Comparative analysis of leading and lagging techniques in investment strategies

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ABSTRACT

This research compares the accuracy and performance of leading and lagging indicators in predicting stock price movements on the IDXGrowth30 index over a three-year period from January 2021 to December 2023. Leading indicators provide signals before a trend forms, while lagging indicators confirm trends after price movements have occurred. The Relative Strength Index (RSI) is used as a representation of the leading indicator, while the Parabolic Stop and Reverse (Parabolic SAR) represents the lagging indicator. This study evaluates the effectiveness of technical indicators in supporting investment decisions based on signaling theory. The results show that RSI has an accuracy rate of 94%, higher than Parabolic SAR's 39%, and also generates a larger return (14.652 compared to 3.032). These findings indicate that RSI is more effective in providing fast and accurate signals for growth-oriented stocks. This research fills a gap in the literature regarding the comparison of technical indicators on the IDXGrowth30 index, although the generalization of results remains limited.

1. Introduction

The capital market plays a strategic role in national economic development, particularly by providing funding sources for the real sector. Stocks, as one of the primary instruments in the capital market, serve not only as investment tools but also as indicators of confidence in economic stability and prospects, both at the micro level (companies) and the macro level (Ngo & Le, 2019). Figure 1 shows during the period of 2021–2023, the Indonesian capital market demonstrated positive performance. The Jakarta Composite Index (JCI) recorded a growth of 18.4% at the end of 2021 and continued to increase, reaching a market capitalization of Rp12,168 trillion by the end of 2023 (KSEI, 2024). This growth reflects an increasing flow of capital, which strengthens the relationship between macroeconomic stability and the investment dynamics of the capital market (Aveh & Awunyo-Vitor, 2017).

Fluctuations in stock prices result from the interaction between micro factors such as a company's financial performance and business prospects, and macro factors such as inflation rates, interest rates, and fiscal and monetary policies (Abbas et al., 2023). Therefore, an investor's ability to anticipate the direction of price movements is crucial. One method widely used is technical analysis, which utilizes historical price and volume data to identify market patterns and trends (Edwards et al., 2018). In practice, technical analysis employs technical indicators that are classified into two types: leading indicators, such as the Relative Strength Index (RSI), which provide early signals before a trend occurs, and lagging indicators, such as the Parabolic SAR, which confirm a trend after it has formed

(Yao & Li, 2020). Selecting the appropriate indicators significantly influences the accuracy of predictions and potential profits.
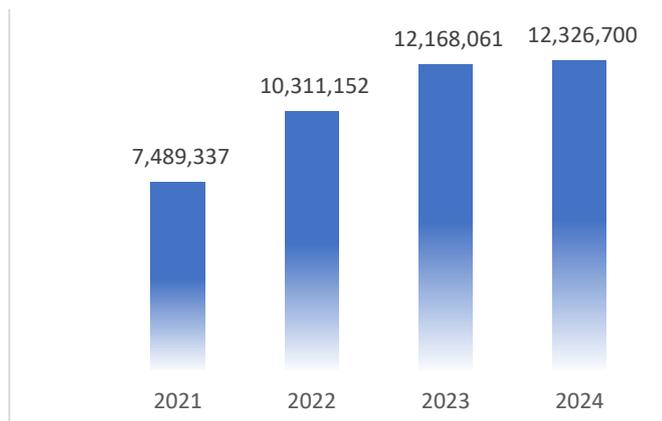

Figure 1. The Indonesian Capital Market

Several previous studies have demonstrated the effectiveness of RSI as an adaptive indicator in dynamic market conditions (Nidhi et al., 2023). Gurrib & Kamalov (2019) found that RSI is effective in detecting overbought and oversold conditions, even in inefficient markets. Similar findings were put forward by Chong et al (2014) stated that RSI provides more accurate signals compared to other indicators such as MACD in the Asian market. In contrast, studies by Huang et al (2011) and Padhi et al (2022) emphasized the superiority of Parabolic SAR in avoiding false signals in stable long-term trends. This raises a debate in the literature regarding which indicator is generally superior. However, most of these studies highlight the effectiveness of indicators individually rather than in the context of direct comparison. This indicates a gap in the understanding of comparative technical strategies, especially for market participants who require a data-driven approach to adjust their strategies according to market dynamics.

Therefore, this study aims to conduct a comparative analysis of the leading RSI indicator and the lagging Parabolic SAR based on accuracy, potential returns, and risk in predicting stock prices. The study uses stock data from the IDXGrowth30 index, which represents companies with strong financial performance growth, thereby reflecting microeconomic dynamics amid the influence of national macroeconomics. This research is not only beneficial for practical investors but also has significant implications for academics. For investors, a clearer understanding of the relative advantages of each type of indicator can assist in making more informed investment decisions, especially in choosing trading strategies that align with their risk profiles and financial goals (Corbet et al., 2019). Meanwhile, for academics, these findings can enrich the literature in the field of finance and capital markets, as well as serve as a basis for further research exploring combinations or modifications of technical indicators to improve market prediction performance. Thus, this research can contribute to a more applicable bridge between market practice and financial theory.

2. Literature Review

2.1 Signal Theory in Capital Market

Signaling theory was developed by Spence (1973) to explain how parties with asymmetric information can reduce uncertainty through the transmission of signals. In the context of capital markets, this theory is highly relevant because investors often face information limitations and must rely on signals from the market or corporate actions when making investment decisions (Chui et al., 2022). Technical indicators like RSI and Parabolic SAR can be classified as types of market signals. RSI, being a leading indicator, offers an early indication of potential price trend reversals. When prices hit overbought or oversold levels, RSI alerts investors to a possible change in direction, enabling them to act before the trend fully develops (Lutey, 2022). In contrast, Parabolic SAR, as a lagging indicator, delivers a signal only after the price trend is confirmed, allowing investors to validate the market direction before taking action. In the framework of signal theory, technical indicators function not only as analytical tools but also as communication mechanisms between market conditions and investor expectations (Anand & Venkataraman, 2016). Therefore, understanding the accuracy and

timeliness of each indicator is crucial in mitigating risk and optimizing decision-making, particularly in the context of economic development that demands efficient allocation of capital and information.

2.2 Leading and Lagging Indicators

Technical indicators in market analysis are divided into two main categories: leading indicators and lagging indicators. Leading indicators are intended to offer signals before a market trend emerges. These tools are particularly valuable for predicting price turning points, especially in fast-moving and volatile markets (Chakrabarty et al., 2024). Examples of such indicators include the RSI, Stochastic Oscillator, and Fibonacci Retracement. The primary advantage of leading indicators is their capacity to deliver early signals; however, the downside is the risk of generating false signals, particularly in sideways market conditions that lack a clear direction. In contrast, lagging indicators provide signals after a trend has been confirmed. Parabolic SAR, Moving Average, and MACD belong to this category. The benefit of lagging indicators is their high reliability in strong trending conditions, although they tend to be delayed in providing early signals, which may result in missed initial trend opportunities (Metghalchi et al., 2021). In the context of microeconomics, the use of these indicators by individual and institutional investors reflects an asset allocation strategy influenced by expectations of corporate performance. Meanwhile, on a macroeconomic scale, the accumulation of investment decisions based on technical indicators influences the liquidity and efficiency of the capital market as a whole, which is an important part of the financial system for development (Hassani et al., 2023).

2.3 Relative Strength Index (RSI)

RSI is a momentum indicator created by Wilder (1978) that the theory measures the relative strength of upward and downward price movements over a period, typically 14 days, and is represented on a scale from 0 to 100. Values exceeding 70 are generally seen as indicating overbought conditions, while values below 30 suggest oversold conditions. The strength of RSI lies in its capacity to provide early signals of trend changes and to identify divergences between price and momentum, which can indicate potential price reversals. Additionally, RSI is versatile and can be applied to various asset types.
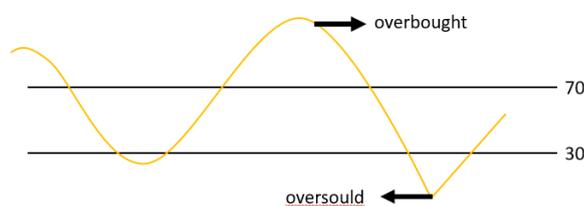

Figure 2. Relative Strength Index (RSI) in Capital Market

Figure 2 shows the accuracy of the RSI is highly dependent on market conditions. The RSI tends to be more effective in stable and fluctuating markets. But in market conditions without a clear direction, the RSI can give misleading signals if used without confirmation from other indicators.

2.4 Parabolic Stop and Reverse (Parabolic SAR)

Parabolic SAR is an indicator developed by Wilder (1978) to identify trend direction and price reversal points (Muis et al., 2021). This indicator displays dots above or below the price chart; when the dots are below the price, it signals an uptrend, and vice versa.

Figure 3. Parabolic SAR Indicators in Capital Markets

Parabolic SAR is designed to provide visual and easily interpretable signals of trend direction changes (Figure 3). The advantage of this indicator is its simplicity and effectiveness in markets with strong trends. However, in volatile or sideways market conditions, this indicator is prone to generating false signals (Amraini et al., 2025). Therefore, many practitioners suggest using Parabolic SAR alongside other indicators to validate signals, particularly in short-term decision-making. In the realm of development-based investing, grasping indicators like Parabolic SAR is essential to ensure that portfolio management is not only reactive to price movements but also adaptable to intricate market dynamics (Chourmouziadis & Chatzaglou, 2016).

3. Method

This research used a quantitative, comparative, and descriptive approach to compare the accuracy, return, and risk between two technical indicators: the Relative Strength Index (RSI) as a leading indicator and the Parabolic Stop and Reverse (Parabolic SAR) as a lagging indicator in predicting stock price movements. The primary objective of this study is to evaluate the effectiveness of both indicators in providing accurate buy and sell signals to support efficient and sustainable investment strategies. The subjects of the study are stocks listed in the IDXGrowth30 Index, which comprises companies demonstrating consistent and substantial profit growth. The selection of this index reflects the microeconomic landscape of firms during the national economic recovery phase. The observation period spans from January 2021 to December 2023, as this timeframe captures relevant market fluctuations. The sample in this study includes 17 stocks that have consistently remained in the IDXGrowth30 group throughout the observation period. A purposive sampling technique was employed to maintain consistency in technical performance analysis under relatively uniform market conditions. However, this approach may introduce selection bias, as it excludes stocks that entered or exited the index during the research period.

The data used is secondary data, obtained from the official website of the Indonesia Stock Exchange (IDX) and registered stock trading platforms. The data includes daily closing stock prices for each issuer during the observation period. The data analysis technique as follows: a). RSI is calculated using a standard period of 14 days (n=14), reflecting short-term trends in stock buying or selling. RSI is used to identify overbought and oversold moments that signal trend reversals; b). The Parabolic SAR calculation uses an initial parameter of 0.02, which is gradually increased to a maximum of 0.20. This indicator is used to identify price reversal points based on the position of the SAR dots relative to the stock price movement; c). Although a purposive approach is used, it should be noted that this approach can lead to selection bias because it ignores stocks that exit or enter during the observation period; d). The daily closing stock price data used has undergone a data cleaning process to remove anomalies, and has been adjusted for corporate actions such as dividend payouts and stock splits, to ensure the accuracy of signal and return calculations; e). This study does not involve human subjects, so ethical approval is not required. All data is public and accessible through the official website of the Indonesia Stock Exchange and registered stock trading platforms; f). Signal accuracy is assessed by comparing the direction of the signal with the stock price movement within 5 trading days after the signal appears. A signal is considered "correct" if the price moves at least ±2% in the direction corresponding to the indicator's prediction within that period; and g). Risk evaluation is carried out by calculating the number of false signals and comparing the variability of returns from each indicator.

4. Results and Discussion

4.1 Signal Accuracy

Signal accuracy analysis was performed to compare the precision of the Relative Strength Index (RSI) and Parabolic SAR indicators in generating buy and sell signals during the period from January 2022 to December 2023. This evaluation is crucial for investment efficiency, as signal accuracy greatly influences the likelihood of success for technical strategies in generating profits while minimizing risk. Table 1 shows the RSI indicator, as a leading indicator, yields a signal accuracy rate of 94%, with only two false signals out of a total of 31 signals generated. This demonstrates the reliability of the RSI in detecting market momentum prior to price reversals. The four stocks with the most signals via RSI are AKRA, HEAL, INDF, and TLKM, each with 3 signals. On the other hand, several stocks such as AMRT, BBCA, and ISAT only showed one signal during the research period. Conversely, the Parabolic SAR indicator, which acts as a lagging indicator, generated 322

signals, significantly more than the RSI. However, its signal accuracy was only 39%, with 183 signals deemed false. This suggests that while the SAR produces signals more frequently, most of those signals lack support from actual price movements. BBRI stock had the highest number of signals (22), whereas HEAL stock had the fewest (16).

Table 1. Summarizes the number of signals, true signals, false signals, and accuracy percentage

Indicators	Parabolic SAR	RSI
Total Signal	322	31
True Signal	127	29
False Signal	183	2
Signal success percentage	39%	94%
Stocks with the Most Signals	BBRI	AKRA, HEAL, INDF, TLKM
Number of Signals	22	3
Stocks with the least Signal	HEAL	AMRT, BBCA, BBRI, BMRI, ENRG, ISAT, KLBF
Number of Signals	16	1

Source: data processed

Table 1 shows these results indicate that the RSI indicator tends to produce fewer but more accurate signals, while the Parabolic SAR tends to generate a large number of signals with low accuracy. These differing characteristics align with each indicator's role in technical theory—RSI is more effective as an early signal, while SAR is better suited for trend confirmation in relatively stable markets. In the context of economic development-based investment strategies, the accuracy of signals is paramount. Investors with a short-term horizon or those facing highly volatile markets will benefit more from indicators like RSI, which can detect momentum early on. Conversely, the use of Parabolic SAR requires additional strategies to manage the risk of false signals, such as implementing stop-loss orders or validation with other indicators. The accuracy difference of 55% between the two indicators strongly argues that the selection of technical indicators cannot be uniform but must be tailored to the market characteristics and investment objectives (Basak et al., 2019).

4.2 Profit Maximization

The evaluation of investment returns is conducted to determine the potential profit that investors can gain by following the signals generated by the technical indicators RSI and Parabolic SAR. This calculation aims to measure the effectiveness of the indicators in the context of optimizing returns within a stock trading strategy.

Table 2. The Estimation of Stock Return Calculations

Code	RSI	Parabolic SAR
AKRA	830	286
AMRT	370	335
BBCA	575	-700
BBNI	1170	1079
BBRI	695	-615
BMRI	1050	615
BMTR	34	-81
BRM	107	4
ENRG	46	94
ESSA	195	360
HEAL	715	435
ICBP	4525	-100
INDF	2300	-175
ISAT	550	3475
KLBF	-95	-560
MIKA	455	-980
TLKM	1130	-440
TOTAL	14652	3032

Source: data processed

Table 2 shows the RSI indicator generated a total return of 14.652, much higher than Parabolic SAR, which only reached 3.032. The highest return from RSI was recorded for ICBP shares at 4.525, followed by INDF (2.300) and TLKM (1.130). Conversely, Parabolic SAR recorded its highest return for ISAT shares at 3.475, but also showed significant losses for shares such as MIKA (-980) and BBCA (-700). The difference in return values between the two indicators reached 11.620, which confirms RSI's superiority in generating signals that can provide more optimal profits. This advantage is attributed to RSI's nature as a leading indicator, which allows investors to enter trends earlier so that maximum profit potential can be achieved before prices undergo correction.

Parabolic SAR, as a lagging indicator, tends to provide signals after a trend is confirmed. Although in some cases this indicator can provide positive returns, especially in stocks that follow strong and consistent trends such as ISAT and BBNI, overall it shows weaker and more varied performance. Its main weakness lies in signal delays and sensitivity to unstable price movements. From an economic perspective, efficiency in generating high returns with minimal risk is an important foundation for strengthening investor participation and the sustainability of the domestic capital market (Firmansyah et al., 2025). These results indicate that the use of the RSI indicator tends to be more profitable, especially in dynamic and volatile markets like Indonesia. However, it should be noted that RSI, although superior overall, is not entirely free from potential losses. An example can be seen in KLBF shares, where RSI generated a negative return (-95). Therefore, the use of a combination of indicators is still recommended to reduce the risk of erroneous single signals.

4.3 Risk Evaluation

Risk is a fundamental element in every investment decision. In the context of financial markets, risk can be defined as the potential for loss due to inaccurate signals or mistimed buy and sell decisions. Evaluating technical indicators such as RSI and Parabolic SAR is important to understand the extent to which each analysis tool can minimize false signals and support more reliable decision-making. Table 3 shows that the RSI indicator produces 2 false signals out of 31 total signals, meaning the invalid signal rate is only about 6%. In contrast, the Parabolic SAR produces 183 false signals out of a total of 322 signals, with a false signal ratio reaching 57%. This significant difference indicates that RSI is statistically much more reliable than Parabolic SAR in minimizing potential losses from erroneous signals.

Table 3. The Result of RSI and Parabolic SAR accuracy

Code	RSI	Parabolic SAR
AKRA	100%	37%
AMRT	100%	39%
BBCA	100%	33%
BBNI	100%	65%
BBRI	100%	45%
BMRI	100%	32%
BMTR	100%	35%
BRM	100%	30%
ENRG	100%	40%
ESSA	50%	37%
HEAL	100%	44%
ICBP	100%	37%
INDF	100%	45%
ISAT	100%	53%
KLBF	0%	29%
MIKA	100%	30%
TLKM	100%	37%

Source: data processed

Table 3 shows the RSI has a very high accuracy distribution, particularly in stocks with high volatility such as BMRI, INDF, and TLKM. Conversely, the accuracy of Parabolic SAR varies significantly and tends to be low, especially in stocks experiencing undirected price movements (sideways) like KLBF and MIKA. These characteristic differences are closely tied to the design of each indicator. RSI, as a leading indicator, typically provides earlier signals of potential price reversals, making it effective in dynamic markets. Parabolic SAR, as a lagging indicator, waits for

trend confirmation before issuing a signal, making it susceptible to lagging and generating false signals when the market fluctuates without a clear trend direction.

The ability to minimize risk is a crucial component in attracting and retaining investor participation. Investors who face repeated losses due to false signals tend to lose confidence in market efficiency, which can disrupt capital mobilization for the real sector in the long term. Therefore, selecting reliable and responsive indicators, such as RSI, can enhance the stability and effectiveness of the capital market in supporting economic development (Kurniawan et al., 2025). Although RSI excels in terms of accuracy, it is important to note that not all market conditions are suitable for this indicator. In highly volatile or undirected market situations, RSI can also yield ambiguous signals. Thus, employing a combination of RSI and Parabolic SAR indicators is a relevant strategy to improve the reliability of the analysis, where RSI serves as an early signal and SAR acts as a trend confirmation tool. This strategy can mitigate the risk of false signals and bolster investor confidence in the technical system utilized (Luthfiya & Darsono, 2025).

4.4 Combination Strategy for Invesment on Macroeconomic Context

An increasingly complex investment environment shaped by global macroeconomic dynamics, reliance on a single technical indicator is no longer sufficient. Investors need a strategy that is technically robust and adaptive to shifts in macro variables such as inflation, interest rates, exchange rates, and uncertainties in fiscal and monetary policies. Combining the Relative Strength Index (RSI) with the Parabolic Stop and Reverse (Parabolic SAR) yields a more comprehensive technical approach by merging early signals with trend confirmation, creating a decision-making framework that is more consistent and resilient to market volatility (Koegelenberg & Vuuren, 2024). Combination strategy for structural practice as follows: a). Early detection with RSI: When the RSI value breaks into the overbought zone (>70) or oversold zone (<30), investors receive an early warning of a potential price reversal; b). Trend direction confirmation with Parabolic SAR: After the RSI gives its signal, investors wait for the Parabolic SAR point to shift relative to the price as validation of the trend; and c). execution only if both signals align, thereby increasing the probability of transaction success and decreasing the risk of false signals.

The causal relationship between the use of data-driven technical strategies and macroeconomic impact can be explained through financial market mechanisms. Structured technical strategies reduce investors' reliance on speculative and emotional decisions, thereby enhancing the rationality of market behavior. When domestic investors have more reliable tools to time their market entry and exit, their participation tends to increase (Shalini et al., 2019). This increased participation by domestic investors gradually reduces the dominance of foreign capital in trading activities, ultimately lowering capital flow volatility and easing pressure on the exchange rate. This is highly relevant in developing countries' macro economies that are driving growth through the investment sector but are still vulnerable to capital outflows, rupiah fluctuations, and changes in external conditions such as global interest rates. Accurate technical strategies, such as the combination of RSI and Parabolic SAR, not only benefit individual investors but also have significant systemic effects on the national economy.

a) Increase The Domestic Investor Confidence

Reliable technical strategies encourage retail investor participation, strengthen market structure, and reduce reliance on foreign capital. This is vital for the stability of the balance of payments and the growth of a national investor base. For example, when domestic investors increase their share of total daily transaction value from 60% to 70%, the potential for exchange rate depreciation caused by foreign capital outflows can be offset, helping to maintain the rupiah's exchange rate stability.

b) Market efficiency

Adaptive and efficient capital markets reflect true economic expectations. Data-driven investment strategies promote integration between the financial and production sectors, enhancing capital mobilization for infrastructure projects, MSMEs, and strategic industries. According to a World Bank simulation (2022), a 1% rise in market capitalization relative to GDP can boost economic growth by 0.3–0.4% in developing countries.

c) Mitigate the Global External Shocks

When investors have tools to filter out disturbances from global volatility, investment flows become more stable. This supports exchange rate stability, reduces expectation-driven

inflationary pressures, and allows for more accommodative monetary policy. For instance, with increased investor confidence in data-driven technical strategies, the risk of panic selling can be reduced by 20–30%, based on estimates from OJK (Financial Services Authority) in 2021.

While a technical approach can enhance micro-efficiency in financial markets, its effectiveness still hinges on macroeconomic structural foundations. Developing countries frequently encounter chronic fiscal deficits, weak institutional quality, and reliance on commodity exports. These factors can undermine the positive transmission of technical strategies into overall economic stability. For instance, if the fiscal deficit remains elevated (>3% of GDP) without accompanying institutional reform, pressure on exchange rates and borrowing costs persists, regardless of capital market efficiency (Ayunda & Purnamasari, 2025). Consequently, sophisticated technical investment strategies can only achieve optimal impact if bolstered by macro stability, fiscal/monetary policy transparency, and improved governance. The integration of indicators such as RSI and Parabolic SAR becomes a crucial element in fostering a healthy and resilient investment ecosystem amid global external pressures, provided it is supported by structural improvements in macroeconomic policy.

5. Conclusion

The study shows RSI is more effective when used in volatile market conditions that tend to experience trend reversals. As a leading indicator, RSI can provide accurate early signals, enabling investors to take positions more quickly. Conversely, the Parabolic SAR is more suitable for use in markets with strong and consistent trends, whether upward or downward, because its lagging nature allows for trend direction confirmation but carries a higher risk of false signals. Overall, RSI delivers a higher accuracy rate (94%) compared to Parabolic SAR (39%) and generates a greater total return over the observation period. However, Parabolic SAR still holds added value as a confirmation tool that can boost confidence in investment decision-making. This study has several important limitations. First, the sample coverage is limited to only 17 IDXGrowth30 stocks, which do not fully represent all sectors of the Indonesian capital market. Second, the study has not integrated macroeconomic factors such as inflation, interest rates, or exchange rates, which significantly influence stock price movements and investment strategies.

these findings provide guidance for investors to adjust technical indicators according to market characteristics. Short-term investors active in fluctuating markets can rely primarily on RSI, while investors with a medium-term position orientation can use the Parabolic SAR for trend validation. A combined strategy of both indicators can be applied to enhance discipline, reduce the risk of false signals, and strengthen data-driven decision-making. For further research, it is recommended to expand the sample scope to include various sectoral indices and different market capitalizations. Furthermore, it would be more comprehensive if these technical indicators were combined with fundamental analysis and macroeconomic indicators to obtain a more complete picture. New approaches such as machine learning or artificial intelligence-based prediction models can also be explored to build automated trading systems that are more adaptive to dynamic market conditions.

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