often used to give a higher weight to the latest data.

The Stochastic Oscillator (SO), as described by Ni et al. (2020), is a technical indicator that measures price momentum and identifies overbought or oversold conditions, helping investors predict potential price reversals. It compares the closing price to the price range over a set period, signaling a buy when the market is oversold and a sell when it is overbought. In the context of the Fed's interest rate cuts, SO is valuable as it helps investors identify if a price increase has reached overbought levels, allowing for more rational decisions amid market euphoria and excessive optimism (Dadhich et al., 2019).

## 2. METHODS

This research is quantitative research. The purpose of the study was to use technical analysis with the SO and MA methods to examine changes in stock prices. This study will also test the differences in buy and sell signals using SO and MA for 5-day and 10-day periods before and after the announcement of the interest rate cut by the Fed. The study's population consists of mining businesses listed on the Indonesia Stock Exchange (IDX) and included in the LQ 45 index from August to October 2024. Companies in the coal mining sector were chosen as the population for this study since this industry is constantly evolving. The coal mining companies used as samples in this study are six banks, namely: PT Adaro Energy Indonesia Tbk (ADRO), PT Bukit Asam Tbk (PTBA), PT Aneka Tambang Tbk (ANTM), PT Indo Tambangraya Megah Tbk (ITMG), PT Vale Indonesia Tbk (INCO), and PT Harum Energy Tbk.

This study's data sources are secondary. Secondary data sources include periodicals, books, and websites about stock price changes and investing decisions. Secondary data is used by researchers as the primary data source for analysis. The data was analyzed using the SO and MA methods, followed by the Normality Test to determine whether the data from SO and MA were normally distributed or not, and the difference test, namely the Paired T Test to test normally distributed SO and the Wilcoxon Test to test non-normally distributed MA, using the SPSS21 statistical program.

## 3. RESULTS

### 3.1. Normality Test

In this study, the Kolmogorov-Smirnov test was used to determine the normality of data. If the test results show a significance value (sig) less than 0.05, the data is not normal, but a sig more than 0.05 indicates that the data is normally distributed. In the data that has been tested, MA 5 days before and after 0.00 less than 0.05 means that the data is not normally distributed; MA 10 before and after 0.00 less than 0.05 means that the data is not normally distributed; SO 5 before and after 0.88 and 0.59 means that the data is normally distributed; and SO 10 before and after 0.10 and 0.33 means that the data is normally distributed.

### 3.2. Paired T Test

Paired T Test is used to test whether there is a significant difference in means between two paired or related groups. This test is often used in pretest-posttest or experimental research designs that measure the same variable at two different times (before and after treatment) (Ghozali, 2018: 81). If the result  $< 0.05$  then  $H_0$  is rejected and  $H_1$  is accepted. Conversely, if the result  $> 0.05$  then  $H_0$  is accepted and  $H_a$  is rejected. In this study, the following results were obtained: Stochastic 5 days before and after was 0.00 and Stochastic 10 days before and after was 0.00, which is less than 0.05.

### 3.3. Wilcoxon Test

Wilcoxon test is used to test whether there are significant differences between two paired groups in data that is not normally distributed. This test is often used when data are ordinal or when normality assumptions are not met. The Wilcoxon test is a non-parametric test that tests differences in two paired samples, like the paired t test, but without

requiring the assumption of a normal distribution. The basis for decision making in this test is if the result is smaller than  $<0.05$ , then  $H_1$  is accepted and if the result is greater than  $>0.05$ , then  $H_1$  is rejected. In this research, the following results were obtained: MA 5 Days before and after was 0.002 and MA 10 days before and after was 0.02, it means that there is a difference between 5 days before and after and 10 days before and after the announcement of the interest rate cut by The Fed. Still using the Wilcoxon Test to test the 5th hypothesis, namely the difference between the two indicators, after the test was carried out with the Wilcoxon test, it was found that MA5-SO5 5 days before was 0.00, MA5-SO5 5 days after was 0.00, MA10-SO10 10 days before was 0.00, and MA10-SO10 10 days after was 0.00 smaller than 0.05, it can be interpreted that both the Stochastic Oscillator and Moving Average indicators for the 5-day and 10-day periods before and after have differences.

#### 4. DISCUSSION

Differences before and after using the Stochastic Oscillator Indicator for a 5 days period on Buy Signals and Sell Signals on Stock Price Movements in the LQ45 Stock Index.

The results of the first hypothesis in this study indicate that the Stochastic Oscillator indicator for the 5-day period before and after the announcement of the interest rate cut by the Fed has a value of 0.00 which is smaller than 0.05, meaning that there is a difference between 5 days before and after the announcement using the Stochastic Oscillator indicator in the coal mining sector So hypothesis 1 is accepted.

The Stochastic Oscillator, used to identify overbought or oversold conditions, was analyzed before and after the Fed's announcement to detect price reversals. A Paired T-test revealed a significant difference in the Stochastic Oscillator values for the 5-day period, showing that the Fed's interest rate decisions impact market volatility. This suggests that investors can use the 5-day Stochastic Oscillator to navigate short-term market conditions influenced by the Fed's announcements, helping them manage the systematic risks of such policy changes.

From the perspective of the Efficient Market Hypothesis (EMH), an interest rate cut should be immediately reflected in stock and commodity prices. However, market fluctuations show that prices don't adjust instantly, suggesting the market isn't fully efficient. This delay or overreaction could be due to psychological factors and uncertainty. The significant difference in Stochastic Oscillator signals before and after the announcement indicates that the market takes time to absorb new information. This highlights systematic risk and imperfections in EMH, particularly during major events like a Fed interest rate cut.

Differences before and after using the Moving Average Indicator for a 5 day periods on Buy Signals and Sell Signals on Stock Price Movements in the LQ45 Stock Index.

The results of the second hypothesis in this study indicate that the Moving Average indicator for the 5-day period before and after the announcement of the interest rate cut by the Fed has a value of 0.002 which is smaller than 0.05, meaning that there is a difference between 5 days before and after the announcement using the Stochastic Oscillator indicator in the coal mining sector So hypothesis 2 is accepted

The 5-day Moving Average, commonly used to track long-term price trends, can signal potential price reversals before and after the Fed's announcement. Researcher applied the Wilcoxon test, suited for abnormal residuals, to compare the Moving Average values from the 5-day periods before and after the announcement. The test revealed a significant difference, reflecting the impact of the Fed's decision on market dynamics. This supports the idea that the Fed's interest rate policy influences market volatility, which can be managed using technical analysis, allowing investors to navigate short-term risks around such announcements.

From the perspective of the Efficient Market Hypothesis (EMH), an interest rate cut should be immediately reflected in stock prices. However, market fluctuations show that prices don't adjust perfectly or quickly, suggesting delays or overreactions. This could be due to psychological factors and uncertainty. The significant changes in the 5-day Moving Average before and after the announcement indicate that the market isn't fully efficient in processing information. This highlights systematic risk and imperfections in EMH, particularly during major events like a Fed interest rate cut.

Differences before and after using the Stochastic Oscillator Indicator for a 10 days period on Buy Signals and Sell Signals on Stock Price Movements in the LQ45 Stock Index.

The results of the second hypothesis from this study indicate that the Stochastic Oscillator indicator for 10-days period before and after the announcement of the interest rate cut by the Fed has a value of 0.00 which is smaller than 0.05, meaning that there is a difference between 5 days before and after the announcement using the Stochastic Oscillator indicator in the coal mining sector So hypothesis 3 is accepted.

The 10-day Stochastic Oscillator, commonly used to identify overbought or oversold conditions, helps analyze stock price changes before and after the Fed's announcement. Researchers applied the Paired T-test to assess any significant differences in the indicator values over a 10-day period. The results showed a significant difference, reflecting the impact of the Fed's decision on market dynamics. This supports the idea that the Fed's interest rate policy influences market volatility, and investors can use the 10-day Stochastic Oscillator to navigate short-term risks tied to such announcements.

From the perspective of the Efficient Market Hypothesis (EMH), an interest rate cut should be instantly reflected in stock prices, as prices are believed to reflect all public information. However, market fluctuations show that prices do not adjust perfectly or quickly, suggesting delays or overreactions due to psychological factors and uncertainty. The significant changes in the Stochastic Oscillator 10 days before and after the announcement reveal that the market is not fully efficient in processing information. This highlights systematic risk and imperfections in EMH, especially during major events like a Fed interest rate cut.

Differences before and after using the Moving Average Indicator for a 10 days period on Buy Signals and Sell Signals on Stock Price Movements in the LQ45 Stock Index.

The results of the second hypothesis in this study indicate that Moving Average indicator for the 10-days period before and after the announcement of the interest rate cut by the Fed has a value of 0.02 which is smaller than 0.05, meaning that there is a difference between 5 days before and after the announcement using the Stochastic Oscillator indicator in the coal mining sector So hypothesis 4 is accepted.

The 10-day Moving Average, used to identify overbought or oversold conditions, helps analyze stock price changes before and after the Fed's announcement. Researchers applied the Wilcoxon test to check for significant differences in the indicator's values. The results showed a notable change, reflecting the impact of the Fed's decision on market dynamics. This supports the idea that the Fed's interest rate policy influences market volatility, and investors can use the 10-day Moving Average to manage short-term risks around such announcements.

From the perspective of the Efficient Market Hypothesis (EMH), an interest rate cut should immediately impact stock prices, as they reflect all public information. However, market fluctuations show that prices don't adjust perfectly or quickly, suggesting delays or overreactions, possibly due to psychological factors and uncertainty. The differences in technical indicators like the 10-day Moving Average before and after the announcement indicate that the market isn't fully efficient in processing information. This reveals systematic risk and flaws in EMH, especially during major events like a Fed interest rate cut.

The Difference between the Stochastic Oscillator and Moving Average indicators for Buy Signals and Sell Signals for Stock Price Movements in the LQ45 Stock Index.

The results of the second hypothesis test in this study indicate that the Stochastic Oscillator and Moving Average indicator for the 5 and 10days period before and after the announcement of the interest rate cut by the Fed has a value of 0.00 which is smaller than 0.05, meaning that there is a difference between 5 and 10 days before and after the announcement using the Stochastic Oscillator indicator and Moving Average in the coal mining sector So hypothesis 5 is accepted.

Technical indicators like the Stochastic Oscillator and Moving Average (MA) are used to analyze stock price changes before and after the Fed's interest rate announcement. The Stochastic Oscillator detects overbought or oversold conditions and signals potential price reversals, while the Moving Average highlights long-term trends. The significant changes after the announcement led to noticeable differences in the indicators' signals. Using the Wilcoxon test, the analysis showed a significant difference between the indicators before and after the announcement, indicating the Fed's impact on market dynamics. This supports the idea that the Fed's interest rate policy drives market volatility, and investors can use indicators like MA5, MA10, SO5, and SO10 to navigate short-term risks tied to such announcements.

From the perspective of the Efficient Market Hypothesis (EMH), an interest rate cut should immediately affect stock prices, as they reflect all public information. However, market fluctuations show that prices don't adjust perfectly or quickly, suggesting delays or overreactions due to psychological factors and uncertainty. The differences in signals from indicators like the Stochastic Oscillator and Moving Average highlight that the market is not fully efficient in processing information. This points to systematic risk and flaws in EMH, especially during major events like a Fed interest rate cut.

The findings of this study offer valuable insights, highlighting significant differences in buy and sell signals during the 5-day and 10-day periods before and after the Fed's interest rate announcement, as observed through the Stochastic Oscillator and Moving Average indicators. These variations demonstrate the impact of monetary policy on market dynamics, supporting Dow theory and the Efficient Market Hypothesis (EMH), which suggests that stock prices should

quickly reflect all available public information, including interest rate changes. However, the differences in signals point to inefficiencies in how the market processes information, revealing flaws in EMH. Furthermore, signal theory shows that market responses can be delayed or exaggerated, as reflected in the shifts in technical indicators before and after the announcement. From a systematic risk perspective, these discrepancies indicate how external factors like interest rate decisions influence market volatility and heighten risks. Investors should account for such economic factors in their strategies, using technical indicators to manage risk and make more informed short-term decisions.

## 5. CONCLUSIONS

This study demonstrates that the Fed's interest rate announcement has a major impact on market dynamics, with notable changes in buy and sell signals from the Stochastic Oscillator and Moving Average indicators before and after the announcement. These findings show inefficiencies in market responses, confirming the concept of systemic risk and highlighting flaws in the Efficient Market Hypothesis (EMH), which predicts quick price adjustments based on public information. Delays or overreactions in market reactions, caused by psychological factors and uncertainty, add to these inefficiencies. Based on these findings, investors are recommended to use technical indicators such as MA5, MA10, SO5, and SO10 in their strategies to manage highly volatile market conditions produced by systematic risks such as Fed interest rate reduction.

Further research should use a longer observation period of 5 and 10 days to properly capture market movements before and after the Fed's interest rate announcement on September 19, 2024. Furthermore, using other firms, particularly those with a more stable stock price range, such as mining companies, would help to close wide price gaps and provide a more accurate analysis. Future research might investigate the efficiency of these indicators in different market settings, including global economic events, which would contribute to technical analysis theory and provide fresh perspectives on stock market financial management.

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