INVESTIGATING THE EFFICACY OF RSI DIVERGENCE IN THE NIFTY 50 INDEX

by

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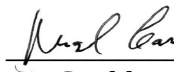

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Dedication

This thesis is dedicated to Dr. Sagar Bansal, whose pioneering work on Relative Strength Index laid the foundation for my research. Despite losing his eyesight in 2021 due to a genetic disorder, Dr. Bansal's determination to contribute to the field never wavered. His resilience, both as a practitioner and as an educator at the Swiss School of Business and Management, Geneva, continues to inspire me. It is with great honor that I extend the work he began, and I owe much of my progress to his guidance and unwavering spirit.

Thank you, Dr. Bansal, for showing me the power of perseverance and dedication.

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Special thanks are also due to my parents, Dr. Suresh Khatavkar and Aruna Khatavkar, for their constant love and encouragement. Their unwavering support has been a cornerstone of my success, and I am forever grateful for their presence in my life

ABSTRACT

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SEPTEMBER, 2024

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This dissertation empirically evaluates the performance of Relative Strength Index Divergence (RSID) as a predictive tool in the NIFTY50 index, focusing on its practical applications in financial market trading. The research tests the hypothesis that RSI divergences reliably predict trend reversals. It was found that divergences forming within 14-21 days, and beyond, exhibited the highest success rates, with bullish divergences outperforming bearish ones in terms of reliability and immediate success.

The study employed a manual observation methodology, analyzing data across three eight-year periods (2000–2024). The empirical results revealed that most divergences formed within an 8-14 day range, with longer divergences showing higher predictive reliability. Bullish divergences, particularly those exceeding 21 days, demonstrated near-perfect success rates, while bearish divergences often experienced delayed success or occasional failures, especially during market downtrends.

The validation phase involved executing real-world trades based on RSI divergences in Reliance Industries Ltd., yielding a 15.34% quarterly return on investment. These practical results corroborated the theoretical findings, reinforcing the value of RSI divergence as a tool for traders.

Despite the robustness of the methodology, limitations include the reliance on manual observation and potential biases, as well as the study's focus on the NIFTY50 index. Future research should explore the use of automated algorithms and extend the analysis to other markets and technical indicators.

In conclusion, this study provides valuable insights into RSI divergences, contributing to the broader understanding of their predictive capabilities and offering a strong foundation for future research in technical analysis.

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CHAPTER 1:

INTRODUCTION

This chapter provides a comprehensive introduction to the study of the Relative Strength Index (RSI) and its application in technical analysis for stock market trading. The concept of RSI divergence, a pivotal aspect of this study, is then be introduced, outlining how divergences between the RSI and stock prices can signal impending trend reversals. Finally, the chapter addresses the research problem, objectives, and significance of investigating RSI divergence, setting the stage for the detailed empirical analysis presented in subsequent chapters.

1.1 Overview

Technical analysis serves as a fundamental approach in the realm of stock market trading, with roots extending to the late 19th century. Charles Dow and his Dow Theory laid the foundation, focusing on market trends and price movements. Over the years, technical analysts have developed a variety of tools and indicators to predict market directions and identify trading opportunities. Among these indicators is the Relative Strength Index (RSI), introduced by J. Welles Wilder Jr. in his seminal 1978 work "New Concepts in Technical Trading Systems."

The RSI measures the speed and change of price movements, oscillating between 0 and 100. It was conceptualized to gauge the internal strength of a stock relative to recent price trends based on closing prices over a specified period (usually 14 days). The RSI quickly became a staple in technical analysis due to its straightforward interpretation and robust applicability across different financial markets.

1.1.1 Understanding RSI Calculation

RSI remains one of the most widely-utilized indicators due to its ability to signal overbought and oversold conditions. The formula for RSI involves calculating the average gains and losses over a designated number of periods. Here's a step-by-step breakdown:

Calculating the RSI involves two stages. The first stage entails calculating the Initial RSI by determining the average gain and average loss over a chosen number of periods and then using these values to compute the relative strength (RS) and the RSI. The formula for the first stage is as follows:

- Average Gain = Sum of gains / number of periods.
- Average Loss = Sum of losses / number of periods.
- Relative Strength = Average Gain / Average Loss.
- RSI = 100 - (100 / (1 + RS)).

It enhances chart interpretation and provides additional insights when analyzed alongside a price chart. Interestingly, the term "relative strength" is commonly utilized to underscore the robustness of a security relative to the market on which it is traded or in comparison to another security however in RSI, the relative strength is a comparison of the stock's own price over a period.

In order to circumvent ambiguity between the Relative Strength Index (RSI) and the concept of relative strength delineated earlier, many authors opt to solely employ the abbreviation RSI for the Relative Strength Index. The RSI is ascertained by computation of the increase (U: ups) or decrease (D: downs) of the closing price for each period utilizing designated formulas.

The second stage of the calculation process which is used for calculating all subsequent RSI values, involves using a smoothening factor.

- Average gain = [(previous average gain) x 13 + current gain] / 14
- Average loss = [(previous average loss) x 13 + current loss] / 14
- RS = Average gain / Average loss
- RSI = 100 - (100 / (1 + RS))

B	D	E	F	G	H	I	J
Date	Close	UP	DOWN	UP AVG	DOWN AVG	RS	RSI
11/1/1999	1270.00						
11/2/1999	1332.20	62.20	0				
11/3/1999	1326.40	0	5.8				
11/4/1999	1336.80	10.40	0				
11/5/1999	1364.50	27.70	0				
11/7/1999	1369.60	5.10	0				
11/9/1999	1371.20	1.60	0				
11/10/1999	1389.10	17.90	0				
11/11/1999	1389.60	0.50	0				
11/12/1999	1373.50	0	16.1				
11/15/1999	1362.70	0	10.8				
11/16/1999	1357.70	0	5				
11/17/1999	1352.20	0	5.5				
11/18/1999	1364.20	12.00	0				
11/19/1999	1361.80	0	2.4				
11/22/1999	1375.20	13.40	0	9.81	3.26	3.01	75.08196721
11/24/1999	1394.90	19.70	0	10.52	3.02	3.48	77.67063432
11/25/1999	1408.60	13.70	0	10.75	2.81	3.83	79.28253436
11/26/1999	1399.60	0	9	9.98	3.25	3.07	75.43028752
11/29/1999	1384.60	0	15	9.27	4.09	2.27	69.37963738
11/30/1999	1376.10	0	8.5	8.61	4.40	1.95	66.14187388
12/1/1999	1388.70	12.60	0	8.89	4.09	2.17	68.48937807
12/2/1999	1408.80	20.10	0	9.69	3.80	2.55	71.84317894

Figure 1.1a: Dual Stage RSI Calculation Source: Bansal (2023)

1.1.2 Introduction to RSI Divergence

Beyond its conventional use, RSI divergence has intrigued traders and analysts. RSI divergence occurs when the RSI moves in a direction contrary to the stock price. There are two primary types of RSI divergences:

- Bullish Divergence: When the price forms lower lows but the RSI forms higher lows, indicating increasing momentum.

- Bearish Divergence: When the price forms higher highs but the RSI forms lower highs, suggesting decreasing momentum.

Figure 1.1b: RSI Divergence On NIFTY 50 Price Chart Source: Bansal (2023)

Divergences are considered significant as they often precede price reversals. For example, a bullish divergence signals that despite the price making new lows, the underlying strength (as indicated by RSI) is improving, hinting at a potential upward reversal. Similarly, a bearish divergence suggests that even though the price is making new highs, the upward momentum is waning, which could herald an impending downward reversal.

1.1.3 Importance of Investigating RSI Divergence

Despite its potential, the effectiveness and reliability of RSI divergence in predicting trend reversals have not been exhaustively studied. RSI divergence's timely identification and application could offer substantial benefits to traders, providing early warning signals before the actual price reversal. However, its applicability might vary across different market conditions, timeframes, and financial instruments. Thus,

investigating the conditions under which RSI divergences are most reliable is paramount for traders seeking to refine their strategies and improve market timing.

1.2 Research Problem and Significance

While the Relative Strength Index (RSI) has been a focal point in numerous studies exploring technical indicators, its specific role in predicting trend reversals through divergences is less comprehensively understood. Most existing literature highlights the RSI's utility in identifying overbought and oversold conditions, but only one delves into its predictive capabilities regarding divergences. This points to a critical gap in understanding how reliably RSI divergences can signal impending trend reversals.

The significance of this study is rooted in its potential to enhance the predictive power and practical utility of RSI divergence as a trend reversal indicator. Successful identification and utilization of RSI divergences can offer substantial benefits, such as:

- Enabling traders to enter or exit trades at optimal points.
- Allowing for more informed risk assessment and management.
- Helping traders develop and refine their trading strategies based on empirical evidence.

By focusing on the reliability and application of RSI divergence, this study aims to contribute both to the academic discourse on technical analysis and to practical trading methodologies in financial markets.

1.3 Research Objectives and Questions

The primary objective of this research is to evaluate the reliability of RSI divergence as a stock trend reversal indicator and to identify the conditions under which it is most effective.

1.3.1 Research Objectives

The study has the following research objectives:

1. Determine typical timeframes within which RSI divergences form and verify their performance.
2. Categorize different types of RSI divergences and assess their predictive accuracy and robustness.
3. Test and validate the identified reliable divergences in real-world trading scenarios using actual funds.
4. Incorporate comprehensive transactional cost analysis, including broker fees, indirect taxes, and duties, to evaluate net profitability.

1.3.2 Research Questions

The study revolves around the following main question:

- Can RSI divergence be used as a reliable indicator for stock trend reversals?

Apart from this, there are three sub-questions:

1. How long does it take for RSI divergences to form and signal a reversal?
2. Which types of RSI divergences are most reliable in predicting trend reversals?

3. Does incorporating RSI divergence in trading strategies, while accounting for all transactional costs, lead to profitable outcomes in real markets?

1.4 Research Hypotheses

The hypotheses in this research will guide the empirical analysis and validation processes. They are framed to comprehensively address the research questions and objectives.

Hypothesis 1: Reliability of RSI Divergence

- H1.1: RSI divergence reliably predicts stock trend reversals within specific timeframes.

Hypothesis 2: Duration for Divergence Formation

- H1.2: RSI divergences typically form and signal a trend reversal within a defined short-to-medium term period.

Hypothesis 3: Types of Divergences

- H1.3: Certain types of RSI divergences, such as bullish and bearish divergences, demonstrate higher predictive reliability compared to others.

Hypothesis 4: Profitability After Transactional Costs

- H1.4: Trading strategies based on reliable RSI divergences remain profitable after accounting for all transactional costs, including broker fees, taxes, and duties.

1.5 Scope, Limitations & Contributions of the Study

This scope of this study encompasses:

- Analysis of major stock index -NIFTY 50 to ensure diverse and comprehensive market representation.
- Examination of various sub-periods to observe differing market conditions and their impact on RSI divergence reliability and to avoid the problem of data-snooping.
- Focus on different types of RSI divergences, including bullish and bearish divergences, and various formation patterns.

The research limitations are defined in later chapters in more detailed. However, to summarize, they are as follows:

- The study uses data from NIFTY-50 index and the results may not be generalizable on individual stocks or index from other markets.
- The study uses manual observations as it's primary data collection procedure and may introduce biases that need careful consideration.

The study has the following theoretical contributions

- Enhancing understanding of RSI divergence and its application in trend reversal predictions.
- Expanding the body of knowledge in technical analysis by providing empirical evidence on the reliability of RSI divergences.

Apart from the academic contributions, the study contributes to the business world especially the financial sector by offering actionable insights on the profitability and risk associated with RSI divergence-based trading after accounting for real-world costs.

1.6 Chapter Summary

This chapter has provided a comprehensive introduction to the study, detailing the background, research problem, objectives, hypotheses, scope, and limitations. The subsequent chapters will build upon this foundation, starting with a detailed literature review to contextualize the research within the broader academic and practical landscape of technical analysis and RSI divergence.

CHAPTER 2:

LITERATURE REVIEW

This chapter initially delves into the major works preceding the development of RSI, setting the stage for understanding its inception and original methodological principles. The subsequent sections then examine how RSI was initially conceptualized and applied by Wilder, followed by an analysis of key empirical studies investigating its performance across different markets and time periods.

The review culminates in identifying prevailing themes and gaps in the literature, paving the way for further exploration of uncharted dimensions of RSI application. Finally, an examination of contemporary research that narrows these gaps will be addressed, offering nuanced insights into RSI's efficacy and optimization in modern trading environments. This holistic approach aims to provide a robust foundation for the dissertation, not only appreciating historical contributions but also challenging and advancing RSI methodology for future research endeavors.

2.1 Major Works Before The Development Of RSI

17th Century: Joseph de la Vega, a diamond merchant and financial expert, is recognized for his book Confusion of Confusions describing operations in Amsterdam's stock exchange (De La Vega, 2021). The book, written as dialogues, explores decision-making under uncertainty and ethical implications of speculation (Cardoso, 2002). De la Vega is considered a precursor of behavioral finance, documenting investor biases like herding and overconfidence (Corzo et al., 2014). His work draws parallels between financial speculation and religious movements, particularly Sabbateanism (Held, 2006). De la Vega's literary identity reflects his Sephardic background, combining Jewish connotations with Hispanic cultural influences in his Spanish-language dialogue (Gómez,

2019). His work is considered a foundational text for modern technical analysis as it offers descriptions of financial instruments like puts, calls, and speculation in the Dutch stock market at the time. His work laid the groundwork for understanding market behavior, emphasizing techniques to predict stock price movements

18th Century: Homma Munehisa, a Japanese rice trader, developed candlestick charting techniques in the mid-18th century, which are still widely used today (Hübler, 2011; Santur, 2022). Candlestick charts provided a visual representation of price movements using open, high, low, and close data (Honma, 1755; Raut, 2020). Homma's work emphasized the psychological aspect of trading, linking market trends and reversals to human emotions. His techniques were initially applied to the rice futures market in Japan (Nison, 2001). Despite their simplicity, candlestick charts remain effective for problem-solving and data visualization (Blaise & Dudek, 2014). Researchers have explored various applications of candlestick charts, including pattern recognition using fuzzy time series (Lee et al., 2006), image processing techniques for stock prediction (Tsai & Quan, 2014), and ensemble learning for trading systems (Santur, 2022). The effectiveness of candlestick charts in technical analysis has been demonstrated through their integration with computer analysis and artificial intelligence (Wagner & Matheny, 1993). While some studies focus on the historical and theoretical aspects of candlestick charting (Tudela, 2008), others emphasize its practical applications in stock market analysis and investment decision-making (Hendarsih, 2016).

1896: Charles Dow, co-founder of Dow Jones & Company and The Wall Street Journal, developed the Dow Theory, which became a cornerstone of modern technical analysis (Hayes, 2024). The Dow Theory posits that market trends can be identified by analyzing the behavior of stock market averages. Dow's analysis of market peaks and troughs laid the foundation for understanding market cycles. His work continues to

influence technical analysis today (Hamilton, 1922; Ray, 2012). While some studies have found mixed results regarding its effectiveness (Kim, 2019), others have demonstrated its potential for yielding positive risk-adjusted returns (Brown et al., 1998). The theory has been applied to various markets, including the Indian stock market (Yadav, 2017). Key components of the Dow Theory include the identification of primary trends, secondary reactions, and the importance of volume confirmation (Ray, 2012; Edwards et al., 2018). Modern adaptations have incorporated additional technical indicators to improve investment results (Schannep, 2008). Despite its limitations, the Dow Theory continues to influence technical analysis, particularly in understanding market emotions and trend analysis (Ray, 2012; Edwards et al., 2018).

1920s: Goichi Hosoda, a Japanese journalist, developed the Ichimoku Kinko Hyo, a comprehensive charting technique that offers a clear view of potential price action (Chen, 2022). Ichimoku provides more data points than standard candlestick charts and uses midpoints of highs and lows for plotting. This technique allows traders to assess price action, momentum, and support/resistance levels at a glance. It consists of five components: Tenkan Sen, Kijun Sen, Chikou Span, Senkou Span A, and Senkou Span B (Cahyadi, 2012; Patel, 2010). Studies have shown its effectiveness in stock markets and foreign exchange trading, with some research indicating improved performance during the COVID-19 pandemic (Che-Ngoc et al., 2022). While certain Ichimoku-based strategies have demonstrated profitability in stock index trading, results for currency trading have been mixed (Deng et al., 2020; Deng & Sakurai, 2014). The indicator's accuracy has been reported as high as 86.67% in some cases (Noviaty et al., 2024). Combining Ichimoku Kinko Hyo with other technical indicators, such as MACD, can enhance its effectiveness in generating buy and sell signals (Pramodya et al., 2023).

However, successful implementation requires careful backtesting, optimization, and consideration of trader psychology (Patel, 2010; Utomo, 2020).

1929: William Peter Hamilton, who succeeded Charles Dow as editor of The Wall Street Journal, refined and expanded the Dow Theory (Schannep, 2008). Hamilton's editorial work, particularly his 1929 piece "A Turn in the Tide," predicted the onset of a bear market before the Great Depression. He likened market trends to ocean waves, providing a vivid metaphor for understanding long-term trends, shorter waves, and daily fluctuations. Cowles (1933) argued against the idea that Hamilton and other market forecasters had the ability to consistently achieve better results than the average market performance or random portfolios. According to Cowles, these forecasters were unable to demonstrate a reliable advantage over simply following the broader market trends or the outcomes of portfolios selected by chance. This assertion challenged the credibility of market forecasting as a strategy that could consistently yield superior returns. Brown et al. (1998) re-evaluated Alfred Cowles' critique of Hamilton's application of the Dow Theory, finding that Hamilton's strategies yielded positive risk-adjusted returns, contrary to Cowles' conclusions. Dimand and Veloce (2010) further supported this by highlighting flaws in Cowles' methodology, emphasizing that Hamilton's success could not be attributed to chance. The enduring relevance of the Dow Theory is underscored by its principles, which reflect market psychology and the interplay of various economic factors (Ray, 2012). Schannep (2008) updated the theory for modern investors, integrating new technical indicators while maintaining its core tenets.

1930: Ralph Nelson Elliott developed the Elliott Wave Theory, which analyzes market movements in repetitive wave patterns (Dharmaraj & Balaji, 2011). Inspired by the Dow Theory, Elliott identified fractal patterns in market price movements and proposed that these patterns reflected investor psychology (Chen, 2023). His Wave

Principle published in 1938, laid the foundation for predicting market trends based on these wave patterns (Elliott Wave Forecast, n.d.; Frost and Prechter, 1995). Several studies have empirically tested the theory's effectiveness in various stock markets, including India (Chendroyaperumal & Karthikeyan, 2011; Dash & Patil, 2009). The theory has been combined with neuro-fuzzy systems for stock market prediction (G. Atsalakis et al., 2011) and with Fibonacci analysis for trading strategies (Zahra, 2023). Research has shown its potential in forecasting currency markets (D'Angelo & Grimaldi, 2017) and identifying typical wave cycle structures using case-based reasoning (Wang et al., 2013). While the theory's application involves some subjectivity, these studies suggest it can be a valuable tool for market analysis and prediction.

1932: Robert Rhea refined and expanded Charles Dow and William Hamilton's work on the Dow Theory. Published "The Dow Theory," highlighting its use for predicting market tops and bottoms. His accurate calls, including the market bottom in 1932 and top in 1937, gained significant attention and credibility (Kirkpatrick II and Julie, 2019).

1935: William D. Gann developed Gann Angles and Master Charts, focusing on geometry and time in price movements (Mitchell, 2022). techniques involve concepts such as the Golden Ratio, number spirals, and 360-degree angles (Gann, 1949; Bruno, 2019). Gann's methods combine pattern, price, and time analysis, including trend indicators, swing charts, and support/resistance levels (Hyerczyk, 2012). While some view Gann's approach as mystical, it has been applied to various markets, including cryptocurrencies (Bruno, 2019). Gann's work is part of a broader field of technical analysis, which uses charts and mathematical methods to forecast asset prices (Chan et al., 2014). Other related techniques include Fibonacci ratios (Maclean, 2005) and more modern approaches like LSTM models (Bhor et al., 2021). The development of technical

analysis was influenced by the availability of price data technologies, with chartism emerging in New York partly due to the introduction of ticker tape (Preda, 2007).

1948: Edwards and Magee published a comprehensive work on trend analysis, volume analysis, and chart patterns. Introduced concepts like head and shoulders, support and resistance, and trend lines, laying the foundation for modern technical analysis (Edwards and Magee, 2007; Edwards, Magee, and Bassetti, 2018). Chart patterns, including reversals, consolidations, and trends, are extensively studied and classified (Edwards et al., 2018; Bulkowski, 2000). These patterns, along with indicators like Moving Average Convergence-Divergence (MACD) and Bollinger Bands, help in timing market entries and exits (Jiler, 2004; Meyers, 1994). The effectiveness of technical analysis has been debated, with some researchers formalizing chart pattern specifications for algorithmic classification (Wan & Si, 2017). Despite criticisms, many experts argue that markets move in discernible trends, making technical analysis valuable for forecasting. Modern approaches integrate computer technology and the internet, enhancing the application of technical analysis (Edwards et al., 2018).

1949: Richard Donchian developed the Donchian Channels, an indicator that uses moving averages to identify volatility and trend breakouts (Teo, 2022). Research has shown that these channels can be profitable when combined with proper risk management techniques (Rayome & Jain, 2008). The system has been applied to futures contracts, demonstrating significant capital growth over extended periods (Rayome & Jain, 2008). Channel pattern trading, including Donchian Channels, has been found to exhibit statistically significant links between channel attributes and profitability (Dempster & Jones, 2002). These channels are often used in conjunction with other technical analysis tools, such as moving averages and oscillators, to identify trends and potential trading opportunities (Elder, 1993; Kaufman, 2005). While no trading system is foolproof,

Donchian Channels remain a popular tool among traders for their ability to capture market trends and provide clear entry and exit signals (Gunn, 2009; Appel, 2005).

1950: George Lane developed the Stochastic Oscillator, a momentum indicator comparing closing prices to a range of prices over time. Popularized the use of %K and %D indicators to identify overbought or oversold conditions and momentum shifts (FMR LLC, n.d; Achelis, 1994). The indicator's values range from 0% to 100%, with readings above 80% considered overbought and below 20% oversold (Aby & Fusilier, 1997). To minimize false signals, the Stochastic Oscillator is often combined with moving averages, such as the Weighted Moving Average (Saputra et al., 2019). The indicator's simplicity and effectiveness have made it a favorite tool for both novice and experienced traders (Toshboyeva & Sodiqova, 2021). It is frequently used in conjunction with other technical analysis tools, such as Bollinger Bands, to enhance trading strategies (Pring, 1993).

1960: P.N. Haurlan introduced EMAs, borrowing the concept from rocket science for easier computation in early computers. EMA became a key tool in tracking price trends with greater emphasis on recent data (Hansun, 2014; Jahn, 2022). EMA is considered an improvement over Simple Moving Average (SMA) and Weighted Moving Average (WMA) methods (Hansun, 2013; Widodo & Hansun, 2016). Studies have shown that EMA can be effective in predicting market trends and generating profitable trading signals, particularly during financial crises (Khand et al., 2019). Researchers have also developed variations of EMA, such as the Exponential Hull Moving Average, which demonstrates superior smoothness and lag characteristics (Raudys et al., 2013). Additionally, EMA has been applied in other fields, such as computational intelligence algorithms for optimization problems (Haynes et al., 2012).

1960: Gerald Appel created MACD (Appel, 2005; Reed, 2020) which became a popular technical analysis tool used to predict stock market trends (Appel, 2003; Wang &

Kim, 2018). MACD combines trend-following characteristics of moving averages with oscillator properties, making it effective in both trending and choppy markets (Au & Keung, 2023). The indicator consists of two lines: the MACD line, which is the difference between two exponential moving averages, and a signal line (Larson, 2012). Traders use MACD to identify overbought/oversold conditions, momentum, and divergences (Thorp, 2000). While MACD has been widely adopted, it has limitations such as time lag and false signals (Au & Keung, 2023). Various studies have explored MACD's predictive ability and compared different MACD-based trading strategies across markets (Hung, 2016; Wang & Kim, 2018).

1967: Richard Arms Jr. developed the TRIN Index (also known as the Arms Index) as a market breadth indicator to interpret overbought and oversold market conditions (Arms, 1994; Aigner & Schrabmair, 2019). The index gained widespread use in financial media and became a core technical indicator (Mitchell, 2024). However, subsequent research identified flaws in the original calculation, leading to proposals for improved versions that address distortions caused by stock prices (Aigner & Schrabmair, 2019). The TRIN Index is often used alongside other technical analysis tools, such as moving averages and relative strength indicators, to assess market trends and make investment decisions (Appel, 2005).

1970: J.M. Hurst introduced the Hurst exponent which became a key measure in fractal market analysis (Hurst, 1970), challenging the efficient market hypothesis (Peters, 1994). It quantifies long-term memory and persistence in time series, with $H>0.5$ indicating trend-reinforcing behavior (Qian & Rasheed, 2005). Studies have found Hurst exponents ranging from 0.56 to 0.74 for various financial markets, suggesting non-random behavior (Hołyst & Żebrowska, 2000). The Hurst exponent has been applied to analyze stock markets worldwide, including the Czech PX50 index (Quang, 2005) and

the Dow Jones Industrial Average (Álvarez-Ramírez et al., 2020). Research has shown that time series with higher Hurst exponents are more predictable using neural networks (Qian & Rasheed, 2005). Additionally, cyclic behavior in financial markets has been observed through Hurst exponent analysis, with cycles ranging from 8 to 10.5 years for the Dow Jones index (Álvarez-Ramírez et al., 2020), aligning with Juglar investment cycles.

1978: J. Welles Wilder Jr. published his book “New Concepts In Technical Trading Systems” which became a cornerstone in the field of modern technical analysis. His work is particularly notable for introducing several key indicators, each of which has transformed the way traders approach the market. Some of the most prominent concepts developed by Wilder are Average True Range (ATR), Directional Movement Index (DMI) and Average Directional Index (ADX), Parabolic Stop And Reverse (P-SAR) and finally the RSI - Relative Strength Index (Wilder, 1978).

The historical development of technical analysis underscores a journey of continual refinement and evolution. From the foundational theories of Charles Dow to the sophisticated indicators of J. Welles Wilder Jr., technical analysis has grown to become an integral part of financial market analysis. This historical context provides a solid foundation for understanding the significance and application of RSI in technical analysis, which will be elaborated upon in subsequent sections.

2.2 RSI As Originally Explained By Wilder (1978)

J. Welles Wilder Jr., in his book "New Concepts in Technical Trading Systems," explained various methods of calculating and using the RSI. This section explains those in detail as it is relevant for understanding the major gap in the literature.

2.2.1 Two Stages Of RSI Calculation

The original calculation of RSI was done using a pen and paper. Wilder explicitly mentions the optional requirement of using a chart as it was not easily available at that time to everyday traders.

The formulae given was RSI = 100 – [100 / (1-RS)] where RS represents Average of 14 day's closes UP / Average of 14 day's closes DOWN.

It is important to note that Wilder explicitly embeds 14 days in the RS calculation and gives the equation as the sum of all the previous 14 days close which a. close passively and b. close negatively, divided by 14 in respective case.

Wilder's also explicitly mentions that this calculation is only done for the first RSI. For the second and all upcoming calculations, only previous average up close and previous average down close is needed as he introduces the EMA for smoothing purposes and redefines the average up close = Previous Average Up Close x 13 + Today's Average Up Close (If Any) / 14. The same is to be done for Average Down.

Wilder provides the following example and the proposes the 10 column worksheet for easy calculation of Daily RSI.

DAILY WORK SHEET COMMODITY _____

RELATIVE STRENGTH INDEX CONTRACT MONTH _____

(1) DATE	(2) CLOSE	(3) UP	(4) DOWN	(5) UP AVG	(6) DOWN AVG	(7) (5) − (6)	(8) 1 + (7)	(9) 100 ÷ (8)	(10) 100 − (9)
1	54.80								
2	56.80	2.00							
3	57.85	1.05							
4	59.85	2.00							
5	60.57	.72							
6	61.10	.53							
7	62.17	1.07							
8	60.60		1.57						
9	62.35	1.75							
10	62.15		.20						
11	62.35	.20							
12	61.45		.90						
13	62.80	1.35							
14	61.37		1.43						
15	62.50	1.13/11.80	/14.10	.84	.29	2.90	3.90	25.64	74.36
16	62.57	.07		.79	.27	2.93	3.93	26.45	74.55
17	60.80		1.77	.73	.38	1.92	2.92	34.25	65.75

Figure 2.2a: Worksheet For RSI Calculation By Wilder, Source: Wilder (1978)

2.2.2 Three Oscillators Problems That RSI Avoids

Wilder describes how and why RSI doesn't fall in the so-called oscillator issues that all others inherently display.

Unlike others, RSI is resistant to extreme value due to the use of Averages in it's formulae yet it maintain sufficient correlation with the price to avoid excessive lagging. This is possible because any increase in the price is reflected in the Average Up but also directly affects Average Downs and vice-versa.

RSI also avoids uncertainty about how high is high or how low is low especially during the all time high and low periods because it's value is range bound and always remains between 0 to 100.

Further Wilder mentions it avoids the problem of data collection and management as after the first RSI only current day price is needed for calculating the current day RSI.

However, considering's the technological advancements since then, this problem is insignificant.

2.2.3 Five Ways Of Using RSI

This sub-section is the most significant part of this literature review because it highlights not one but five ways in which RSI can be used. These are originally defined by Wilder himself.

1. **Tops & Bottoms:** Wilder explains that RSI will generally top out or bottom out at above 70 or below 30 levels and it happens usually before the market. He suggests that in such a situation we may observe a retracement or possible a reversal in the market.
2. **Chart Formations:** Wilder mentions that technical analysis trend patterns might be visible on RSI instead of price chart which can be used for entry and exit signals.
3. **Failure Swings:** Wilder suggests a failure swing on RSI above 70 or below 30 is a strong possibility for a price reaction.
4. **Support & Resistance:** Wilder mentions that similar to chart patterns, support and resistance are also easily to spot on the RSI instead of price chart
5. **Divergence:** Wilder explains that if a divergence between RSI and Price is seen, it may result in a price reaction.

Sadly, only the first method of using RSI i.e. Tops and Bottoms has been studied and evaluated by researchers in the existing body of knowledge and all other 4 have been ignored. In the next section, we will go through the key emphatical literature on RSI and see why the overall body of knowledge is steering in a wrong direction.

2.3 Key Studies On RSI

Wong, Manzur, and Chew (2003) investigates the efficacy of Relative Strength Index (RSI), in generating profitable trading signals within the Singapore stock market. The study focuses on various forms of RSI, including the RSI Centerline (50) Crossover and the classic buy and sell signals, examining their effectiveness in different market conditions over a period of 21 years. Key terms explored in the paper include "RSI 50 Crossover," "Buy and Sell Signals," "Classic Form," and "Singapore Stock Market," with a focus on the general utility of RSI in technical analysis.

With 300+ citations, this paper has made a substantial impact in the field of relative strength index, providing evidence that supports the use of RSI in stock trading. It serves as a reference point for subsequent research on the validity and practicality of technical indicators, particularly in Asian markets.

The study encapsulates the central question of the study: whether technical analysis, particularly the use of RSI, can yield significant positive returns in stock trading. The paper contains several notable insights: RSI is highlighted as the most frequently used counter-trend indicator. The study concludes that technical indicators, specifically RSI, can generate significantly positive returns, confirming their utility in timing stock market entries and exits. The results strongly suggest that RSI, even in its basic forms, can play a crucial role in stock trading strategies.

The study utilizes the daily closing prices of the Singapore Straits Times Industrial Index (STII) from January 1, 1974, to December 31, 1994, covering a 21-year period. This data is divided into three sub-periods of seven years each. The RSI is applied in various forms—'Touch,' 'Peak,' 'Retracement,' and '50 Crossover'—to generate buy and sell signals. Statistical tests were conducted to assess whether these signals produced

significantly positive returns. Additionally, a separate test was introduced to compare the returns generated by buy versus sell signals.

The study found that the RSI '50 Crossover' method produced consistently impressive results, with a majority of the statistics being significant at the 5% and 1% levels. While other methods, such as 'Touch,' 'Peak,' and 'Retracement,' yielded mixed results, the '50 Crossover' was robust enough to be considered effective, even across different market conditions.

A significant limitation of the study is the absence of the data, which could have helped distinguish between trending and range-bound markets. This meant that all tests were conducted across both trending and range-bound periods, potentially contributing to the mixed results observed with methods like 'Touch,' 'Peak,' and 'Retracement.' Consequently, the study focuses primarily on the '50 Crossover' method, as it proved to be effective despite this limitation.

Chong and Ng (2008) examine the effectiveness of the MACD and RSI rules on the London Stock Exchange. The paper has garnered 200+ citations, underscoring its impact in the field. The study delves into the application of RSI classical interpretation, where a reading above 70 suggests that a stock is overbought, and a reading below 30 indicates it is oversold. When the RSI crosses above 50, it signals a bullish trend, while a reading below 50 suggests a bearish trend.

The researchers utilized the Financial Times – Institute of Actuaries 30 (FT30) index, the longest-running UK stock index, covering the period from July 1935 to January 1994. To avoid data snooping, the sample was divided into three sub-periods: 1935–1954, 1955–1974, and 1975–1994, each with approximately 5,000 observations. Daily closing prices were analyzed, with a focus on the 14-day RSI—a popular choice among traders. The trading rule was straightforward: a buy signal was triggered when the

RSI crossed the center line (50) from below, and a sell signal was triggered when the RSI crossed the center line from above. Following the methodology of Brock et al. (1992), the study concentrated on 10-day returns, ignoring other signals within the subsequent 10 days after a buy/sell signal.

The study found that the RSI buy signal generated a 10-day return of 0.779% for the full sample, translating to an annual return of 22.44%. In contrast, a sell signal produced a return of -0.127%, or -3.36% annually. The buy return was significantly different from the unconditional mean returns at the 5% level, while the sell return was significant at the 10% level. On average, there were 4.9 buy signals and 5.2 sell signals per year, resulting in an annual return of 4.48% when combined. The study concluded that both the RSI and MACD rules outperformed the buy-and-hold strategy, marking them as effective tools for technical analysis.

However, the study's conclusions were not entirely consistent across the different sub-periods. The period from 1975 to 1994 generated the highest number of significant returns, with the buy return being significant at the 10% level and the buy-sell return at the 5% level. In contrast, during the sub-period from 1935 to 1954, only the buy-sell return was significant at the 10% level, while the other returns were insignificant. The sub-period from 1955 to 1974 saw all returns become insignificant, indicating that the use of RSI during this period was less profitable compared to the buy-and-hold strategy. The authors did not provide an explanation for why the performance of RSI against the buy-and-hold strategy varied across different sample periods, leaving this as a limitation in the study.

Chong, Ng, and Liew (2014) later extended the previous research by Chong and Ng (2008), which analyzed the effectiveness of the MACD and RSI rules on the London Stock Exchange over a 60-year period. This study, sought to determine whether these

indicators could generate excess returns across a broader range of markets, specifically the stock markets of five OECD countries. The study focused on the daily closing prices of indices from the Milan Comit General, S&P/TSX Composite, DAX 30, Dow Jones Industrials, and Nikkei 225, covering the period from January 1976 to December 2002.

The study examined several RSI trading rules, including the RSI(7, 50), RSI(14, 50), and RSI(21, 50) for centerline crossovers, as well as the RSI(14, 30/70) and RSI(21, 30/70) for overbought and oversold conditions. Following the methodology of Brock et al., the performance of MACD and RSI rules was evaluated based on ten-day returns, computed as the logarithmic difference between prices over a ten-day period. This approach also involved ignoring additional signals within the next ten days after a buy or sell signal was triggered, ensuring a focus on the primary trading signals.

The results revealed mixed outcomes across different indices and RSI rules. For instance, the RSI(7, 50) rule generated negative returns in the Milan Comit General, while the RSI(14, 50) rule exhibited some predictability and profitability across various indices. The RSI(21, 50) rule outperformed the buy-and-hold strategy in the Milan Comit General and S&P/TSX Composite indices. However, when applying the RSI(7, 30/70) rule, most series produced negative returns, particularly in the Milan Comit General, which experienced a significant loss of 1.163% from a pair of buy-and-sell transactions. Similarly, the RSI(14, 30/70) rule resulted in negative returns for three indices, including a significant loss of 1.03% in the Milan Comit General and -0.91% for the DAX30. The RSI(21, 30/70) rule also yielded a negative return for the Milan Comit General, indicating that these overbought and oversold strategies were less effective in certain markets.

A key consideration in this study was the inclusion of a 1% transaction cost, reflecting the minimum round-trip cost of executing trades. Despite this, the study found

that the MACD(12,26,0) rule remained profitable in the Italian and Canadian markets, with net profits of 1.021% for the Milan Comit General Index and 0.776% for the S&P/TSX Composite Index. Additionally, the RSI(21, 50) rule produced an average annual return of 5.069% net of transaction costs for the Milan Comit General Index.

However, the study highlighted an important limitation: while Chong and Ng (2008) demonstrated that MACD and RSI rules were robust to the choice of sample, this study found that their effectiveness was not consistent across different markets. Despite its findings, the study's geographical market limitation is notable, indicating the need for further research into the application of these rules across diverse market environments.

Ţăran-Moroşan (2011) reexamined the effectiveness of RSI with both its classic and adjusted forms. The study focused on the S&P 500 index, analyzing data from March 1, 2004, to April 30, 2010, along with the corresponding daily trading volume. The research aimed to test the accuracy of RSI signals at extreme points, comparing the traditional RSI interpretation with a modified approach that incorporates trading volume.

The study noted that for highly volatile markets, technical analysts often recommend adjusting the standard RSI signal levels from 30 and 70 units to 20 and 80 units. Additionally, the study highlighted the significance of divergences between the RSI chart and the price data on which the RSI is based, particularly after periods of overselling or overbuying. The traditional interpretation suggests that when the RSI exceeds 50 units from bottom to top, it indicates an emerging or continuing bullish trend, and when it crosses 50 units from top to bottom, it signals a bearish trend. This interpretation is rooted in the RSI's calculation formula, where values above 50 indicate that the average gain over a period is higher than the average loss, and vice versa.

The methodology involved using the classic RSI, which only considers price, and an adjusted form of RSI (RSIM), which also includes volume. For the RSIM, exceeding

37.5 units from bottom to top was interpreted as a signal of a price increase, while crossing 62.5 units from top to bottom indicated an impending price decrease. The study used the 14-day Exponential Moving Average (EMA) for both RSI forms and focused on extreme points, defined as 30 and 70 for the classic RSI and 37.5 and 62.5 for the adjusted version.

The results revealed that the adjusted RSI form (RSIM) generated higher gains than the classic RSI, particularly when a reverse interpretation was applied—where signals typically indicating a trend reversal were instead seen as continuing the trend. This reversal approach resulted in positive outcomes for both the classic and adjusted RSI forms, leading the study to conclude that the extreme values of RSI and RSIM do not indicate trend reversals but rather the continuation of the trend, at least in the short term. Consequently, the study found the traditional RSI interpretation to be ineffective, while the reversed interpretation provided better results, especially for the adjusted RSI form.

However, the study acknowledged a significant limitation: the analysis was based on a relatively short time frame. The author themselves mentioned that the data was insufficient and that future research should encompass a more in-depth and extended period to validate these findings comprehensively.

Nor and Wickremasinghe (2014) investigated the effectiveness of the Moving Average Convergence Divergence (MACD) and Relative Strength Index (RSI) indicators in the Australian market, specifically using data from the Australian All Ordinaries Index (XOA). A notable criticism highlighted in the study was the potential look-ahead bias in previous research, which examined these oscillators using data that predates their development in the late 1970s.

The methodology involved analyzing data from January 1, 1996, to June 30, 2014, covering a total of 4,685 daily observations. This 23-year period was further

divided into four non-overlapping subperiods of equal size to ensure robust analysis across different market conditions. Data was sourced from Yahoo Finance. The study adhered to Wilder's original recommendation of using a 14-day period for the RSI calculation. To create a realistic trading environment and avoid look-ahead bias, buy and sell trades for both MACD and RSI were executed at the next day's (T-1) index value following the trading signals generated at T-0. The study also examined 10-day holding period returns following a trading signal, consistent with methodologies used in prior studies. The results of the study were mixed emphasizing the importance of realistic trade execution during back-testing by avoiding look-ahead bias.

2.4 Key Themes & Gaps In RSI Literature

Literature discusses application of the Relative Strength Index (RSI) across various global markets, including Singapore, the UK, Italy, and the US. The efficacy of RSI is analyzed in different contexts, suggesting that while RSI can be profitable, its success varies significantly depending on the market.

Studies highlighted differences in RSI performance across different markets. For example, the '50 Crossover' method was particularly effective in the Singapore market, while other RSI rules showed mixed results in markets like the Milan Comit General and DAX 30.

The studies generally found that RSI-based strategies could produce statistically significant positive returns, particularly in certain markets and periods. However, the effectiveness of specific RSI rules, like the Centerline-Crossover versus the classic 70/30 strategy, varied depending on the time frame and market conditions.

A recurring theme is the utility of RSI in timing market entries and exits. The studies provide evidence that RSI can be a valuable tool for timing stock trades, particularly in its Centerline-Crossover.

Studies usually compare RSI strategies with the buy-and-hold approach. Findings indicate that RSI can outperform the buy-and-hold strategy under certain conditions, although not consistently across all markets or time periods.

The studies employ statistical methods, including dividing data into sub-periods and conducting tests for significance. The use of daily closing prices and the division of data into different sub-periods ensures the problem of data-snooping is resolved.

It has been observed that the existing literature suffers from the problem of look-ahead bias where a trade is entered into and exited from on the basis of the closing price however in reality once the market has closed, it is not possible to take a trade and it must be taken on the next day open price.

Most studies do not account for transaction costs, reflecting a realistic approach to evaluating the profitability of RSI-based trading strategies. This highlights the importance of considering real-world trading conditions in academic research. Only two studies in our review have considered transactional costs.

Only two form of RSI trading rules namely the classic RSI (70/30 levels) and Centerline-Crossover aka 50-Crossover. The studies consistently test these strategies to determine which are most effective in generating profitable trading signals and ignore the other methods originally proposed by Wilder.

2.5 Narrowing the Gap – Bansal (2023)

Bansal (2023) narrows the gap in existing literature and serves as a basis for this dissertation. His research covered 21 years (2000-2021) of daily price data from the

NIFTY 50, which is extensive and aligns with previous studies. The study employs Python for data pre-processing and analyses multiple RSI lengths (7, 14, 21), mirroring comprehensive statistical practices seen in prior research.

Unlike previous studies that predominantly focused on classic or centerline crossover RSI strategies, Bansal evaluated 33 RSI strategies grouped into different categories, including divergence detection. The study analyzed average returns, maximum potential, risk levels, and stability, providing a nuanced understanding of RSI's effectiveness across different scenarios.

The findings revealed several critical insights as the study meticulously analyzed various RSI strategies and compared their performance against a Buy and Hold strategy. Here is a summarized account of all findings:

The mean log return for the Buy and Hold strategy over the entire period was 0.0041. This strategy exhibited a standard deviation of 0.0480, indicating a relatively moderate level of risk.

When examining subsamples (2000-2007, 2007-2014, 2014-2021), the results indicated consistent performance, suggesting that the Buy and Hold strategy is a reliable benchmark for the NIFTY 50 over different market phases.

A total of 33 RSI strategies were evaluated, each providing varied results. The strategies were categorized into six groups for meaningful comparison, here are the key insights:

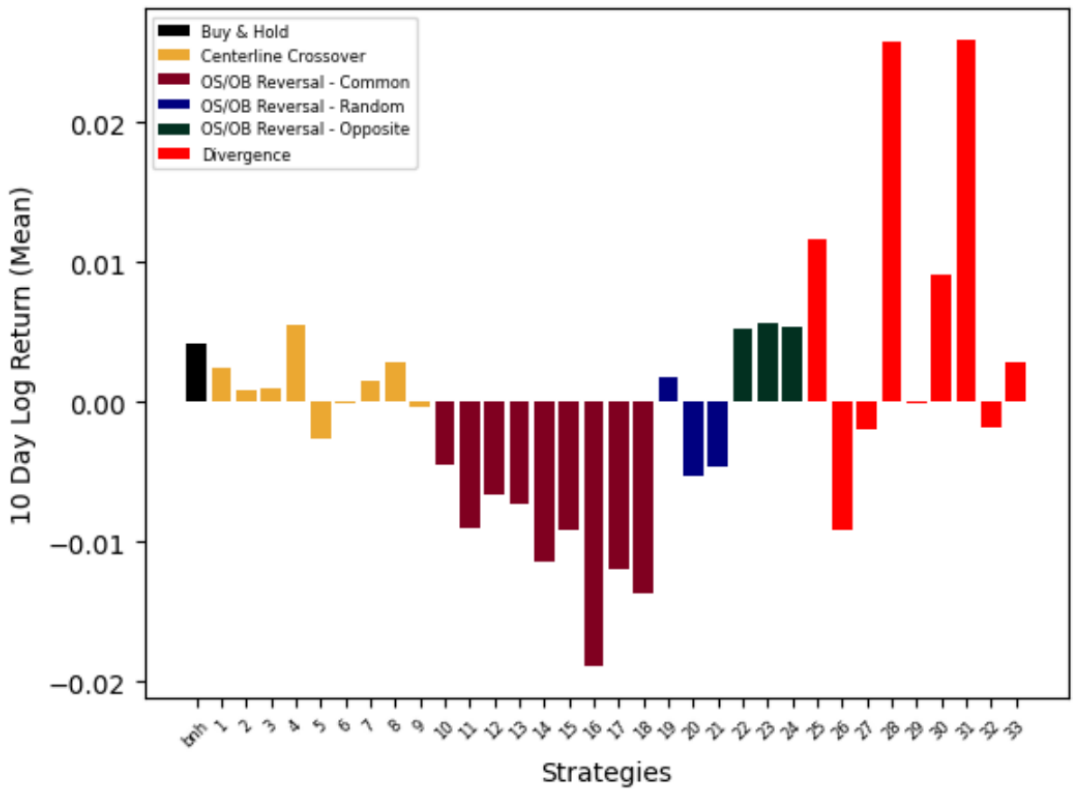

Figure 2.5a: Mean Log Return Of 33 RSI Strategies, Source: Bansal (2023)

RSI (7, 50): This strategy yielded mixed results, with the Buy and Hold strategy outperforming the Buy RSI (7, 50) in terms of mean returns.

RSI (14, 50): This demonstrated a positive mean return of 0.006, outperforming the Buy and Hold strategy and indicating its potential use for buy signals.

RSI (14, 30/70): This popular industry strategy resulted in negative returns (-0.002 for the combined strategy), highlighting its inefficacy in the context of the NIFTY 50 index.

RSI (7, 20/80): Similar poor performance with a mean return of -0.004 for buy signals, suggesting that commonly accepted OS/OB levels may not be optimal for this index.

RSI (14, 36/63): This non-traditional setup showed a mean return of 0.002 for buy signals, indicating potential robustness across unconventional settings.

RSI (14, 70/30): This strategy, which reverses the usual OS/OB levels, delivered negative returns for sell signals but showed better results for buy signals.

RSI (14, D): Strategies based on divergence exhibited positive performance for buy decisions. This emphasizes that divergence strategies can effectively mitigate timing risks and capture potential uptrends .

The standard deviation varied significantly across strategies, reflecting the associated risk levels. Strategies with higher volatility, such as RSI (21, 40/60), provided mixed results with positive skewness, suggesting potential outliers with significant positive returns.

Strategies like Buy RSI (14, 30/70) possessed high kurtosis values, indicating the distribution of returns with frequent extreme values. This measure is critical for understanding the behavior of returns and the likelihood of extreme events .

Certain RSI strategies outperformed the Buy and Hold strategy regarding the average return, maximum potential, lower risk, and stability. However, the findings advocate the use of divergence-based RSI strategies for buy decisions while cautioning against the blind adoption of popular OS/OB reversal levels (70/30 or 20/80), which often resulted in negative returns.

The study underscores the importance of using risk management techniques such as stop loss orders to mitigate potential risks associated with using RSI due to its variable degree of standard deviation, skewness, and kurtosis.

The research was constrained to the NIFTY 50 index from 2000-2021, necessitating caution in generalizing the findings to other assets or indices.

Recognizing the impact of market order execution delays, network issues, and other real-world factors on trading outcomes, Bansal suggested incorporating these variables in future studies.

Future research should also consider trading costs, as the analysis did not account for broker commissions, exchange fees, taxes, etc.

2.6 Chapter Summary

This chapter provided an extensive exploration of the origins, development, and application of technical analysis in the stock market, with a focus on the Relative Strength Index (RSI). This chapter was divided into four key sections, each contributing to a deep understanding of technical analysis and the RSI:

1. Major Works Before The Development Of RSI:

17th Century: Joseph de la Vega's foundational work, "Confusion of Confusions," set the stage for technical analysis by discussing market behavior and investor psychology.

18th Century: Homma Munehisa introduced candlestick charting, emphasizing the psychological aspects of trading.

Late 19th to Mid 20th Century: The contributions of Charles Dow (Dow Theory), Goichi Hosoda (Ichimoku Kinko Hyo), and Ralph Nelson Elliott (Elliott Wave Theory) advanced the field significantly, each offering unique methodologies for understanding market trends.

Mid 20th Century: Key figures like William D. Gann, Richard Donchian, and George Lane developed tools and theories (e.g., Gann Angles, Donchian Channels, Stochastic Oscillator) that further refined technical analysis, leading up to J. Welles Wilder Jr.’s introduction of the RSI in 1978.

2. RSI As Originally Explained By Wilder (1978):

Wilder's original method, emphasizing the importance of averages and smoothing with the Exponential Moving Average (EMA), provided a robust tool for technical traders.

The RSI avoids common issues associated with other oscillators, such as extreme values and excessive lagging, making it a reliable indicator.

Wilder identified multiple ways to utilize RSI, including identifying tops and bottoms, chart formations, failure swings, support and resistance levels, and divergence, though only the first has been extensively studied in literature.

3. Key Studies On RSI:

Studies by Wong et al. (2003) and Chong and Ng (2008) confirm the efficacy of RSI in various markets, particularly emphasizing the centerline crossover method.

RSI's performance and utility have been tested across different markets and conditions, with varying degrees of success. Research commonly neglects Wilder’s other suggested uses of RSI beyond the classical overbought/oversold levels and centerline crossover.

Bansal (2023) highlighted the robustness of divergence-based RSI strategies in the NIFTY 50 index.

4. Key Themes & Gaps In RSI Literature:

The effectiveness of RSI strategies varies considerably across different markets, with some strategies yielding significant positive returns under specific conditions.

Most studies fail to account for real-world trading complexities, such as transaction costs and market order execution delays, which can affect the profitability of RSI-based strategies.

There is a need for further research to explore unexamined aspects of RSI usage, incorporate trading costs, and examine the impact of market conditions on RSI effectiveness.

The chapter concluded that while RSI is a powerful tool in technical analysis, its application beyond well-trodden strategies (like the 70/30 overbought/oversold levels) remains underexplored. Addressing these gaps can lead to more refined and efficient trading strategies, thus advancing both academic research and practical trading methodologies in the stock market.

CHAPTER 3:

RESEARCH METHODOLOGY

This chapter outlines the research methodology employed to test the efficacy of Relative Strength Index (RSI) Divergence in the NIFTY 50 index. The methodology provides a detailed account of the design, data collection, analytical framework, procedures, statistical analysis, segmented analysis, limitations, and ethical considerations, aiming to ensure that the research objective is thoroughly investigated and rigorously validated.

The primary goal of this research is to empirically evaluate the performance of RSI Divergence as a predictive tool in the NIFTY 50 index over an extended period from 2000 to 2024. Given the inherent complexities and limitations of automated tools in accurately detecting divergences, this study employs a manual observation method to identify and analyze RSI Divergences. This approach is expected to provide more nuanced and accurate results.

3.1 Research Design

The research design for this study is grounded in a case study approach, focusing on the NIFTY 50 index to explore the efficacy of Relative Strength Index (RSI) Divergence as a predictive tool. This design involves a detailed and systematic examination of the historical closing prices of the NIFTY 50 index from the years 2000 to 2024, divided into three key sub-periods to capture varied market conditions.

The decision to use a case study approach is based on the need to conduct an in-depth analysis of a specific phenomenon within its real-life context, particularly when the boundaries between the phenomenon and context are not clearly evident (Yin, 2014). The RSI Divergence, being an intricate component of technical analysis that may exhibit

different behaviors under varied market scenarios, necessitates such an approach for a comprehensive examination.

3.1.1 Manual Observation Method

Manual observation was chosen as the primary method for identifying RSI Divergence over automated tools due to several reasons. While automated algorithms can facilitate quick and large-scale data analysis, their accuracy in detecting nuanced patterns such as divergences remains questionable. Previous studies and practical experiences have demonstrated that automated tools often fail to capture the subtle and context-specific nature of divergences accurately (Murphy, 1999).

By adopting manual observation, this study leverages the expertise and discretion of the researcher to identify divergences more accurately. This method involves a meticulous review of the RSI and price charts to spot bullish and bearish divergences, ensuring that each identified instance conforms to the theoretical definitions and practical considerations of RSI Divergence.

3.1.2 Justification for Period Selection

The selection of the 24-year period from 2000 to 2024 encompasses a wide range of market conditions, including major crashes such as the dot-com bubble burst in 2000, the global financial crisis in 2008, and the COVID-19 pandemic in 2020. This extensive time frame ensures that the study captures various market phases—bullish, bearish, and sideways trends—providing comprehensive insights into the efficacy of RSI Divergence across different contexts.

3.1.3 Data Subdivision into Three Subsets

To deepen the analysis and enhance the robustness of the findings, the data is subdivided into three equal sub-periods of eight years each:

First Subset (2000-2008) - This period covers the aftermath of the dot-com bubble and includes the early stages of the global financial crisis. The inclusion of major market events during this time provides a fertile ground for assessing the predictive power of RSI Divergence under adverse conditions.

Second Subset (2008-2016) - This subset spans the recovery from the global financial crisis and a period of sustained growth. Examining RSI Divergence during this recovery phase offers insights into its efficacy in rising markets.

Third Subset (2016-2024) - The most recent period, which includes significant events like the demonetization in India, the COVID-19 pandemic, and evolving economic policies. Analyzing this period helps in understanding the relevance of RSI Divergence in the contemporary market environment.

By validating the findings of the entire period against these subsets, the research not only tests the general efficacy of RSI Divergence but also examines its performance across different market conditions, enhancing the study's overall reliability and validity.

3.2 Data Collection

This section provides a detailed account of the data source, time frame, and the rationale for the selected periods, ensuring the research is grounded in a robust and transparent data collection process.

3.2.1 Data Source

The data for this research is primarily sourced from the historical closing prices of the NIFTY 50 index, which is one of the major stock indices in India. The NIFTY 50 index is composed of 50 of the largest and most liquid companies listed on the National Stock Exchange of India (NSE), making it a comprehensive representation of the Indian stock market. The historical price data spanning from 2000 to 2024 was obtained from the official NSE database. This ensure the accuracy and authenticity of the data used for analysis.

3.2.2 Time Frame

The selected time frame for this study is from January 1, 2000, to January 1, 2024. This 24-year period is strategically chosen to encompass varying market conditions, including significant bull and bear markets, and the effects of major economic events. The rationale for selecting this extended period is to capture the long-term trends and cycles in the market, providing a comprehensive backdrop for analyzing the efficacy of RSI Divergence. The diversity of market conditions within this time frame offers a robust testing ground for validating the findings and ensures the generalizability of the results.

3.2.3 Data Subsets

To enhance the depth and reliability of the analysis, the 24-year period is further divided into three subsets, each consisting of eight years. This segmentation allows for a focused examination of different market phases and facilitates cross-validation.

The first subset spans from 2000 to 2008, a period characterized by the aftermath of the dot-com bubble burst and the early stages of the global financial crisis. Key events

during this period include the dot-com crash (2000-2002), the recovery phase (2003-2007), and the onset of the global financial crisis in 2008. The analysis of this subset will help in understanding the behavior of RSI Divergence during periods of market stress and recovery.

The second subset covers the period from 2008 to 2016, capturing the recovery from the global financial crisis and a subsequent phase of economic growth. Noteworthy events include the rebound of global markets post-2009, the Eurozone debt crisis (2010-2012), and steady growth until 2016. This period represents a predominantly bullish market, allowing for the assessment of RSI Divergence efficacy during rising trends.

The final subset includes data from 2016 to 2024, encompassing recent and ongoing economic events such as India's demonetization in 2016, market fluctuations due to geopolitical tensions, and the unprecedented impact of the COVID-19 pandemic on global economies. This subset provides an opportunity to analyze the contemporary relevance of RSI Divergence, especially in volatile and uncertain market conditions.

By examining these distinct periods, the research ensures a thorough analysis of RSI Divergence across diverse market environments, validating the consistency and reliability of the findings both within each subset and the entire timeframe. This segmented approach not only highlights the general efficacy of RSI Divergence but also uncovers any period-specific variations, contributing to a nuanced understanding of its predictive power.

3.3 Analytical Framework

The analytical framework for this study revolves around the application of the Relative Strength Index (RSI) and the identification of RSI Divergence in the NIFTY 50 index. This section elaborates on the key components of the analytical framework,

including the RSI, the concept of RSI Divergence, and the rationale for choosing a manual observation method.

3.3.1 Relative Strength Index (RSI)

The Relative Strength Index (RSI) is a momentum oscillator that measures the speed and change of price movements. Developed by J. Welles Wilder, the RSI is a widely used indicator in technical analysis, typically employed to identify overbought or oversold conditions in a market (Wilder, 1978).

To calculate the RSI, one must first determine the average gain and average loss over the selected period. This involves comparing the closing prices of each period. If the closing price is higher than the previous period's, the difference is recorded as a gain; conversely, if the closing price is lower, the difference is recorded as a loss. The average gain is then calculated by summing all the gains over the 14 periods and dividing by 14, while the average loss is computed similarly by summing all the losses and dividing by 14. Once the average gain and average loss are determined, the next step is to calculate the Relative Strength (RS), which is the ratio of the average gain to the average loss. The RSI is then derived from the RS using the formula: RSI = 100 - (100 / (1 + RS)). This formula transforms the RS into a value that oscillates between 0 and 100, allowing for the identification of potential overbought or oversold conditions. Traditionally, an RSI value above 70 indicates that an asset may be overbought, while a value below 30 suggests that it may be oversold.

Wilder also introduced a smoothing technique in the RSI calculation, which enhances the stability of the indicator. For the first 14 periods, the initial average gain and average loss are calculated using simple averages. For each subsequent period, the average gain and average loss are calculated using a smoothing method that involves

multiplying the previous average gain by 13, adding the current gain, and then dividing by 14. The same process is applied to the average loss. This smoothing method ensures that the RSI calculation reflects ongoing price movements more accurately, making it a robust tool for technical analysis.

For the purpose of this study, a 14-day period is used, as it is the default and most commonly utilized period in RSI calculations.

3.3.2 RSI Divergence

RSI Divergence is a phenomenon where the RSI and the price of an asset move in opposite directions. Divergence is classified into two types: Bullish Divergence and Bearish Divergence.

Bullish divergence occurs when the price of an asset makes a new low while the RSI forms a higher low. This indicates a potential upward reversal in the price trend, as the momentum implied by the RSI does not confirm the new low in price.

Bearish divergence occurs when the price of an asset makes a new high while the RSI forms a lower high. This signals a potential downward reversal in the price trend, suggesting that the strength of the upward movement is weakening.

RSI Divergence is a powerful tool for predicting market reversals because it highlights discrepancies between price movements and underlying momentum (Bansal, 2023). This study aims to test the effectiveness of RSI Divergence in predicting reversals and trends within the NIFTY 50 index.

3.3.3 Procedure For Observations

Given the nuanced nature of RSI Divergence, this study employs a manual observation method for identifying divergences. Manual observation allows for the

researcher's expertise and discretion in recognizing patterns that automated tools might miss. While automated tools offer efficiency, they often lack the ability to account for the contextual and subtle elements of divergences.

The procedure involves the following steps:

- Data Preparation: Historical closing price data of NIFTY 50 and corresponding daily RSI values are plotted on charts.
- Identification of Divergences: Each RSI value is meticulously reviewed in conjunction with the price chart to spot bullish and bearish divergences.
- Criteria for Confirmation: Confirm divergences based on bearish and bullish deflations already explained previously.
- Documentation and Analysis: Log identified divergences and analyze their success or failure on the price trend.

Manual observation ensures a high level of accuracy in detecting divergences, leveraging the ability to incorporate context-specific nuances that automated systems might overlook. It also allows for real-time adjustments and interpretations based on the evolving market conditions.

3.3.4 Statistical Analysis

The identified divergences are subjected to statistical validation to assess their predictive efficacy. We investigated the duration of days it takes an rsi divergence to form on NIFTY 50 index. How many of them are successful and how many of them fail. Out of successful divergences, how many gets successful immediately and how many gets successful with a delay. Finally in the later case, what is the duration in days for a divergence to extend and achieve delayed success. The analysis was conducted for the

entire period and then further subdivided into shorter time frames, allowing for a detailed comparison.

3.3.5 Segmented Analysis

Dividing the data into three subsets allowed for a segmented analysis of the effectiveness of RSI Divergences across different market periods.

Each subset was analyzed independently to uncover any distinctive patterns or anomalies during specific market conditions, such as bull or bear markets. The results from each subset were then compared to the overall period to validate the consistency of findings. A comparative analysis was performed to identify any divergences in results between different market phases. Insights from the comparative analysis were used to refine the overarching conclusions and ensure a holistic understanding.

3.4 Limitations

Despite the methodological rigor, certain limitations were acknowledged. Recognizing these limitations not only provides a transparent view of the research process but also helps in contextualizing the findings and suggesting areas for future research.

3.4.1 Manual Observation Bias

One of the primary limitations of this study is the reliance on manual observation for identifying RSI Divergences. Manual identification involves the risk of human error and subjective bias.

Human Error - The accuracy of manually spotting divergences may be compromised by oversight or misinterpretation of patterns. This can lead to inconsistencies in identifying true divergences versus spurious ones.

Subjective Bias - The interpretation of chart patterns can be influenced by the observer's previous experiences and personal biases. This subjectivity might affect the objectivity and uniformity of the divergences identified.

Mitigation Measures: To counter these issues, cross-verification with multiple reviewers and the use of predefined criteria for divergence identification were implemented. Nonetheless, complete elimination of these biases is challenging.

3.4.2 Data Constraints

This study is based on historical closing prices of the NIFTY 50 index, and certain limitations associated with the data need to be acknowledged.

Data Quality - Although data was sourced from official provider - NSE, issues such as missing data points and inaccuracies in historical records could impact the findings.

Mitigation Measures: Data cleaning techniques were employed to address quality issues, and adjustments for missing data was made from other reliable sources like Yahoo Finance and Bloomberg, to ensure consistency. The cleaned data was then used as a custom data-feed for TradingView charts.

3.4.3 Market-Specific Findings

The findings of this study are specific to the NIFTY 50 index and may not be generalizable to other indices or markets.

Market Dependency - RSI Divergence efficacy might vary across different markets and asset classes due to differences in market structure, participant behavior, and regulatory environments.

Period-Specific Conditions - The results are influenced by the specific conditions during the analyzed periods (2000-2024). Different economic cycles, technological advancements, or geopolitical events can yield different outcomes in other time frames.

Mitigation Measures: Future studies should consider analyzing multiple indices from different markets to enhance generalizability.

3.4.4 Limited Scope of RSI Parameters

The study primarily uses a standard 14-day RSI period, as proposed by J. Welles Wilder. However, different RSI settings might yield varying results.

Single Parameter Focus - Relying only on a 14-day RSI might not capture the entire picture. Other RSI periods (e.g., 7-day, 21-day) could provide a more holistic view as already suggested by (Bansal, 2023).

Mitigation Measures: Further research could incorporate varying RSI settings and additional indicators to validate and expand the findings from this study.

3.4.5 Economic and Structural Changes

The time span from 2000 to 2024 encompasses significant economic and structural changes that can influence market dynamics.

Regulatory Changes - Changes in market regulations, financial products, and trading technologies over this period can affect market behavior and, consequently, the efficacy of RSI Divergence.

Technological Advancements - Advances in trading algorithms and market analysis tools can alter market patterns, potentially impacting the relevance of traditional technical indicators like RSI.

Mitigation Measures: The study acknowledges these influences and suggests that future research should account for regulatory and technological impacts explicitly.

3.5 Ethical Considerations

Ethical considerations are paramount in ensuring the integrity and credibility of this research. This section highlights the ethical guidelines followed during the study.

Data Integrity - Ensuring the accuracy, authenticity, and confidentiality of the financial data used was a primary concern. Data was sourced from reputable databases to guarantee reliability.

Transparency - The research methodologies, analytical frameworks, and findings were documented in a transparent manner to allow for peer review and replication.

Avoiding Misleading Conclusions - Care was taken to interpret results objectively and avoid sensationalizing or misrepresenting the findings. The study adheres to ethical standards in reporting both significant and non-significant results.

Respect for Intellectual Property - Proper citations and references were provided for all theoretical frameworks, methodologies, and secondary data sources used in this study.

3.6 Chapter Summary

This chapter provided a comprehensive outline of the research methodology employed to test the efficacy of RSI Divergence within the NIFTY 50 index over the

selected time frame from 2000 to 2024. The methodology includes a detailed account of the research design, data collection, analytical framework, procedures, statistical analysis, and the segmented analysis approach. Additionally, potential limitations and ethical considerations have also been discussed to ensure transparency and integrity in the research process.

CHAPTER 4:

OBSERVATIONS

4.1 Observations Made During 2000-2003

The first trade, observed on 04/01/2000 and confirmed on 11/02/2000, had a formation duration of 26 days. This was a sell trade that proved to be immediately successful if executed on 14/02/2000. The second trade, starting on 04/04/2000 and confirmed on 25/04/2000, was a buy trade with a formation duration of 12 days. Unlike the first, this trade did not succeed immediately. However, after an extended duration of 18 days, it eventually turned successful on 24/05/2000. The third trade in this period began on 20/06/2000, with confirmation on 05/07/2000, marking a formation duration of 10 days. This sell trade does not initially work but achieves success after a 4-day delay, with the trade date being 13/07/2000. The fourth trade, which started on 24/07/2000 and was confirmed on 07/08/2000, was a buy trade with a 9-day formation duration. This trade succeeds immediately if executed on 08/08/2000.

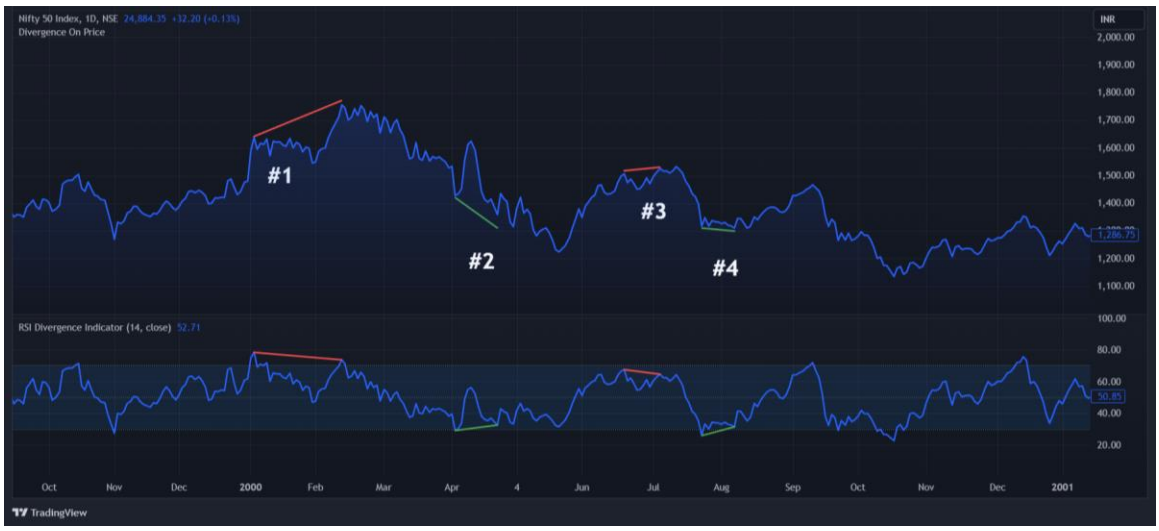

Figure 4.1a: RSID Observations Made During 2000-2001, Source: Screenshot By Author

Moving into 2001, the fifth trade began on 25/01/2001 and was confirmed on 15/02/2001, with a formation duration of 13 days. This sell trade was successful immediately on 16/02/2001. Similarly, the sixth trade, observed on 13/03/2001 and confirmed on 12/04/2001, was a buy trade with a formation duration of 20 days. This trade also shows immediate success if executed on 16/04/2001. The seventh trade, which started on 18/06/2001 and was confirmed on 09/07/2001, was another buy trade, with a 14-day formation duration, and it too succeeds immediately on 10/07/2001.

Figure 4.1b: RSID Observations Made During 2001-2002, Source: Screenshot By Author

In 2002, the eighth trade was observed on 18/02/2002 and confirmed on 26/02/2002, with a brief formation duration of 5 days. This sell trade was immediately successful on 27/02/2002. Similarly, the ninth trade, starting on 26/02/2002 and confirmed on 07/03/2002, was a sell trade with a 6-day formation duration and succeeds immediately on 08/03/2002. The tenth trade, which began on 23/05/2002 and was

confirmed on 31/05/2002, was a buy trade with a 5-day formation duration and results in immediate success on 03/06/2002.

Towards the end of 2002, the eleventh trade was observed on 02/12/2002 and confirmed on 13/12/2002. This sell trade, with an 8-day formation duration, did not succeed immediately. However, after an 8-day delay, it eventually turned successful on 30/12/2002. The twelfth and final trade observed during this period began on 13/12/2002 and was confirmed on 27/12/2002. This sell trade also had an 8-day formation duration and becomes immediately successful on 30/12/2002.

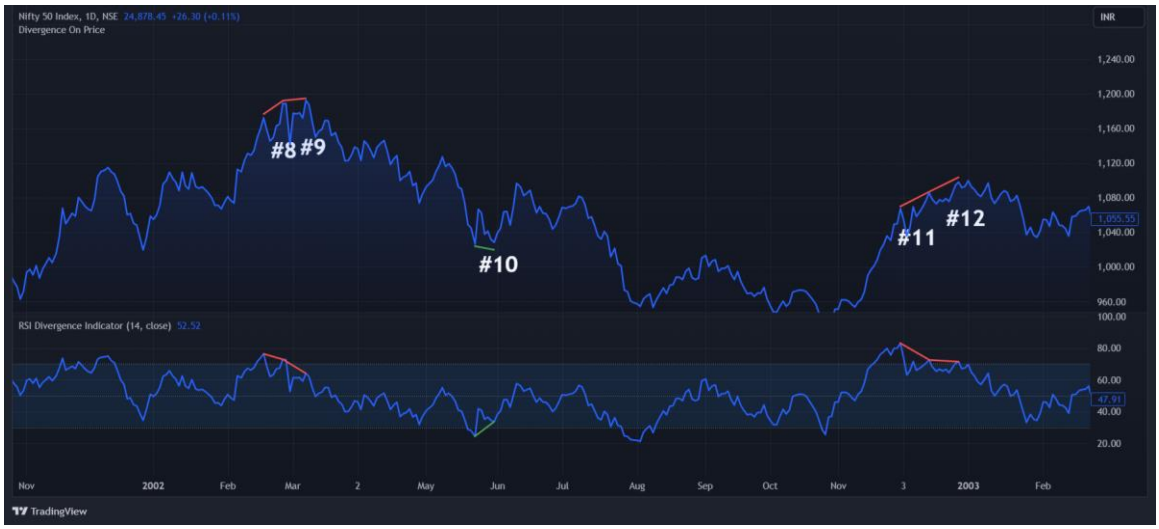

Figure 4.1c: RSID Observations Made During 2002-2003, Source: Screenshot By Author

4.2 Observations Made During 2003-2006

The thirteenth trade, which began on 17/03/2003 and was confirmed on 31/03/2003, was a buy trade with a formation duration of 8 days. This trade is immediately successful if executed on 01/04/2003. The fourteenth trade, observed on

03/07/2003 and confirmed on 14/07/2003, was a sell trade with a 6-day formation duration. This trade also marks immediate success, with the trade date being 16/07/2003.

However, the fifteenth trade, which began on 14/07/2003 and was confirmed on 04/08/2003, did not follow the same pattern. With a 14-day formation duration, this sell trade ultimately failed, marking it as one of the unsuccessful attempts during this period. In contrast, the sixteenth trade, observed on 22/08/2003 and confirmed on 02/09/2003, was also a sell trade with a 6-day formation duration. Although it did not succeed immediately, it achieved success after a 3-day delay, with the trade date recorded as 08/09/2003.

The seventeenth trade, starting on 02/09/2003 and confirmed on 13/10/2003, had a notably longer formation duration of 27 days. This sell trade, similar to the previous one, did not see immediate success but succeeded after a 3-day delay on 17/10/2003. The eighteenth trade, observed on 13/10/2003 and confirmed on 04/11/2003, was another sell trade, this time with a 15-day formation duration. This trade was immediately successful on 05/11/2003. In contrast, the nineteenth trade, which began on 04/11/2003 and was confirmed on 04/12/2003, had a 20-day formation duration. Unfortunately, this sell trade failed, marking it as another unsuccessful attempt.

In 2004, the twentieth trade was observed on 22/01/2004 and confirmed on 03/02/2004. This buy trade, with a brief 5-day formation duration, was immediately successful when executed on 04/02/2004. Similarly, the twenty-first trade, starting on 13/04/2004 and confirmed on 23/04/2004, was a sell trade with a 6-day formation duration. This trade also saw immediate success on 27/04/2004. The twenty-second trade, observed on 22/09/2004 and confirmed on 05/10/2004, was another sell trade with an 8-day formation duration. This trade was successful immediately on 06/10/2004.

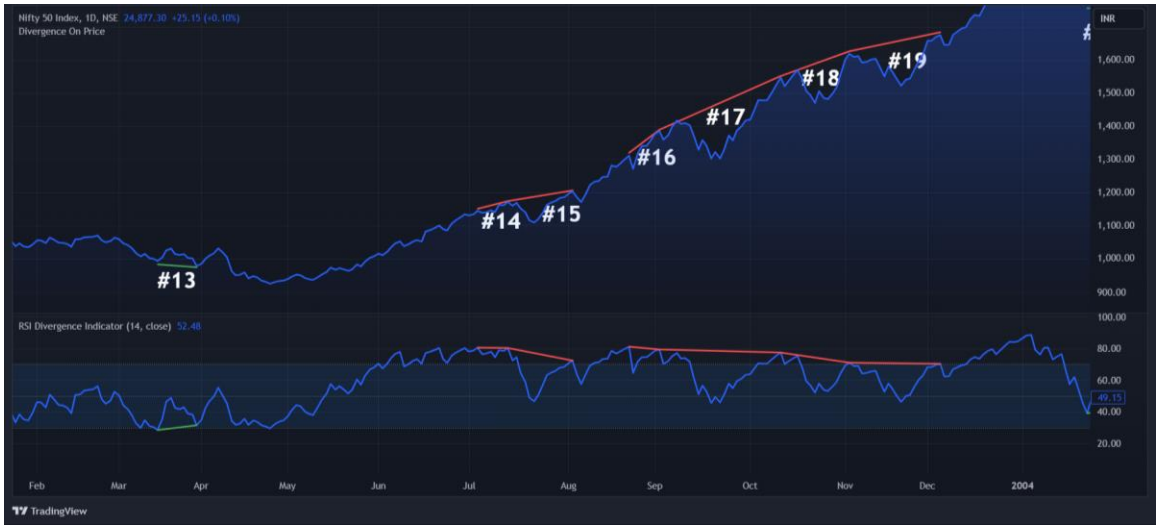

Figure 4.2a: RSID Observations Made During 2003-2004, Source: Screenshot By Author

However, the twenty-third trade, which began on 05/10/2004 and was confirmed on 18/11/2004, had a long formation duration of 28 days. This sell trade, unfortunately, failed, adding to the list of unsuccessful trades during this period. In contrast, the twenty-fourth trade, observed on 02/12/2004 and confirmed on 16/12/2004, was a sell trade with a 9-day formation duration. Although it did not succeed immediately, it turned successful after an 11-day delay, with the trade date recorded as 03/01/2005.

Figure 4.2b: RSID Observations Made During 2004-2005, Source: Screenshot By Author

In 2005, the twenty-fifth trade, starting on 19/04/2005 and confirmed on 29/04/2005, was a buy trade with a 7-day formation duration. This trade was immediately successful on 02/05/2005. The twenty-sixth trade, observed on 27/06/2005 and confirmed on 04/08/2005, was a sell trade with a 26-day formation duration. While it did not succeed immediately, it became successful after a 7-day delay, with the trade date recorded as 17/08/2005. The twenty-seventh trade, starting on 04/08/2005 and confirmed on 17/08/2005, was another sell trade with a 7-day formation duration and was successful immediately on 18/08/2005.

The twenty-eighth trade, observed on 20/09/2005 and confirmed on 04/10/2005, was a sell trade with a 9-day formation duration. This trade saw immediate success on 05/10/2005. The twenty-ninth trade, which began on 04/10/2005 and was confirmed on 28/11/2005, had a long formation duration of 34 days. This sell trade did not succeed immediately but eventually turned successful after a significant 28-day delay, with the trade date recorded as 06/01/2006.

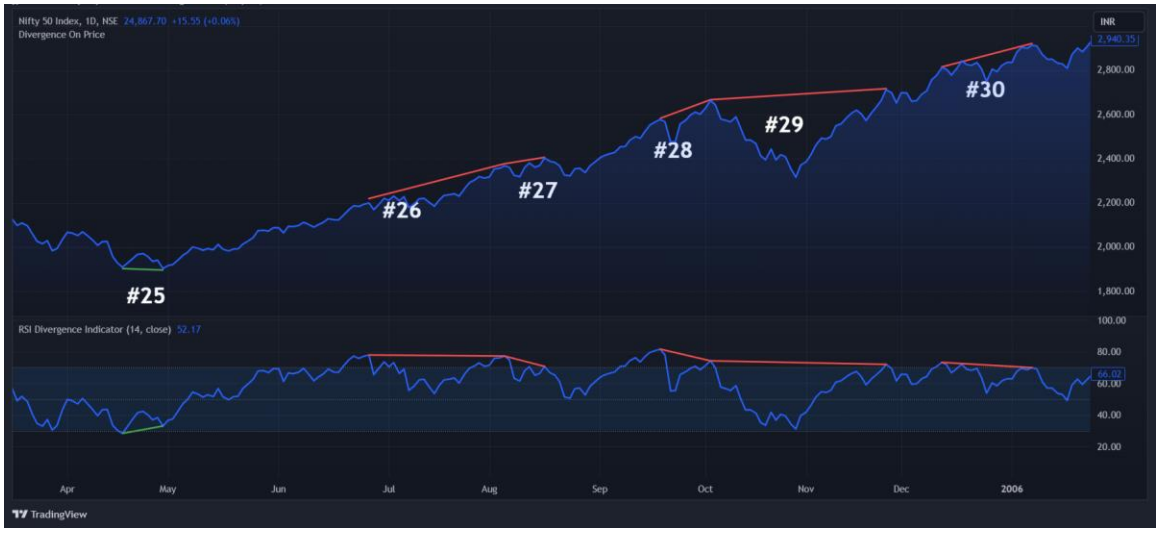

Figure 4.2c: RSID Observations Made During 2005-2006, Source: Screenshot By Author

4.3 Observations Made During 2006-2009

The thirtieth trade, which began on 13/12/2005 and was confirmed on 06/01/2006, was a sell trade with a formation duration of 17 days. This trade was immediately successful when executed on 09/01/2006. Similarly, the thirty-first trade, observed on 05/04/2006 and confirmed on 20/04/2006, was another sell trade with a 7-day formation duration, and it also saw immediate success on 21/04/2006.

However, the thirty-second trade, starting on 31/01/2006 and confirmed on 13/02/2006, did not follow the same trend. With a formation duration of 7 days, this sell trade ultimately failed, marking it as an unsuccessful attempt during this period. In contrast, the thirty-third trade, observed on 05/05/2006 and confirmed on 20/04/2006, was a sell trade with a 7-day formation duration. Although it did not succeed immediately, it achieved success after a 12-day delay, with the trade date being 10/05/2006.

The thirty-fourth trade, which began on 04/09/2006 and was confirmed on 21/09/2006, had a 12-day formation duration. Unfortunately, this sell trade failed, adding to the list of unsuccessful trades during this period. Conversely, the thirty-fifth trade, observed on 22/11/2006 and confirmed on 06/12/2006, was a sell trade with a 9-day formation duration. This trade was immediately successful on 07/12/2006. The thirty-sixth trade, starting on 06/12/2006 and confirmed on 03/01/2007, had a formation duration of 17 days. This sell trade also saw immediate success, with the trade date recorded as 04/01/2007.

Figure 4.3a: RSID Observations Made During 2006-2007, Source: Screenshot By Author

In 2007, the thirty-seventh trade began on 03/10/2007 and was confirmed on 29/10/2007. This sell trade, with a formation duration of 17 days, did not succeed immediately but turned successful after a 2-day delay, with the trade date being 02/11/2007. The thirty-eighth trade, observed on 29/10/2007 and confirmed on 14/11/2007, was another sell trade with an 11-day formation duration. This trade was immediately successful on 15/11/2007. The thirty-ninth trade, starting on 12/10/2007 and confirmed on 08/01/2008, had a 16-day formation duration. This sell trade saw immediate success on 09/01/2008.

Figure 4.3b: RSID Observations Made During 2007-2008, Source: Screenshot By Author

Finally, in 2008, the fortieth trade was observed on 01/07/2008 and confirmed on 16/07/2008. This buy trade, with a 10-day formation duration, was immediately successful when executed on 17/07/2008.

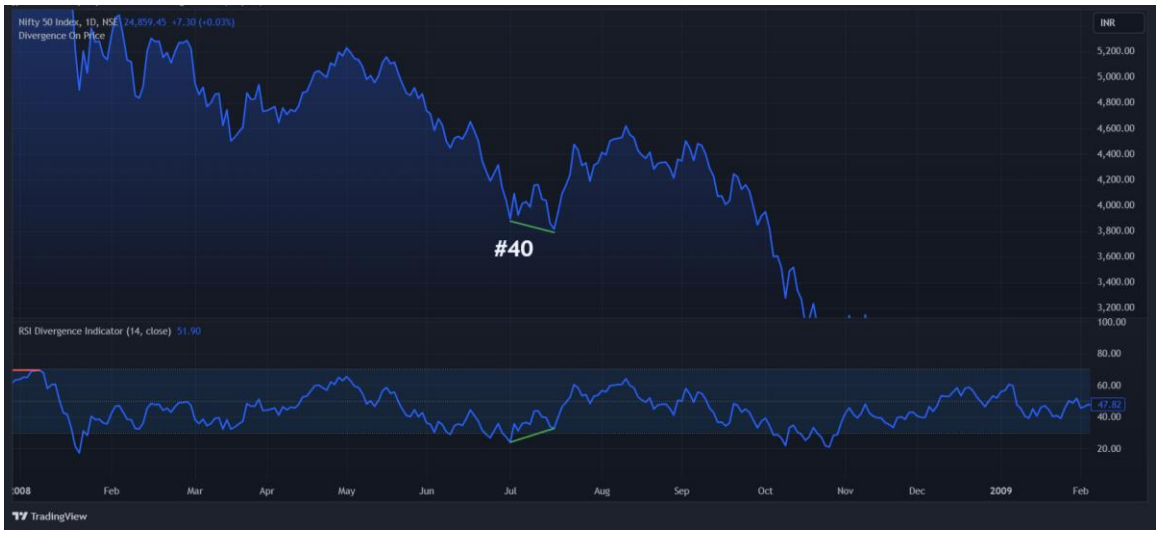

Figure 4.3c: RSID Observations Made During 2008-2009, Source: Screenshot By Author

4.4 Observations Made During 2009-2012

The forty-first trade, observed on 15/04/2009 and confirmed on 05/05/2009, was a sell trade with a formation duration of 11 days. Unfortunately, this trade failed to yield any success. The forty-second trade, starting on 18/05/2009 and confirmed on 05/06/2009, also failed to deliver immediate success. However, after a 2-day delay, it turned profitable, with the trade date recorded as 10/06/2009.

The forty-third trade, observed on 22/09/2009 and confirmed on 16/10/2009, had a formation duration of 14 days and was a sell trade. This trade saw immediate success and was executed successfully on 20/10/2009. In contrast, the forty-fourth trade, which started on 23/11/2009 and was confirmed on 03/12/2009, had a formation duration of 7 days. It did not succeed immediately but turned successful after a 2-day delay, with the trade date being 08/12/2009.

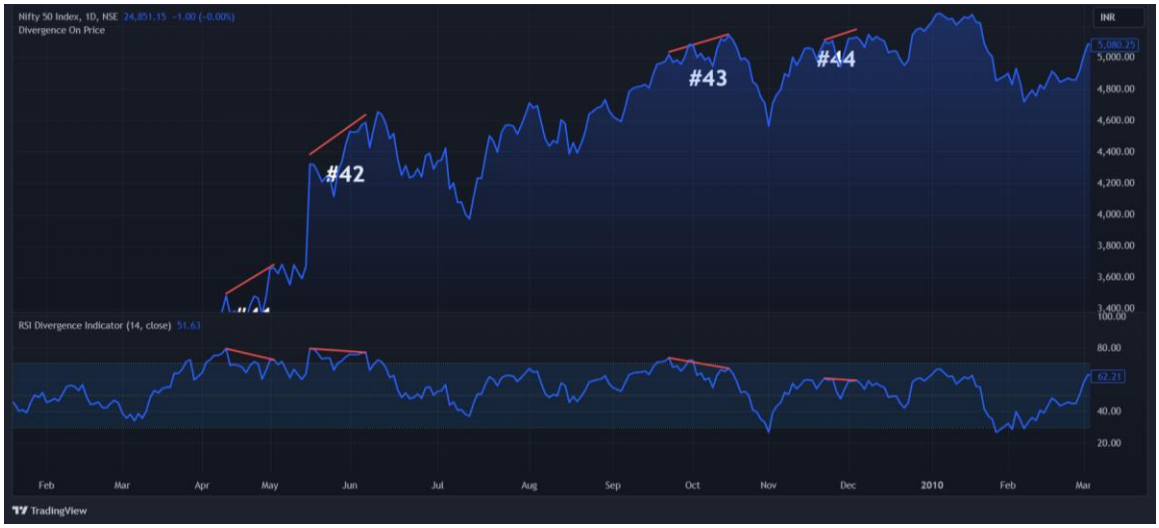

Figure 4.4a: RSID Observations Made During 2009-2010, Source: Screenshot By Author

The forty-fifth trade began on 19/03/2010 and was confirmed on 07/04/2010. With a formation duration of 10 days, this sell trade achieved immediate success when

executed on 08/04/2010. However, the forty-sixth trade, observed on 21/06/2010 and confirmed on 13/07/2010, did not follow the same path. This sell trade had a 15-day formation duration and only succeeded after a 29-day delay, with the trade date recorded as 23/08/2010.

Similarly, the forty-seventh trade, starting on 23/07/2010 and confirmed on 09/08/2010, had a formation duration of 10 days. Although it did not see immediate success, it turned profitable after a 20-day delay, with the trade executed on 23/08/2010. The forty-eighth trade, observed on 21/09/2010 and confirmed on 04/10/2010, was a sell trade with an 8-day formation duration. After a 6-day delay, this trade also succeeded, with the trade date being 13/10/2010.

The forty-ninth trade, starting on 04/10/2010 and confirmed on 05/11/2010, was another sell trade with a formation duration of 23 days. It was successful immediately and executed on 08/11/2010.

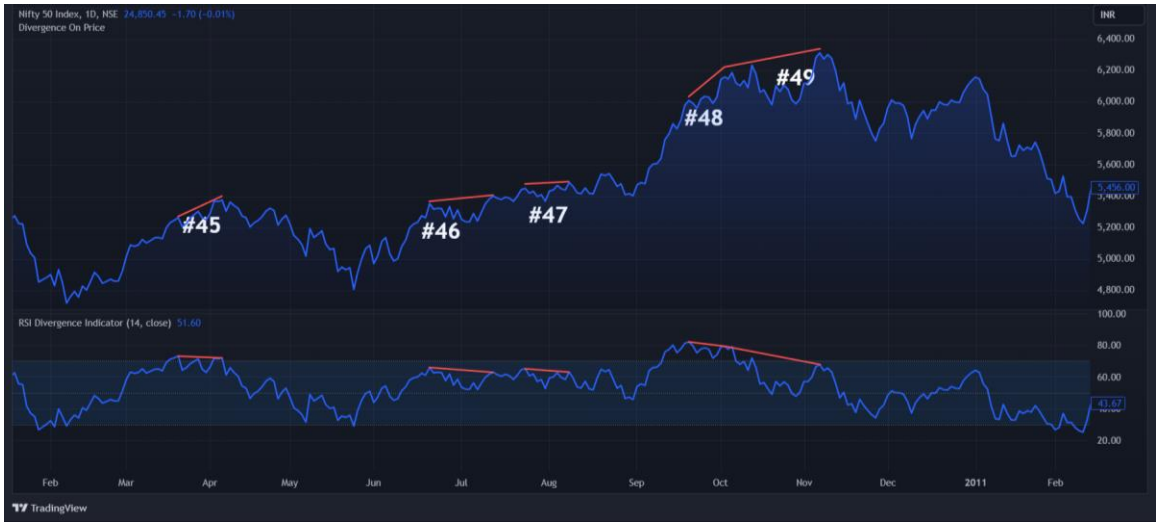

Figure 4.4b: RSID Observations Made During 2010-2011, Source: Screenshot By Author

Moving into 2011, the fiftieth trade, observed on 05/05/2011 and confirmed on 25/05/2011, was a buy trade with a formation duration of 13 days. This trade saw immediate success when executed on 26/05/2011. The fifty-first and final trade during this period began on 23/11/2011 and was confirmed on 20/12/2011. This buy trade, with a 17-day formation duration, also yielded immediate success, with the trade executed on 21/12/2011.

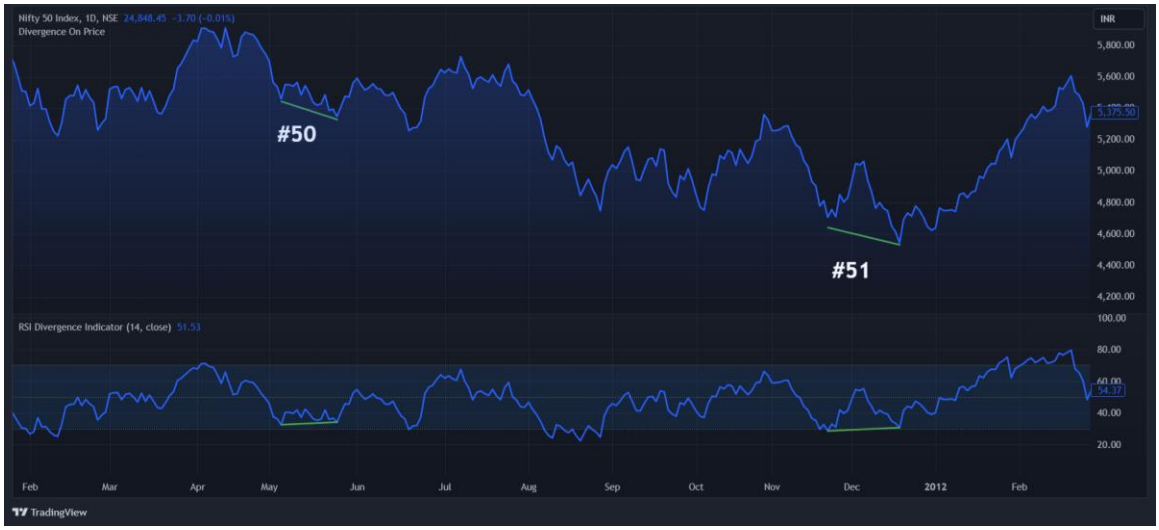

Figure 4.4c: RSID Observations Made During 2011-2012, Source: Screenshot By Author

4.5 Observations Made During 2012-2015

The fifty-second trade, observed on 16/05/2012 and confirmed on 01/06/2012, was a buy trade with an 11-day formation duration. This trade achieved immediate success and was executed on 04/06/2012. The fifty-third trade, starting on 13/06/2012 and confirmed on 21/06/2012, was a sell trade with a 4-day formation duration. However, it failed to yield any positive outcome.

Figure 4.5a: RSID Observations Made During 2012-2013, Source: Screenshot By Author

The fifty-fourth trade began on 04/01/2013 and was confirmed on 15/01/2013. This sell trade had a formation duration of 6 days but did not succeed immediately. However, after a 7-day delay, it turned profitable, with the trade date being 25/01/2013. In contrast, the fifty-fifth trade, observed on 28/02/2013 and confirmed on 25/03/2013, was a buy trade with a formation duration of 16 days. Though it did not see immediate success, it eventually succeeded after an 8-day delay, with the trade executed on 09/04/2013.

The fifty-sixth trade, starting on 10/05/2013 and confirmed on 30/05/2013, had a formation duration of 13 days. This sell trade saw immediate success when executed on 31/05/2013. Similarly, the fifty-seventh trade, observed on 13/06/2013 and confirmed on 24/06/2013, was a buy trade with a formation duration of 6 days. It achieved immediate success, and the trade date was recorded as 25/06/2013.

The fifty-eighth trade, observed on 07/07/2013 and confirmed on 21/07/2013, was a buy trade with a 7-day formation duration. This trade also achieved immediate success when executed on 22/07/2013. In contrast, the fifty-ninth trade, starting on 19/09/2013

and confirmed on 21/10/2013, was a sell trade with a longer formation duration of 19 days. Although it did not succeed initially, it became profitable after an 8-day delay, with the trade date recorded as 01/11/2013.

Figure 4.5b: RSID Observations Made During 2013-2014, Source: Screenshot By Author

The sixtieth trade, observed on 02/04/2014 and confirmed on 23/04/2014, was a sell trade with an 11-day formation duration. This trade saw immediate success when executed on 25/04/2013. The sixty-first trade, starting on 23/05/2014 and confirmed on 10/06/2014, was also a sell trade but did not see immediate success. After an extended duration of 18 days, it turned profitable, with the trade executed on 07/07/2014.

Lastly, the sixty-second and sixty-third trades, both observed in July 2014, demonstrated consistent performance. The sixty-second trade, starting on 10/06/2014 and confirmed on 07/07/2014, had an 18-day formation duration and achieved immediate success, with the trade executed on 08/07/2014. Similarly, the sixty-third trade, beginning on 07/07/2014 and confirmed on 24/07/2014, was a sell trade with a formation duration of 12 days. It also saw immediate success, with the trade date recorded as 25/07/2014.

Figure 4.5c: RSID Observations Made During 2014-2015, Source: Screenshot By Author

4.6 Observations Made During 2015-2018

The sixty-fourth trade, observed on 27/03/2015 and confirmed on 27/04/2015, was a buy trade with a formation duration of 17 days. Although it did not succeed immediately, the trade saw success after a 6-day delay, with the execution occurring on 07/05/2015. Similarly, the sixty-fifth trade, which started on 27/04/2015 and was confirmed on 09/06/2015, was also a buy trade with a significantly longer formation duration of 29 days. Despite not seeing immediate success, it succeeded after just a 1-day delay, with the trade date on 11/06/2015.

The sixty-sixth trade, observed on 24/08/2015 and confirmed on 07/09/2015, was another buy trade with a 9-day formation duration. This trade achieved immediate success, with the trade executed on 08/09/2015. Following that, the sixty-seventh trade, which started on 10/11/2015 and was confirmed on 09/12/2015, had a longer formation duration of 18 days. It, too, saw immediate success when executed on 10/12/2015.

Figure 4.6a: RSID Observations Made During 2015-2016, Source: Screenshot By Author

The sixty-eighth trade, a sell trade observed on 23/03/2016 and confirmed on 04/04/2016, had a shorter formation duration of 5 days and achieved immediate success when executed on 05/04/2016. On the other hand, the sixty-ninth trade, which started on 14/07/2016 and was confirmed on 25/07/2016, was also a sell trade with a 6-day formation duration. It did not see immediate success but eventually turned profitable after a 9-day delay, with the trade executed on 08/08/2016.

The seventieth trade, beginning on 25/07/2016 and confirmed on 08/08/2016, also involved selling, with a formation duration of 9 days. This trade achieved immediate success, being executed on 09/08/2016. In contrast, the seventy-first trade, a buy trade observed on 21/11/2016 and confirmed on 26/12/2016, had a formation duration of 24 days. It achieved immediate success, with the trade taking place on 27/12/2016.

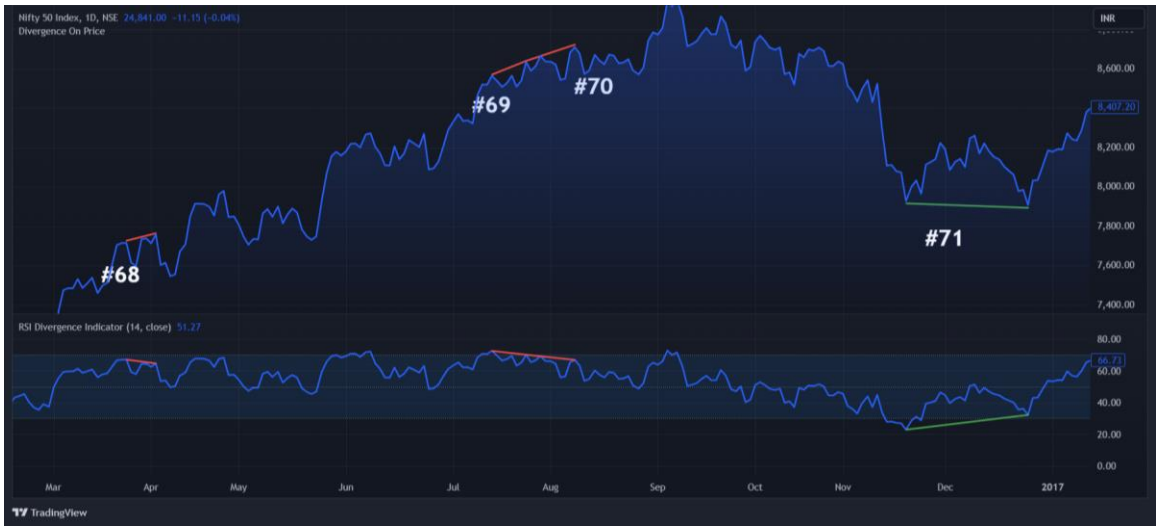

Figure 4.6b: RSID Observations Made During 2016-2017, Source: Screenshot By Author

The seventy-second trade, observed on 06/02/2017 and confirmed on 23/02/2017, was a sell trade with a formation duration of 12 days. Unfortunately, it failed to produce any success. Similarly, the seventy-fourth trade, starting on 05/04/2017 and confirmed on 26/04/2017, was also a sell trade that did not succeed.

The seventy-third and seventy-fifth trades, however, proved to be successful. The seventy-third trade, observed on 17/03/2017 and confirmed on 05/04/2017, was a sell trade with an 11-day formation duration. It achieved immediate success, being executed on 06/04/2017. Likewise, the seventy-fifth trade, starting on 17/05/2017 and confirmed on 05/06/2017, was another sell trade with a formation duration of 12 days, which saw immediate success when executed on 06/06/2017.

Figure 4.6c: RSID Observations Made During 2017-2018, Source: Screenshot By Author

4.7 Observations Made During 2018-2021

The seventy-sixth trade, observed on 07/02/2018 and confirmed on 20/02/2018, was a buy trade with a 7-day formation duration. It achieved immediate success, with the trade executed the following day, 21/02/2018. Similarly, the seventy-seventh trade, starting on 07/03/2018 and confirmed on 23/03/2018, also resulted in immediate success after 11 days of formation, with the trade executed on 26/03/2018.

The seventy-eighth trade, a sell trade observed on 30/04/2018 and confirmed on 14/05/2018, had a formation duration of 8 days and also achieved immediate success, with the trade date being 15/05/2018. Following this, the seventy-ninth trade, starting on 14/05/2018 and confirmed on 13/06/2018, had a longer formation duration of 21 days, but it, too, saw immediate success when the trade was executed on 14/06/2018.

The eightieth trade, which began on 31/07/2018 and was confirmed on 09/08/2018, was a sell trade with a shorter formation duration of 6 days. Although it did not succeed immediately, the trade achieved success after a 10-day delay, with the trade executed on 28/08/2018. Trade eighty-one, a buy trade observed on 05/10/2018 and

confirmed on 26/10/2018, had a 13-day formation duration and saw immediate success, with the trade date being 29/10/2018.

The trend of successful trades continued with trade eighty-two, observed on 03/12/2018 and confirmed on 19/12/2018. This sell trade, with a formation duration of 11 days, saw immediate success on 20/12/2018.

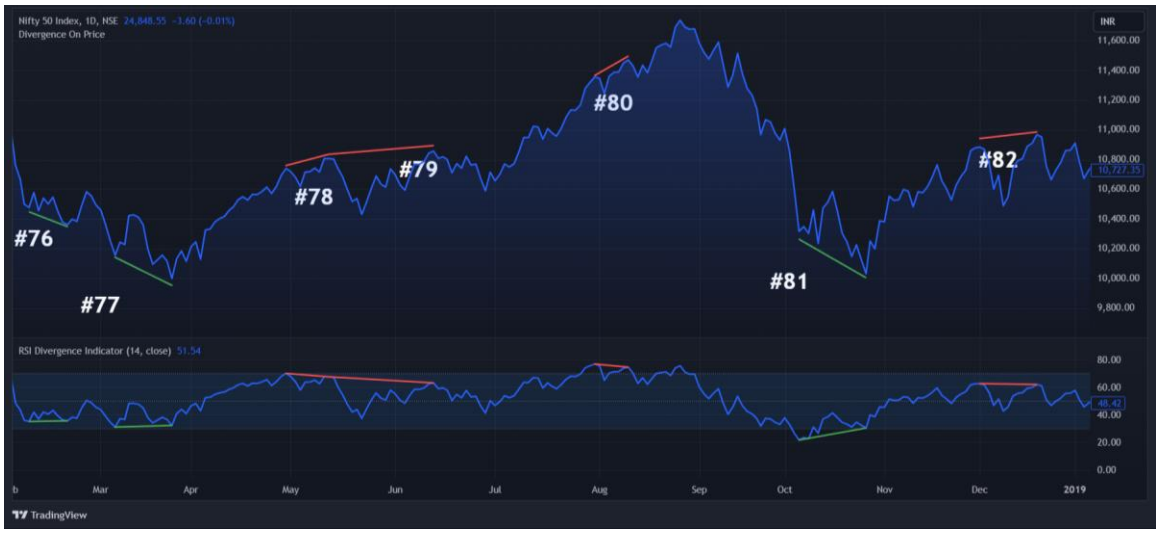

Figure 4.7a: RSID Observations Made During 2018-2019, Source: Screenshot By Author

However, the eighty-third trade, a sell trade starting on 19/03/2019 and confirmed on 02/04/2019, did not achieve immediate success. It saw a 9-day delay before it turned profitable on 16/04/2019.

On the other hand, the eighty-fourth trade, another sell trade observed on 02/04/2019 and confirmed on 16/04/2019, had a 9-day formation duration and saw immediate success, with the trade taking place on 18/04/2019. Trade eighty-five, starting on 16/04/2019 and confirmed on 03/06/2019, had a notably long formation duration of 29 days but still achieved immediate success, with the trade executed on 04/06/2019.

The eighty-sixth trade, a buy trade observed on 05/08/2019 and confirmed on 22/08/2019, had a 10-day formation duration and resulted in immediate success, with the trade occurring on 23/08/2019. Similarly, trade eighty-seven, a sell trade that started on 07/11/2019 and was confirmed on 28/11/2019, had a formation duration of 13 days and achieved immediate success on 29/11/2019. This was followed by trade eighty-eight, another sell trade that started on 28/11/2019 and was confirmed on 20/12/2019, with a 15-day formation duration. It also saw immediate success, with the trade executed on 23/12/2019.

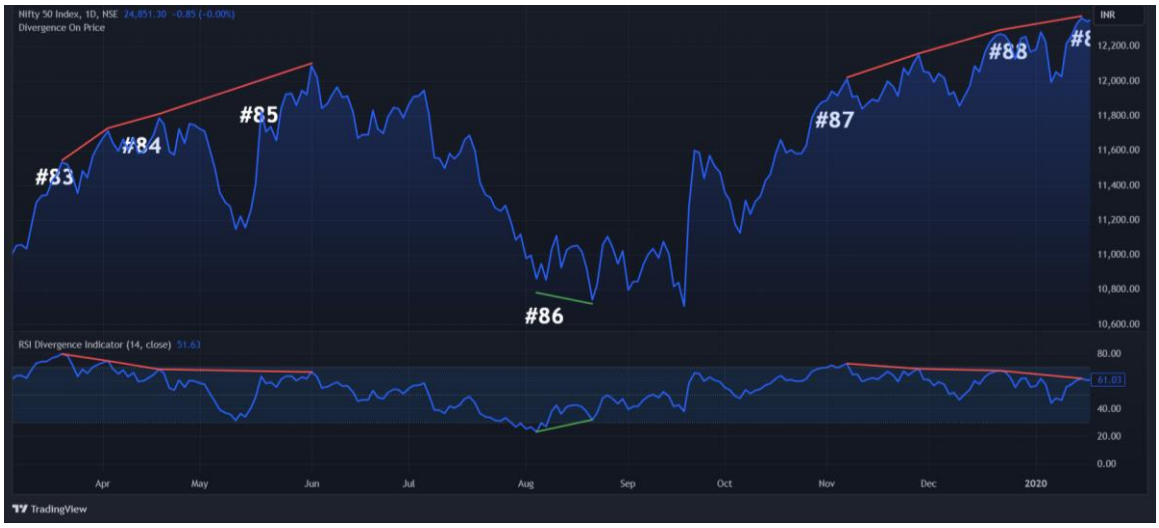

Figure 4.7b: RSID Observations Made During 2019-2020, Source: Screenshot By Author

Trade eighty-nine, which began on 20/12/2019 and was confirmed on 14/01/2020, also had a formation duration of 15 days and achieved immediate success, with the trade executed on 15/01/2020.

Trade ninety, a buy trade observed on 12/03/2020 and confirmed on 18/05/2020, stands out for its particularly long formation duration of 41 days. Despite the extended formation, it saw immediate success, with the trade executed on 19/05/2020.

Finally, the ninety-first trade, a sell trade observed on 23/07/2020 and confirmed on 11/08/2020, had a formation duration of 12 days. Though it did not succeed immediately, the trade turned profitable after a 24-day delay, with the trade date being 16/09/2020.

Figure 4.7c: RSID Observations Made During 2020-2021, Source: Screenshot By Author

4.8 Observations Made During 2021-2024

Trade ninety-two, observed on 14/01/2021 and confirmed on 15/02/2021, was a sell trade with a 20-day formation duration. It achieved immediate success, with the trade executed on 16/02/2021. The ninety-third trade, a buy trade starting on 25/03/2021 and confirmed on 12/04/2021, had a shorter formation duration of 9 days and saw immediate success as well, with the trade date on 13/04/2021.

Trade ninety-four, a sell trade observed on 07/06/2021, had a formation duration of 5 days but did not succeed immediately. However, it turned profitable after 21 days, with the trade executed on 15/07/2021. Similarly, trade ninety-five, a sell trade starting on 25/06/2021, was confirmed on 07/07/2021 with a formation duration of 7 days.

Although it did not succeed right away, it saw a 13-day delay before success, also on 15/07/2021.

The ninety-sixth trade, observed on 07/07/2021 and confirmed on 15/07/2021, was a sell trade with a 5-day formation duration that achieved immediate success the next day, on 16/07/2021. However, the ninety-seventh trade, which began on 16/09/2021 and was confirmed on 27/09/2021, did not achieve immediate success. It saw a 13-day delay but eventually succeeded, with the trade taking place on 18/10/2021.

The ninety-eighth trade, a sell trade observed on 27/09/2021 and confirmed on 18/10/2021, had a formation duration of 13 days and achieved immediate success, with the trade executed on 19/10/2021. Similarly, trade ninety-nine, a buy trade starting on 30/11/2021 and confirmed on 20/12/2021, had a 13-day formation duration and saw immediate success on 21/12/2021.

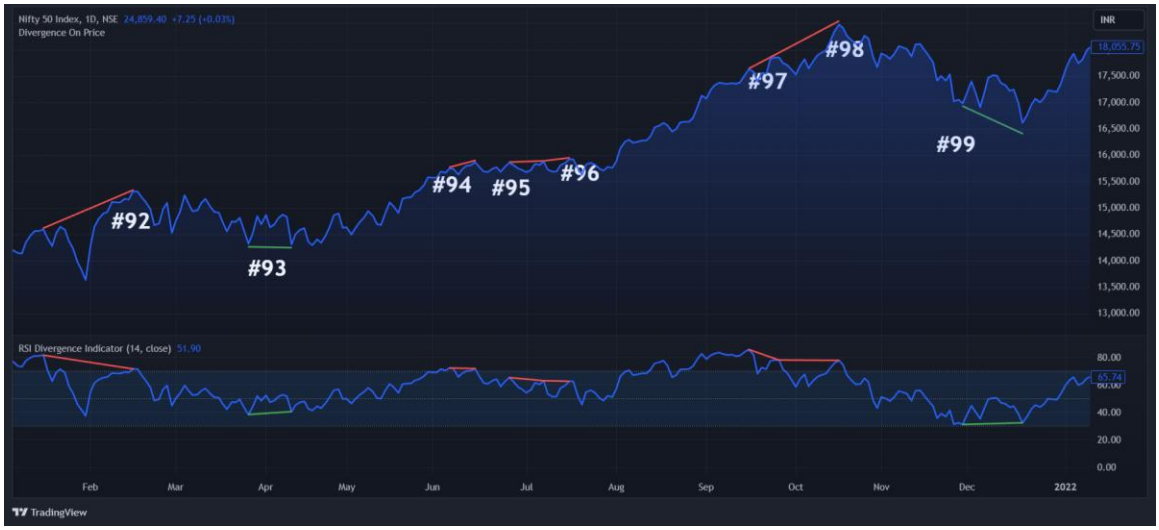

Figure 4.8a: RSID Observations Made During 2021-2022, Source: Screenshot By Author

The next trade, trade one hundred, observed on 24/01/2022 and confirmed on 14/02/2022, was a buy trade with a 13-day formation duration. Unfortunately, it failed

with no success at all. Trade one hundred one, another buy trade observed on 24/02/2022 and confirmed on 07/03/2022, had a formation duration of 5 days and achieved immediate success, with the trade taking place on 09/03/2022.

Trade one hundred two, a buy trade observed on 13/05/2022 and confirmed on 17/06/2022, had a longer formation duration of 24 days but saw immediate success, with the trade executed on 20/06/2022. Trade one hundred three, a sell trade observed on 18/08/2022 and confirmed on 13/09/2022, also had a relatively long formation duration of 16 days and achieved immediate success, with the trade date on 14/09/2022.

Trade one hundred four, observed on 01/11/2022 and confirmed on 16/11/2022, was a sell trade with a 9-day formation duration. Although it did not succeed immediately, it turned profitable after a 10-day delay, with the trade occurring on 01/12/2022.

Figure 4.8b: RSID Observations Made During 2022-2023, Source: Screenshot By Author

Trade one hundred five, a buy trade observed on 28/02/2023 and confirmed on 15/03/2023, had a formation duration of 9 days. It did not succeed immediately but saw success after a 7-day delay, with the trade executed on 28/03/2023.

The final few trades of this period showed a string of failed sell trades. Trade one hundred six, observed on 04/05/2023 and confirmed on 15/05/2023, had a formation duration of 6 days but failed. Similarly, trade one hundred seven, a sell trade observed on 15/05/2023 and confirmed on 30/05/2023, also failed. Trades one hundred eight and one hundred nine, observed on 30/05/2023 and 07/06/2023 respectively, also ended in failure.

The one hundred tenth trade, a sell trade observed on 15/12/2023 and confirmed on 28/12/2023, had a 6-day formation duration but did not succeed immediately. However, it turned profitable after a 12-day delay, with the trade executed on 15/01/2024.

Figure 4.8c: RSID Observations Made During 2023-2024, Source: Screenshot By Author

CHAPTER 5:

RESULTS & ANALYSIS

This chapter aims to present the empirical findings from the analysis of RSI (Relative Strength Index) divergences within the NIFTY50 index. It explores various aspects of these divergences, including the time required for their formation, detailed statistical characteristics, instances where divergences take longer to succeed (delayed success), and the overall success and failure rates, categorized into bullish and bearish divergences.

5.1 RSID Formation Period

Table 5.1a provides an overview of the number of days required for the Relative Strength Index (RSI) to form a divergence. The table breaks down the occurrences of both bullish and bearish divergences over various durations. In total, the table records 113 observations of divergences, with 32 bullish and 81 bearish instances.

Formation Duration	Both	Bullish	%	Bearish	%
1 - 7 days	31	7	22.58	24	77.42
8-14 days	51	15	29.41	36	70.59
15-21 days	20	6	30.00	14	70.00
>21 days	11	4	36.36	7	63.64
Total	**113**	**32**	**-**	**81**	**-**

Table 5.1a: Time It Takes To Form An RSI Divergence On NIFTY50

For the 1-7 days range, there were 31 total instances, with 7 being bullish (22.58%) and 24 being bearish (77.42%).

In the 8-14 days range, out of 51 total instances, 15 were bullish (29.41%) and 36 were bearish (70.59%). This range contains most of our data.

Within the 15-21 days range, there were 20 total instances, with 6 bullish (30.00%) and 14 bearish (70.00%).

For durations exceeding 21 days, there were 11 instances in total, split with 4 bullish (36.36%) and 7 bearish (63.64%).

Table 5.1b provides a detailed statistical breakdown of the durations taken for the Relative Strength Index (RSI) to form divergences. The table is divided into three categories: Both (combining bullish and bearish), Bullish, and Bearish.

Formation Duration	**Both**	**Bullish**	**Bearish**
Count	113	32	81
Mean	12.3097	13.4063	11.8765
Standard Deviation	6.8192	7.7745	6.4039
Skewness	1.5457	1.7671	1.3595
Kurtosis	2.8647	4.1103	1.6715

Table 5.1b: Statistical Analysis of RSI Divergence Formation Durations On NIFTY50

This analysis highlights the central tendency and variability in the duration for both bullish and bearish RSI divergences, as well as the shape and distribution characteristics. The higher skewness values suggest that the durations are positively skewed, indicating that there are more short-duration divergences with a few longer-duration ones. The kurtosis values reveal that bullish divergences have a higher peak (leptokurtic) compared to bearish divergences, which are more spread out (platykurtic).

5.2 RSID Extension Duration

Table 5.2a provides insight into instances where the RSI divergence forms but the price does not immediately follow the divergence, resulting in a delayed success. This data captures the occurrences where the divergence extends over various time frames before achieving success.

Extended Duration	Both	Bullish	%	Bearish	%
1-7 days	12	3	25.00	9	75.00
8-14 days	12	1	8.33	11	91.67
15-21 days	4	1	25.00	3	75.00
>21 days	3	0	0.00	3	100.00

Table 5.2a: Time By Which An RSI Divergence Extends On NIFTY50

For divergences that were extended by 1-7 days, there were 12 instances, with 3 being bullish and 9 being bearish, accounting for 25.00% and 75.00% respectively. For divergences extended by 8-14 days, there were also 12 instances, with only 1 being bullish (8.33%) and 11 being bearish (91.67%). For those extended by 15-21 days, there were 4 instances, with 1 being bullish (25.00%) and 3 being bearish (75.00%). For divergences extended beyond 21 days, there were 3 instances, all of which were bearish (100.00%), with no bullish instances observed.

This analysis highlights that extended divergences predominantly occur in bearish divergences. The data indicates that while some bullish divergences do extend before achieving success, bearish divergences are more likely to experience delayed success, particularly in the 8-14 days and beyond 21 days extensions. This pattern suggests that bearish divergences often require more time to manifest fully in the price action compared to bullish divergences.

Table 5.2b provides a detailed breakdown of the statistical characteristics for divergences that extend before achieving success, differentiating between bullish and bearish instances.

Particular	Both	Bullish	Bearish
Count	31	5	26
Mean	2.9292	1.2500	3.5926
Standard deviation	6.1871	3.6983	6.8352
Skewness	2.4696	3.5723	2.1643
Kurtosis	5.9432	13.9452	4.2695

Table 5.2b: Statistical Analysis of Extended Duration for RSI Divergences On NIFTY50

There were a total of 31 instances where divergences extended before success. Among these, 5 were bullish and 26 were bearish divergences.

The mean extended duration for all divergences was 2.9292 days. Bullish divergences had a mean extended duration of 1.2500 days, while bearish divergences had a longer mean extended duration of 3.5926 days.

The standard deviation, which measures the variability of the extended durations, was 6.1871 days for all divergences. Bullish divergences had a standard deviation of 3.6983 days, indicating less variability compared to bearish divergences, which had a standard deviation of 6.8352 days.

The skewness values indicate the asymmetry of the distribution of extended durations. For all divergences, the skewness was 2.4696, suggesting a right-skewed distribution with more instances having shorter extended durations. Bullish divergences had a higher skewness of 3.5723, indicating a more pronounced right skew. Bearish

divergences had a skewness of 2.1643, also indicating a right-skewed distribution but less pronounced than bullish divergences.

The kurtosis values show the "tailedness" of the distribution. For all divergences, the kurtosis was 5.9432, indicating a distribution with heavier tails than a normal distribution. Bullish divergences had a kurtosis of 13.9452, suggesting a very heavy-tailed distribution with a higher likelihood of extreme values. Bearish divergences had a kurtosis of 4.2695, also indicating a heavy-tailed distribution but less extreme than bullish divergences.

This statistical analysis highlights that bearish divergences tend to extend longer before achieving success compared to bullish divergences, and the variability is higher in bearish divergences. Both types of divergences exhibit right-skewed distributions with heavy tails, particularly pronounced in bullish divergences.

5.3 RSID Reliability In Various Formation Periods

Table 5.3a provides an overview of the success and failure rates of Relative Strength Index (RSI) divergences, categorized into both bullish and bearish divergences. The data presents a clear breakdown of total observations, failure rates, and success rates, along with further differentiation between immediate and delayed success.

All Observations	Both	%	Bullish	%	Bearish	%
Total	113	100.00%	32	100.00%	81	100.00%
Failed	14	12.39%	1	3.13%	13	16.05%
Success	99	87.61%	31	96.88%	68	83.95%
Immediate Success	68	68.69%	26	83.87%	42	61.76%
Delayed Success	31	31.31%	5	16.13%	26	38.24%

Table 5.3a: Outcome Analysis of RSI Divergences On NIFTY50

This analysis shows that a high percentage of RSI divergences (87.61%) result in successful outcomes, with bullish divergences having a higher success rate (96.88%) compared to bearish divergences (83.95%). Immediate success is more common overall, particularly for bullish divergences (83.87%), whereas bearish divergences have a higher rate of delayed success (38.24%). This data can be used to assess the reliability and timing of RSI divergences in market analysis.

Table 5.3b provides a detailed breakdown of the success and failure rates of RSI divergences specifically within a 1-7 day time frame, differentiating between both bullish and bearish divergences.

1 - 7 Days	Both	%	Bullish	%	Bearish	%
Total	31	100.00%	7	100.00%	24	100.00%
Failed	5	16.13%	0	0.00%	5	20.83%
Success	26	83.87%	7	100.00%	19	79.17%
Immediate Success	16	61.54%	7	100.00%	9	47.37%
Delayed Success	10	38.46%	0	0.00%	10	52.63%

Table 5.3b: Outcome Analysis of RSI Divergences for 1-7 Days On NIFTY50

Start Date	Confirmation Date	Formation Duration	Trade Type	Immediate Success	Extended Duration	Delayed Success	Trade Date
18/02/2002	26/02/2002	5	Sell	Yes	0	NA	27/02/2002
26/02/2002	07/03/2002	6	Sell	Yes	0	NA	08/03/2002
23/05/2002	31/05/2002	5	Buy	Yes	0	NA	03/06/2002
03/07/2003	14/07/2003	6	Sell	Yes	0	NA	16/07/2003
22/08/2003	02/09/2003	6	Sell	No	3	Yes	08/09/2003
22/01/2004	03/02/2004	5	Buy	Yes	0	NA	04/02/2004
13/04/2004	23/04/2004	6	Sell	Yes	0	NA	27/04/2004
19/04/2005	29/04/2005	7	Buy	Yes	0	NA	02/05/2005

04/08/2005	17/08/2005	7	Sell	Yes	0	NA	18/08/2005
05/04/2006	20/04/2006	7	Sell	Yes	0	NA	21/04/2006
31/01/2006	13/02/2006	7	Sell	No	0	No	Failed
05/05/2006	20/04/2006	7	Sell	No	12	Yes	10/05/2006
23/11/2009	03/12/2009	7	Sell	No	2	Yes	08/12/2009
13/06/2012	21/06/2012	4	Sell	No	0	No	Failed
04/01/2013	15/01/2013	6	Sell	No	7	Yes	25/01/2013
13/06/2013	24/06/2013	6	Buy	Yes	0	NA	25/06/2013
07/07/2013	21/07/2013	7	Buy	Yes	0	NA	22/07/2013
23/03/2016	04/04/2016	5	Sell	Yes	0	NA	05/04/2016
14/07/2016	25/07/2016	6	Sell	No	9	Yes	08/08/2016
07/02/2018	20/02/2018	7	Buy	Yes	0	NA	21/02/2018
31/07/2018	09/08/2018	6	Sell	No	10	Yes	28/08/2018
07/06/2021	15/06/2021	5	Sell	No	21	Yes	15/07/2021
25/06/2021	07/07/2021	7	Sell	No	13	Yes	15/07/2021
07/07/2021	15/07/2021	5	Sell	Yes	0	NA	16/07/2021
16/09/2021	27/09/2021	6	Sell	No	13	Yes	18/10/2021
24/02/2022	07/03/2022	5	Buy	Yes	0	NA	09/03/2022
04/05/2023	15/05/2023	6	Sell	No	0	No	Failed
30/05/2023	07/06/2023	5	Sell	No	0	No	Failed
07/06/2023	16/06/2023	6	Sell	No	0	No	Failed
15/12/2023	28/12/2023	6	Sell	No	12	Yes	15/01/2024
23/05/2024	03/06/2024	6	Sell	Yes	0	NA	04/06/2024

Table 5.3c: List of Observations In 1-7 Days Duration On NIFTY50

In this period, there were a total of 31 observations, with 7 being bullish and 24 being bearish. Among these, 5 instances failed to achieve the expected outcome, representing 16.13% of the total. All failures were bearish divergences, accounting for 20.83% of bearish instances. Notably, no bullish divergences failed within this period, indicating a 0.00% failure rate for bullish instances.

Successful divergences comprised 83.87% of the total observations. All 7 bullish instances were successful, reflecting a 100.00% success rate. In contrast, 19 out of 24 bearish divergences were successful, equating to a 79.17% success rate.

Further breakdown of the successful divergences shows that immediate success occurred in 16 instances, which is 61.54% of the total successful cases. All 7 bullish divergences achieved immediate success, while 9 out of 19 successful bearish divergences were immediate, representing 47.37% of the bearish success cases.

Delayed success was observed in 10 instances, which is 38.46% of the total successful cases. Interestingly, none of the bullish divergences fell into the delayed success category, whereas 10 out of the 19 successful bearish divergences were delayed, representing 52.63% of bearish success cases.

This analysis highlights the higher reliability of bullish RSI divergences within the 1-7 day timeframe, with all bullish instances achieving success, predominantly immediate. In contrast, bearish divergences, while mostly successful, show a significant portion of delayed success, indicating a variability in the timing of their outcomes.

Table 5.3d presents a comprehensive overview of the performance of RSI divergences within an 8-14 day period, distinguishing between bullish and bearish instances.

8-14 Days	**Both**	**%**	**Bullish**	**%**	**Bearish**	**%**
Total	51	100.00%	15	100.00%	36	100.00%
Failed	7	13.73%	1	6.67%	6	16.67%
Success	44	86.27%	14	93.33%	30	83.33%
Immediate Success	32	72.73%	12	85.71%	20	66.67%
Delayed Success	12	27.27%	2	14.29%	10	33.33%

Table 5.3d: Outcome Analysis of RSI Divergences for 8-14 Days On NIFTY50

Start Date	Confirmation Date	Formation Duration	Trade Type	Immediate Success	Extended Duration	Delayed Success	Trade Date
04/04/2000	25/04/2000	12	Buy	No	18	Yes	24/05/2000
20/06/2000	05/07/2000	10	Sell	No	4	Yes	13/07/2000
24/07/2000	07/08/2000	9	Buy	Yes	0	NA	08/08/2000
25/01/2001	15/02/2001	13	Sell	Yes	0	NA	16/02/2001
18/06/2001	09/07/2001	14	Buy	Yes	0	NA	10/07/2001
02/12/2002	13/12/2002	8	Sell	No	8	Yes	30/12/2002
13/12/2002	27/12/2002	8	Sell	Yes	0	NA	30/12/2002
17/03/2003	31/03/2003	8	Buy	Yes	0	NA	01/04/2003
14/07/2003	04/08/2003	14	Sell	No	0	No	Failed
22/09/2004	05/10/2004	8	Sell	Yes	0	NA	06/10/2004
02/12/2004	16/12/2004	9	Sell	No	11	Yes	03/01/2005
20/09/2005	04/10/2005	9	Sell	Yes	0	NA	05/10/2005
04/09/2006	21/09/2006	12	Sell	No	0	No	Failed
22/11/2006	06/12/2006	9	Sell	Yes	0	NA	07/12/2006
29/10/2007	14/11/2007	11	Sell	Yes	0	NA	15/11/2007
01/07/2008	16/07/2008	10	Buy	Yes	0	NA	17/07/2008
15/04/2009	05/05/2009	11	Sell	No	0	No	Failed
18/05/2009	05/06/2009	13	Sell	No	2	Yes	10/06/2009
22/09/2009	16/10/2009	14	Sell	Yes	0	NA	20/10/2009
19/03/2010	07/04/2010	10	Sell	Yes	0	NA	08/04/2010
23/07/2010	09/08/2010	10	Sell	No	20	Yes	23/08/2010
21/09/2010	04/10/2010	8	Sell	No	6	Yes	13/10/2010
05/05/2011	25/05/2011	13	Buy	Yes	0	NA	26/05/2011
16/05/2012	01/06/2012	11	Buy	Yes	0	NA	04/06/2012
10/05/2013	30/05/2013	13	Sell	Yes	0	NA	31/05/2013
02/04/2014	23/04/2014	11	Sell	Yes	0	NA	25/04/2013
23/05/2014	10/06/2014	11	Sell	No	18	Yes	07/07/2014
07/07/2014	24/07/2014	12	Sell	Yes	0	NA	25/07/2014

24/08/2015	07/09/2015	9	Buy	Yes	0	NA	08/09/2015
25/07/2016	08/08/2016	9	Sell	Yes	0	NA	09/08/2016
06/02/2017	23/02/2017	12	Sell	No	0	No	Failed
17/03/2017	05/04/2017	11	Sell	Yes	0	NA	06/04/2017
05/04/2017	26/04/2017	13	Sell	No	0	No	Failed
17/05/2017	05/06/2017	12	Sell	Yes	0	NA	06/06/2017
07/03/2018	23/03/2018	11	Buy	Yes	0	NA	26/03/2018
30/04/2018	14/05/2018	8	Sell	Yes	0	NA	15/05/2018
05/10/2018	26/10/2018	13	Buy	Yes	0	NA	29/10/2018
03/12/2018	19/12/2018	11	Sell	Yes	0	NA	20/12/2018
19/03/2019	02/04/2019	8	Sell	No	9	Yes	16/04/2019
02/04/2019	16/04/2019	9	Sell	Yes	0	NA	18/04/2019
05/08/2019	22/08/2019	10	Buy	Yes	0	NA	23/08/2019
07/11/2019	28/11/2019	13	Sell	Yes	0	NA	29/11/2019
23/07/2020	11/08/2020	12	Sell	No	24	Yes	16/09/2020
25/03/2021	12/04/2021	9	Buy	Yes	0	NA	13/04/2021
27/09/2021	18/10/2021	13	Sell	Yes	0	NA	19/10/2021
30/11/2021	20/12/2021	13	Buy	Yes	0	NA	21/12/2021
24/01/2022	14/02/2022	13	Buy	No	0	No	Failed
01/11/2022	16/11/2022	9	Sell	No	10	Yes	01/12/2022
28/02/2023	15/03/2023	9	Buy	No	7	Yes	28/03/2023
15/05/2023	30/05/2023	10	Sell	No	0	No	Failed
28/12/2023	15/01/2024	11	Sell	Yes	0	NA	17/01/2024

Table 5.3e: List of Observations In 8-14 Days Duration On NIFTY50

Within this timeframe, there were a total of 51 observations, comprising 15 bullish and 36 bearish divergences. Out of these, 7 instances failed, accounting for 13.73% of the total. Specifically, 1 bullish divergence failed, representing 6.67% of the bullish cases, while 6 bearish divergences failed, making up 16.67% of the bearish cases.

Success was achieved in 44 of the total observations, equating to 86.27%. Of the bullish divergences, 14 out of 15 were successful, resulting in a success rate of 93.33%. For bearish divergences, 30 out of 36 were successful, corresponding to an 83.33% success rate.

Breaking down the successful instances further, immediate success occurred in 32 cases, which is 72.73% of the total successful divergences. Among the bullish divergences, 12 out of 14 successful instances were immediate, leading to an immediate success rate of 85.71%. For bearish divergences, 20 out of 30 successful cases were immediate, amounting to 66.67%.

Delayed success was observed in 12 instances, representing 27.27% of the successful divergences. Within the bullish category, 2 out of 14 successful instances were delayed, accounting for 14.29%. In the bearish category, 10 out of 30 successful instances were delayed, making up 33.33%.

This analysis reveals that RSI divergences within the 8-14 day period predominantly result in success, with bullish divergences exhibiting a higher success rate compared to bearish ones. Immediate success is more common, particularly for bullish divergences, while a notable portion of bearish divergences achieve delayed success, indicating some variability in the timing of their effectiveness.

Table 5.3f provides an in-depth look at the success and failure rates of RSI divergences occurring within a 15-21 day period, with separate analyses for bullish and bearish divergences.

15-21 Days	**Both**	**%**	**Bullish**	**%**	**Bearish**	**%**
Total	20	100.00%	6	100.00%	14	100.00%
Failed	1	5.00%	0	0.00%	1	7.14%

Success	19	95.00%	6	100.00%	13	92.86%
Immediate Success	14	73.68%	4	66.67%	10	76.92%
Delayed Success	5	26.32%	2	33.33%	3	23.08%

Table 5.3f: Outcome Analysis of RSI Divergences for 15-21 Days On NIFTY50

Start Date	Confirmation Date	Formation Duration	Trade Type	Immediate Success	Extended Duration	Delayed Success	Trade Date
13/03/2001	12/04/2001	20	Buy	Yes	0	NA	16/04/2001
13/10/2003	04/11/2003	15	Sell	Yes	0	NA	05/11/2003
04/11/2003	04/12/2003	20	Sell	No	0	No	Failed
13/12/2005	06/01/2006	17	Sell	Yes	0	NA	09/01/2006
06/12/2006	03/01/2007	17	Sell	Yes	0	NA	04/01/2007
03/10/2007	29/10/2007	17	Sell	No	2	Yes	02/11/2007
12/10/2007	08/01/2008	16	Sell	Yes	0	NA	09/01/2008
21/06/2010	13/07/2010	15	Sell	No	29	Yes	23/08/2010
23/11/2011	20/12/2011	17	Buy	Yes	0	NA	21/12/2011
28/02/2013	25/03/2013	16	Buy	No	8	Yes	09/04/2013
19/09/2013	21/10/2013	19	Sell	No	8	Yes	01/11/2013
10/06/2014	07/07/2014	18	Sell	Yes	0	NA	08/07/2014
27/03/2015	27/04/2015	17	Buy	No	6	Yes	07/05/2015
10/11/2015	09/12/2015	18	Buy	Yes	0	NA	10/12/2015
14/05/2018	13/06/2018	21	Sell	Yes	0	NA	14/06/2018
28/11/2019	20/12/2019	15	Sell	Yes	0	NA	23/12/2019
20/12/2019	14/01/2020	15	Sell	Yes	0	NA	15/01/2020
14/01/2021	15/02/2021	20	Sell	Yes	0	NA	16/02/2021
18/08/2022	13/09/2022	16	Sell	Yes	0	NA	14/09/2022
09/05/2024	04/06/2024	17	Buy	Yes	0	NA	05/06/2024

Table 5.3g: List of Observations In 15-21 Days Duration On NIFTY50

For this timeframe, there were a total of 20 observations, with 6 being bullish and 14 being bearish divergences. Among these, only 1 instance failed to produce the

expected outcome, representing 5.00% of the total. This failure was a bearish divergence, accounting for 7.14% of bearish instances, while no bullish divergences failed, resulting in a 0.00% failure rate for bullish cases.

Successful divergences comprised 95.00% of the total observations. All 6 bullish instances were successful, yielding a success rate of 100.00%. For bearish divergences, 13 out of 14 instances were successful, which translates to a 92.86% success rate.

Further analysis of the successful divergences shows that immediate success occurred in 14 instances, representing 73.68% of the total successful cases. Specifically, 4 out of 6 successful bullish divergences were immediate, indicating an immediate success rate of 66.67%. For bearish divergences, 10 out of 13 successful instances were immediate, amounting to a 76.92% immediate success rate.

Delayed success was observed in 5 instances, or 26.32% of the total successful cases. Within the bullish category, 2 out of 6 successful instances were delayed, resulting in a 33.33% delayed success rate. For bearish divergences, 3 out of 13 successful instances were delayed, which corresponds to a 23.08% delayed success rate.

This analysis highlights the high reliability of RSI divergences within the 15-21 day timeframe, particularly for bullish divergences, all of which were successful. While bearish divergences also showed a high success rate, they had a slightly higher proportion of delayed successes compared to bullish divergences. Immediate success is predominant, especially for bearish divergences, but a notable portion of bullish divergences achieved delayed success.

Table 5.3h examines the success and failure rates of RSI divergences beyond 21 days period, distinguishing between bullish and bearish divergences.

>21 Days	Both	%	Bullish	%	Bearish	%
Total	11	100.00%	4	100.00%	7	100.00%
Failed	1	9.09%	0	0.00%	1	14.29%
Success	10	90.91%	4	100.00%	6	85.71%
Immediate Success	6	60.00%	3	75.00%	3	50.00%
Delayed Success	4	40.00%	1	25.00%	3	50.00%

Table 5.3h: Outcome Analysis of RSI Divergences Beyond 21 On NIFTY50

Start Date	Confirmation Date	Formation Duration	Trade Type	Immediate Success	Extended Duration	Delayed Success	Trade Date
04/01/2000	11/02/2000	26	Sell	Yes	0	NA	14/02/2000
02/09/2003	13/10/2003	27	Sell	No	3	Yes	17/10/2003
05/10/2004	18/11/2004	28	Sell	No	0	No	Failed
27/06/2005	04/08/2005	26	Sell	No	7	Yes	17/08/2005
04/10/2005	28/11/2005	34	Sell	No	28	Yes	06/01/2006
04/10/2010	05/11/2010	23	Sell	Yes	0	NA	08/11/2010
27/04/2015	09/06/2015	29	Buy	No	1	Yes	11/06/2015
21/11/2016	26/12/2016	24	Buy	Yes	0	NA	27/12/2016
16/04/2019	03/06/2019	29	Sell	Yes	0	NA	04/06/2019
12/03/2020	18/05/2020	41	Buy	Yes	0	NA	19/05/2020
13/05/2022	17/06/2022	24	Buy	Yes	0	NA	20/06/2022

Table 5.3i: List of Observations Beyond 21 Days Duration On NIFTY50

For divergences forming beyond 21 days, there were 11 total instances, with 4 being bullish and 7 being bearish, each making up 100% of their respective categories.

The failure rate for all divergences in this duration was 9.09%, with 1 instance failing to achieve the expected outcome. This failure occurred in the bearish category, accounting for 14.29% of bearish instances. There were no failures among bullish divergences.

The success rate for all divergences in this duration was 90.91%, with 10 instances achieving the expected outcome. Bullish divergences had a perfect success rate of 100.00%, with all 4 instances being successful. Bearish divergences had a success rate of 85.71%, with 6 successful instances.

Further analysis of the successful divergences reveals that 60.00% of the total successful instances were immediate successes, with 6 immediate successes overall. Among these, 3 were bullish divergences (75.00%) and 3 were bearish divergences (50.00%).

Delayed successes accounted for 40.00% of the total successful instances, with 4 delayed successes overall. Among these, 1 was a bullish divergence (25.00%) and 3 were bearish divergences (50.00%).

This analysis suggests that RSI divergences for Nifty stock beyond 21 days generally have a high success rate, especially for bullish divergences, which experienced no failures. However, the success rate for bearish divergences, while still strong, included a significant portion of delayed successes, indicating that bearish divergences within this longer timeframe may require more time to achieve the expected outcome. The presence of a small failure rate indicates that even in extended durations, there is some risk associated with bearish divergences.

5.4 How Long Does It Takes To Form A Divergence?

Though the mean value of a divergence formation on NIFTY50 index is 12.3 days, we see a high standard deviation of more than 6. After performing various outlier spotting tests, we find that the high standard deviation is not due to outliers rather due to the duration values spread in wide range of 1 day to 27 days for a z-score of 3 or less. The segmental analysis however provides some valuable insights.

Formation Duration	2000-2008	2008-2016	2016-2024
1-7 days	12	5	13
8-14 days	15	14	21
15-21 days	6	8	5
>21 days	5	2	4
Total	38	29	43

Table 5.4a: Segmental Comparison Of RSID Formation Duration

It is interesting to observe that the total number of divergences are more in first and third segment and less in second segment. One of the reasons for such results is the major 2008 crash. There have been crashes in other segments too but the 2008 crash seems to be the most impacting event.

It should also be noted that in all three segments, divergences which take more than 21 days are least occurring whereas majority of divergences form within 8-14 days range.

Formation Duration - Bullish	2000-2008	2008-2016	2016-2024
1-7 days	37.50%	18.18%	16.67%
8-14 days	50.00%	36.36%	58.33%
15-21 days	12.50%	36.36%	0.00%
>21 days	0.00%	9.09%	25.00%

Table 5.4b: Segmental Comparison Of Bullish RSID Formation Duration

We see the patterns continues in the subsection of only the bullish divergences as well. The segment 1 and segment 3 appears to be similar as compared to segment 2.

Further we can notice the same 8-14 days duration dominance however this time, ass the time progresses, the trend has changed to an increase towards longer timeframe starting from 0% in segment 1 to 25% in segment 3.

Formation Duration - Bearish	2000-2008	2008-2016	2016-2024
1-7 days	30.00%	16.67%	35.48%
8-14 days	36.67%	55.56%	45.16%
15-21 days	16.67%	22.22%	16.13%
>21 days	16.67%	5.56%	3.23%

Table 5.4c: Segmental Comparison Of Bearish RSID Formation Duration

It is interesting to note that where the range of beyond 21 days was increasing gradually over all three segments for bullish divergences, the exact opposite is happening for the bearish divergences. The occurrence has decreased gradually starting from 16.67% in segment 1, all the way down to 3.23% in the segment 3.

So, to answer the question, How long does it takes to form a divergence, It is evident that the mean, median and mode all lies in the 8-14 days range. We can not conclude that all divergence form within this range but we can conclude that the possibility of a divergence to form in this range is higher than any other time period. This range is not affected by the type of divergence whether bearish or bullish.

5.5 What Type Of Divergence Is Most Reliable?

To answer this question, we can do a segmental comparison of all the formation periods. The first one is 1-7 days.

1-7 Days	2000-2008	2008-2016	2016-2024
Total	**12**	**5**	**13**

Failed	**1**	**1**	**3**
Success	**11**	**4**	**10**
Immediate Success	**9**	**2**	**4**
Delayed Success	**2**	**2**	**6**

Table 5.5a: Segmental Comparison Of RSID Reliability In 1-7 Day Formation Period

It is clear from the table 5.4 that our range of 1-7 days is moderately reliable. Only 1 out of 12 trades fail in the first segment, 1 out of 5 trades fail in the second segment and 3 out of 7 trades fail in the third segment.

1-7 Days - Bullish	**2000-2008**	**2008-2016**	**2016-2024**
Total	**100.00%**	**100.00%**	**100.00%**
Failed	**0.00%**	**0.00%**	**0.00%**
Success	**100.00%**	**100.00%**	**100.00%**
Immediate Success	**100.00%**	**100.00%**	**100.00%**
Delayed Success	**0.00%**	**0.00%**	**0.00%**

Table 5.5b: Segmental Comparison Of Bullish RSID Reliability In 1-7 Day Formation Period

The reliability of 1-7 days divergence especially the ones categorized under bullish divergences is absolutely perfect with a 100% success rate in all segments. This shows that any trades that went wrong were from a bearish divergence.

1-7 Days - Bearish	**2000-2008**	**2008-2016**	**2016-2024**
Total	**100.00%**	**100.00%**	**100.00%**
Failed	**11.11%**	**33.33%**	**27.27%**
Success	**88.89%**	**66.67%**	**72.73%**
Immediate Success	**75.00%**	**0.00%**	**25.00%**
Delayed Success	**25.00%**	**100.00%**	**75.00%**

Table 5.5c: Segmental Comparison Of Bearish RSID Reliability In 1-7 Day Formation Period

We can confirm our previous observation from the data present in Table 5.6. the first segment shows a 11% failure rate, second segment shows a whopping 33% failure rate and the third segment shows a 27% failure rate. This suggests that the bearish divergences in this formation period are not stable.

Now we can take a look at the formation period of 8-14 days, We have already concluded that most of the divergences form within this range, hence its reliability is most important in the overall results of a divergence success study.

8-14 Days	**2000-2008**	**2008-2016**	**2016-2024**
Total	15	14	21
Failed	2	1	4
Success	13	13	17
Immediate Success	9	9	13
Delayed Success	4	4	4

Table 5.5d: Segmental Comparison Of RSID Reliability In 8-14 Day Formation Period

It is clear from the table 5.7 that 8-14 period is highly reliable. Only 2 out of 15 trades fail in the first segment, 1 out of 14 trades fail in the second segment and 4 out of 21 trades fail in the third segment.

It is interesting to observe that all segments have exactly equal number of divergences which achieved a delayed success. This number is 4 occurrences for all segments.

8-14 Days - Bullish	2000-2008	2008-2016	2016-2024
Total	100.00%	100.00%	100.00%
Failed	0.00%	0.00%	14.29%
Success	100.00%	100.00%	85.71%
Immediate Success	75.00%	100.00%	83.33%
Delayed Success	25.00%	0.00%	16.67%

Table 5.5e: Segmental Comparison Of Bullish RSID Reliability In 8-14 Day Formation Period

The reliability of 8-14 days divergence is outstanding and the reliability of only the bullish divergences in this range is almost accurate with 100% success rate in both segment 1 and 2. We must acknowledge that segment 3 however has a 14.29% failure rate which might be caused due to the all-time high value and market uncertainty due to the expected 2023 crash which didn't happen.

In all the cases of this type of divergence, we see strong reliability in terms of immediate success as well. Every 3 in 4 such successful divergences result in an immediate impact on the price reversal.

8-14 Days - Bearish	2000-2008	2008-2016	2016-2024
Total	100.00%	100.00%	100.00%
Failed	18.18%	10.00%	21.43%
Success	81.82%	90.00%	78.57%
Immediate Success	66.67%	55.56%	72.73%
Delayed Success	33.33%	44.44%	27.27%

Table 5.5f: Segmental Comparison Of Bearish RSID Reliability In 8-14 Day Formation Period

The bearish version of such divergences is also reliable however it is not as good as the bullish version. This is similar to what we concluded in 1-7 days range though better.

We must remember that bearish divergences occur as much as twice of the bullish divergences and this can explain the reduced success rates. Nevertheless, we observe an 80-90% success rate in bearish divergences which are formed within 8-14 days. The Distribution of immediate success and delayed success is also evenly spread in this version being 55-75% and 25-45% on average respectively.

Now we take a closer look at the divergences formed in the 15-14-day range. This range has lesser occurrences of divergences as compared to 1-7 and 8-14 day formation period.

15-21 Days	**2000-2008**	**2008-2016**	**2016-2024**
Total	6	8	5
Failed	1	0	0
Success	5	8	5
Immediate Success	4	4	5
Delayed Success	1	4	0

Table 5.5g: Segmental Comparison Of RSID Reliability In 14-21 Day Formation Period

We see an overall better performance in comparison to the previous formation periods in this one where 5 out of 6 trades were successful in first segment, and all the trades in the second and third segment were successful.

15-21 Days - Bullish	**2000-2008**	**2008-2016**	**2016-2024**
Total	100.00%	100.00%	0.00%
Failed	0.00%	0.00%	0.00%
Success	100.00%	100.00%	0.00%
Immediate Success	100.00%	50.00%	0.00%
Delayed Success	0.00%	50.00%	0.00%

Table 5.5h: Segmental Comparison Of Bullish RSID Reliability In 14-21 Day Formation Period

The bullish version of this divergence show an excellent 100% success rate in the first segment. All the divergences were immediately successful. The second segment also shows a 100% accuracy but this time there was an event split bnetwen immediate successful and delayed success outcomes. It is concerning to note that there were no trades found in the third segment meaning that all the trades were bearish in nature.

15-21 Days - Bearish	**2000-2008**	**2008-2016**	**2016-2024**
Total	100.00%	100.00%	100.00%
Failed	20.00%	0.00%	0.00%
Success	80.00%	100.00%	100.00%
Immediate Success	75.00%	50.00%	100.00%
Delayed Success	25.00%	50.00%	0.00%

Table 5.5i: Segmental Comparison Of Bearish RSID Reliability In 14-21 Day Formation Period

Unlike the other formation periods, the bearish versions of divergences formed in the 14–21 day range is also reliable. The first segment shows a 80% success rate however the second and third segments show 100% accuracy.

So far, the 14–21-day formation period of divergence is the most reliable range on an overall basis. Let’s us now discuss the final formation period which is beyond 21 days.

>21 Days	**2000-2008**	**2008-2016**	**2016-2024**
Total	5	2	4
Failed	1	0	0
Success	4	2	4
Immediate Success	1	1	4

Delayed Success	3	1	0

Table 5.5j: Segmental Comparison Of RSID Reliability In Beyond 21 Day Formation Period

We see that this formation period contains the rarest divergences with only 5, 2 and 4 total count in all three segments respectively. We see that only the first segment shows a single count of failure. Except that this range has an overall 100% accuracy.

>21 Days - Bullish	**2000-2008**	**2008-2016**	**2016-2024**
Total	0.00%	100.00%	100.00%
Failed	0.00%	0.00%	0.00%
Success	0.00%	100.00%	100.00%
Immediate Success	0.00%	0.00%	100.00%
Delayed Success	0.00%	100.00%	0.00%

Table 5.5k: Segmental Comparison Of Bullish RSID Reliability In Beyond 21 Day Formation Period

The bullish version of divergences formed in more than 21 days are highly reliable as there is an absolute 100% accuracy. Though there was no occurance of this type of divergence in the first segment, the second segment shows all divergences have a delayed success and the third segment shows all divergences are successful immediately.

>21 Days - Bearish	**2000-2008**	**2008-2016**	**2016-2024**
Total	100.00%	100.00%	100.00%
Failed	20.00%	0.00%	0.00%
Success	80.00%	100.00%	100.00%
Immediate Success	25.00%	100.00%	100.00%
Delayed Success	75.00%	0.00%	0.00%

Table 5.5l: Segmental Comparison Of Bearish RSID Reliability In Beyond 21 Day Formation Period

There was no bullish version of divergences in this formation period in the first segment and all the occurrences were bearish. Out of those, 20% failed. The second and third segment have a 100% accuracy. In both the segments, we see that all divergences were successful immediately.

Now to conclude the answer to the question "What type of divergences are most reliable?" – We can say that there is a close tie between the 14-21 and beyond 21-day divergences. In fact one must look for 14 day and beyond formation periods to trade with the most reliable divergences.

It is important to note that other formation periods like 8-14 and 1-7 are also reliable and one must not ignore them. We see an overall higher accuracy for bullish versions as compared to bearish versions.

One may avoid going short on bearish divergences as we have observed as high as 33% failure rates and may only use bearish divergences for exit planning for long positions taken on bullish divergence basis.

5.6 Chapter Summary

This chapter discussed that the most reliable divergences are those forming within the 15-21 day and beyond 21-day periods, showing the highest success rates. While other periods like 8-14 days and 1-7 days also demonstrated reliability, they exhibited more variability, particularly with bearish divergences, which had higher failure rates.

Therefore, traders are advised to focus on longer formation periods for the most reliable divergences and use bearish divergences primarily for exit strategies from long

positions rather than initiating short positions. Bullish divergences consistently showed superior reliability across all periods.

CHAPTER 6:

VALIDATION

Validation represents a cornerstone in any empirical study of financial markets, serving as the bridge between theoretical concepts and their practical applicability. To rigorously test the findings of this study, we engaged the expertise of one of India's foremost technical analysts, Jyoti Bansal. She is a certified Investment Advisor and Technical Analyst, recognized for her contributions to stock market education in India. Her institute has educated over 180,000 students across eight international best-selling programs, which have garnered over 40,000 positive reviews online.

It is critical to acknowledge that direct trading on the NIFTY50 index is not feasible, as the index itself cannot be traded directly; rather, it can only be accessed through derivatives such as Futures & Options. These instruments often have short expiration periods, typically as brief as seven days, rendering them unsuitable for implementing divergence-based trading strategies effectively. To navigate this constraint, we selected Reliance Industries Ltd. (RELIANCE), the stock with the highest weightage in the NIFTY50 index at the time of this study, for our validation exercises.

The validation phase was conducted using a 15-minute timeframe, diverging from the daily timeframe employed in the broader research, to align with the research timeline mandated by SSBM Geneva. Eight trades were executed during the fourth quarter of FY23-24, spanning from January to March 2024. Notably, only bullish divergence trades were considered for this validation, in accordance with the parameters established in this study, while bearish divergence trades were excluded. The subsequent sections provide a comprehensive analysis of each trade executed during this validation period.

6.1 First Trade – January 1st, 2024

The validation commenced on January 1st, 2024, with the identification of the first bullish divergence as soon as the day's initial 15-minute candle closed. This divergence originated on December 29th, 2023, but was confirmed on January 1st, 2024, thereby falling within our specified validation period.

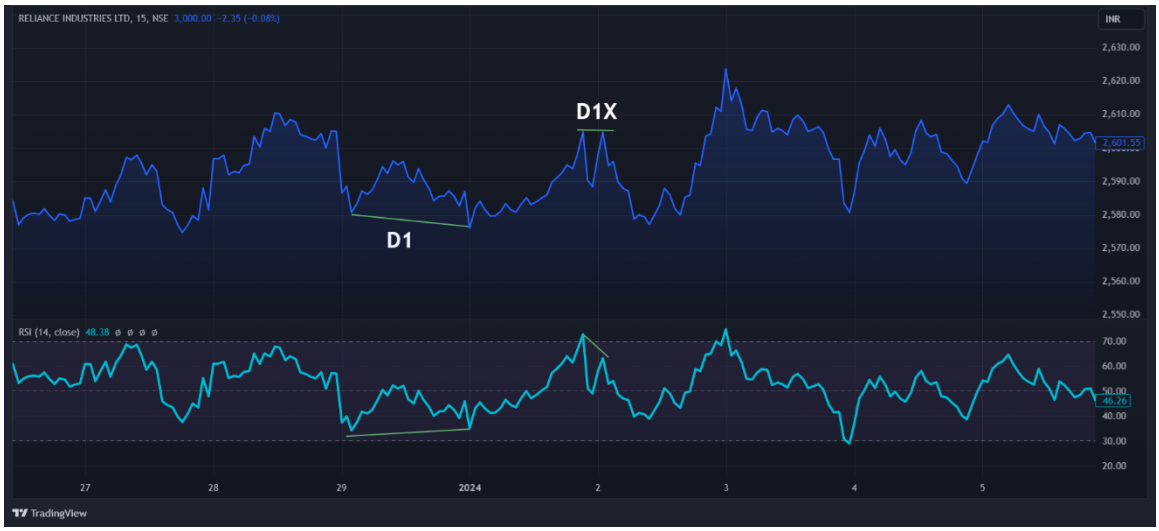

Figure 6.1a: First trade based on bullish divergence Source: Screenshot by Author

The trade was executed on the subsequent 15-minute candle at an average buying price of ₹2580. The D1X marker in Figure 6.1 indicates a bearish divergence, which was used as the exit signal for this long position, resulting in a sale at an average price of ₹2602.

6.2 Second Trade – January 18th, 2024

Following the first trade, there was a hiatus of more than two weeks before the next trade opportunity arose. The divergence for this trade began on January 17th, 2024, with confirmation on the following day, January 18th, 2024.

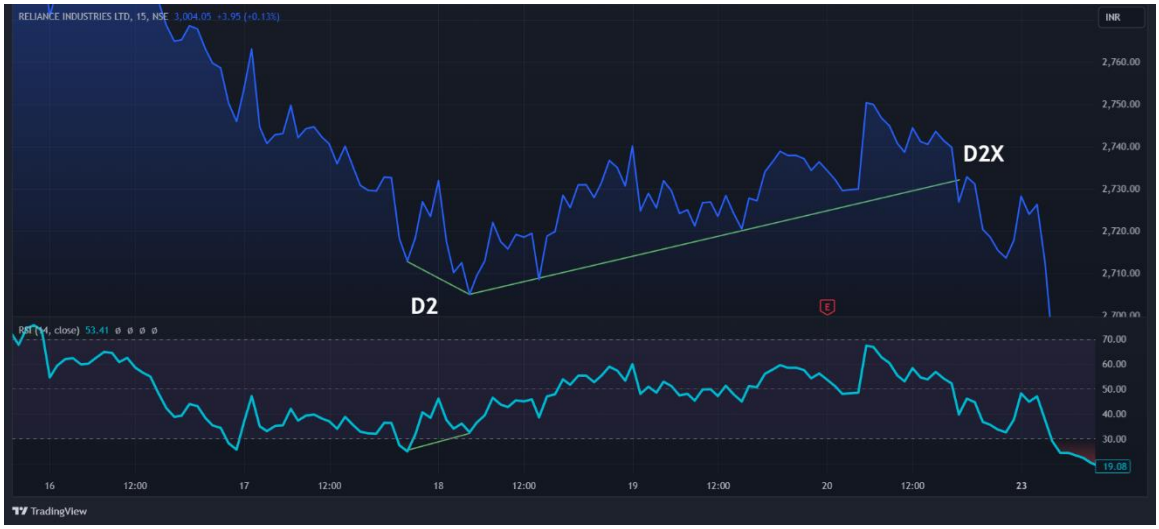

Figure 6.2a: Second trade based on bullish divergence Source: Screenshot by Author

The trade was executed at 10:35 AM at an average buying price of ₹2710. The D2X marker in Figure 6.2 displays a trendline, which served as the exit signal in the absence of any bearish divergence. The position was closed at an average selling price of ₹2731.

6.3 Third Trade – January 23rd, 2024

The third trade was notably profitable and was identified within a week of the second trade. The divergence started and was confirmed on January 23rd, 2**024.**

Figure 6.3a: Third trade based on bullish divergence Source: Screenshot by Author

This trade was executed at 3:15 PM at an average buying price of ₹2660. The D3X marker in Figure 6.3 indicates a bearish divergence, which was used as the exit signal. The position was closed at an average selling price of ₹2887.

A potential point of confusion could arise from the D3F marker, which resembles a false divergence. While the RSI was declining and the price was increasing, it is crucial to note that on January 25th, 2024, at 10:45 AM, the RSI dipped below 50 before the bearish divergence was completed, invalidating it as a legitimate signal.

6.4 Fourth Trade – February 6th, 2024

The fourth trade presented a complex scenario and was observed during the first week of February. The divergence started and was confirmed on February 6th, 2024.

Figure 6.4a: Fourth trade based on bullish divergence Source: Screenshot by Author

The trade was executed at 3:15 PM at an average buying price of ₹2853. The D4X marker in Figure 6.4 shows the RSI exceeding the 70 level before starting to decline, which served as the exit signal. The position was closed at an average selling price of ₹2928.

This trade was deemed complicated due to the presence of a support-resistance level at D4SR and an unclear trendline at D4TL. The trendline was not fully confirmed, lacking a third touchpoint at the time of exit. Consequently, reliance was placed on the RSI topping out, which, while generally not a reliable signal, was the best available option in this case.

6.5 Fifth Trade – February 28th, 2024

The fifth trade occurred after a three-week hiatus. The divergence began and was confirmed on February 28th, 2024.

Figure 6.5a: Fifth trade based on bullish divergence Source: Screenshot by Author

The trade was executed at the market's open the next day using a limit order, during a gap-up opening. The average buying price was ₹2936. The D5X marker in Figure 6.5 indicates a bearish divergence, which was used as the exit signal. The position was closed at an average selling price of ₹2995.

It is possible that this trade was exited prematurely, as the bearish divergence extended further. However, such possibilities were excluded from this study to prevent any forward bias during the analysis.

6.6 Sixth Trade – March 11th, 2024

The sixth trade demonstrated an extended divergence scenario. The divergence began on March 7th, 2024, and was confirmed on March 11th, 2024, at 12:00 PM.

Figure 6.6a: Sixth trade based on bullish divergence Source: Screenshot by Author

The trade was executed on the next 15-minute candle at an average buying price of ₹2946. The D6E marker in Figure 6.6 shows the divergence being extended. It is crucial not to confuse this with a failed divergence, as the RSI value on the start date was 29.28, and at no point did the RSI fall below this value.

A support-resistance zone, represented by D6SRZ, was observed. When the price failed to sustain above this zone, the position was exited at D6X after the breach of the zone's lower level, at an average selling price of ₹2946, resulting in a break-even trade.

6.7 Seventh Trade – March 14th, 2024

Following the break-even trade, a new opportunity for the seventh trade arose. The divergence started on March 13th, 2024, and was confirmed on March 14th, 2024, at 12:30 PM.

Figure 6.7a: Seventh trade based on bullish divergence Source: Screenshot by Author

The trade was executed at an average buying price of ₹2875. The D7E marker in Figure 6.7 shows the divergence being extended. It is essential not to misinterpret this as two separate divergences, as the RSI never reached the 50 level, which we consider a criterion for concluding a divergence in such cases.

The price increased after the divergence extension, and the RSI topped out at 70. As the RSI began to decline, the decision was made to exit the trade when it reached the buying price, resulting in a break-even outcome with an average selling price of ₹2875.

6.8 Eighth Trade – March 26th, 2024

After two consecutive break-even trades due to extended divergences, a relatively straightforward trade was identified on March 26th, 2024, and confirmed on the same day at 3:00 PM.

Figure 6.8a: Eighth trade based on bullish divergence Source: Screenshot by Author

The trade was executed at an average buying price of ₹2894 using a limit order at the market's open the next day. The D8X marker indicates the formation of a bearish divergence, and the position was exited when the RSI fell below 70, at an average selling price of ₹2985. Although this may have been a premature exit, the decision was made to maintain consistency in the study's results.

6.9 Validation Phase Results

While RSI divergence is an extraordinary phenomenon, its practical application in real-money trading presents significant challenges. Entering a position may be relatively straightforward, but exiting it can be particularly challenging in the absence of a counter divergence on the chart. Without Jyoti Bansal's extensive experience, the outcomes of this validation phase might have differed significantly. The table below summarizes the results:

Trade	ROI
1	0.45%
2	0.82%
3	9.02%
4	11.44%
5	13.22%
6	12.76%
7	12.26%
8	15.34%

Table 6.1: Validation Results For Divergence During Jan – Mar 2024 On RELIANCE

ROI in Table 6.1 represents the compounded return on the total investment after deducting brokerage charges, transaction charges, goods and services tax, stamp duty charges, exchange fees, securities transaction tax, and any other relevant fees.

During the three-month validation period, an overall return of 15.34% was achieved across the 8 trades. The average duration of RSI divergence formation was 14 days, which aligns with the findings of this study.

Divergences that formed beyond 14 days resulted in 100% accuracy, while those forming within the 8-14 day period led to two trades exiting at break-even. Considering the actual cost of trading, these break-even exits resulted in a net loss. No divergences were observed within a 1-7 day formation period during our validation, though this may be attributed to the limited sample size.

Both of the divergences that extended beyond their typical formation period resulted in losses, while all successful trades were based on divergences that were immediate in nature.

6.10 Chapter Summary

The validation exercise underscored the practical challenges and considerations in trading based on RSI divergences. While the theoretical model demonstrated its robustness, particularly for divergences forming beyond 14 days, real-world application revealed the nuances of exit strategies and the importance of immediate divergences for successful trades. The insights gleaned from this validation phase serve as crucial feedback for refining trading strategies and underscore the value of seasoned expertise in executing and interpreting these technical signals.

CHAPTER 7:

CONCLUSION

This study aimed to empirically evaluate the performance of Relative Strength Index Divergence (RSID) as a predictive tool within the NIFTY50 index. Through a meticulously designed methodology, comprehensive data analysis, and a rigorous validation phase, the research provides significant insights into the nuances of RSI divergences and their practical applications in financial market trading.

7.1 Concluding The Research Hypotheses

Our hypothesis (H1.1) posited that RSI divergence reliably predicts stock trend reversals within specific timeframes. The empirical data supports this hypothesis, particularly for divergences forming in the 14-21 day range and beyond 21 days, which exhibited the highest success rates across all periods and segments. These timeframes demonstrated near-perfect reliability, with very few failed signals, thus offering traders robust benchmarks for entering and exiting trades.

Bullish Divergences consistently showed higher reliability and immediate success rates compared to bearish divergences. This suggests that positive market momentum, as indicated by bullish divergences, might have more predictable impacts on stock prices.

Bearish Divergences showed higher incidences of delayed success and occasional failures. These occurred more frequently during market downtrends and periods of heightened volatility, reflecting the cautious sentiment and slower reversal actions typical in declining markets.

H1.2 Duration for Divergence Formation: Our findings confirm that typical RSI divergences form and signal a trend reversal predominantly within an 8-14 day period—validating this hypothesis.

H1.3 Types of Divergences: Certain types of RSI divergences—particularly those forming bearish patterns in overextended markets—demonstrated variable reliability. This validates our hypothesis about the differential performance of bullish and bearish divergences, with bullish divergences generally showing a higher predictive reliability.

H1.4 Transactional Costs: Including brokerage fees and other transactional costs was essential to gauge net profitability accurately. The validation phase underscored that despite trading accounts for all transactional costs, RSI Divergence remains profitable.

7.2 Dissertation Summary

The dissertation structure was devided into 7 chapters as per the guidelines provided by the Swiss School of Business and Management, Geneva.

Chapter 1 introduced the concept of RSI and RSI Divergence and then discussed the research problem, it's significance, questions, objectives, hypothesis, scope and limitations.

Chapter 2 provided a comprehensive overview on all major works before the development of RSI. Afterwards, this chapter discussed the concept of RSI and it's use as originally explained by Wilder. Then this chapter explored various key studies on RSI and concluded key themes and gaps in the literature. The chapter discussed the work by Bansal which narrows the gap and brings the research back to the lost track which serves as the basis of this dissertation.

Chapter 3 detailed the research methodology used in this dissertation featuring a systematic case study approach, spanning from 2000 to 2024, to capture the diverse market conditions, including major financial crises and economic events. The decision to employ a manual observation method over automated tools was justified by the need for nuanced and accurate detection of RSI divergences, recognizing the limitations of

automated systems in capturing subtle patterns. Data was sourced from the NIFTY50 index, ensuring robustness and comprehensiveness. The data was strategically divided into three eight-year periods to analyze the performance and reliability of RSI divergences across varied market environments.

Chapter 4 presented all the 110 observations with year wise images of divergences. This chapter was divided into 8 subsections of 3 years each and discussed the dates of starting point and confirmation point in timeline. It also discussed if the divergence failed, was immediately successful, or it succeeds with a delay.

Chapter 5 presented empirical results & analysis highlighting the formation characteristics and statistical properties of RSI divergences. It was observed that most divergences formed within an 8-14 day range. Bullish divergences, which were slightly longer on average than bearish ones, showed higher kurtosis, indicating more extreme values. The analysis revealed a common occurrence of short-duration divergences, with positive skewness in formation durations. The chapter then extends the discussion by analyzing the reliability of various RSI divergence formation periods. It was noted that the 15-21 day and beyond 21-day ranges were the most reliable, with near-perfect success rates. This contrasted with the more common 1-7 and 8-14 day periods, which still showed considerable reliability, especially for bullish divergences. The study identified that bullish divergences consistently outperformed bearish ones in terms of reliability, making them more suitable for predictive trading strategies.

Chapter 6 validated these findings through real-world application by executing eight trades based on bullish RSI divergences on Reliance Industries Ltd. (RELIANCE) during the first quarter of FY23-24. Overseen by expert technical analyst Jyoti Bansal, this phase underscored practical challenges and affirmed the theoretical findings with an overall 15.34% return on investment across the trades. The validation revealed the

intricacies of trading based on RSI divergences, particularly highlighting the importance of immediate divergences for successful trades and the nuanced challenges posed by extended divergences.

Chapter 7 is the current chapter and provides the conclusion to this dissertation by providing a summary, discussions the hypothesis results, key takeaways, limitations and future research opportunities.

7.3 Key Takeaways

RSI divergences predominantly formed within an 8-14 day range. Bullish divergences exhibited a slightly longer formation duration than bearish ones and showed higher statistical extremes.

Divergences forming in the 15-21 day and beyond 21-day ranges demonstrated the highest reliability, while the 1-7 and 8-14 day ranges also showed significant reliability, particularly for bullish divergences.

Real-world application on RELIANCE confirmed the theoretical reliability of RSI divergences, especially when immediate. The validation trades yielded a positive return, thereby underscoring the practical applicability of the study's findings.

Manual identification of divergences, despite its potential biases, was crucial for nuanced detection that automated tools might miss, ensuring accuracy in the study.

Analyzing data across three distinct periods provided a comprehensive understanding of RSI divergences under different market scenarios, contributing to the robustness of the research findings.

7.4 Research Limitations

Despite the robustness of the methodology and comprehensive analysis, several limitations were acknowledged which may impact the generalizability and applicability of the study's findings:

The reliance on manual observation for identifying RSI divergences introduced the potential for human error and subjective bias. While cross-verification was employed, such biases cannot be entirely eliminated.

Issues such as missing data points and survivorship bias, due to changes in the NIFTY50 index composition over time, are inherent limitations that could affect the study's findings. Although data cleaning techniques were applied, these constraints remain a factor.

The effectiveness of RSI divergences may vary across different markets and asset classes. This study's findings are specific to the NIFTY50 index and may not be generalizable to other indices or markets with different structures and behaviors.

The study primarily utilized a 14-day RSI period, as per J. Welles Wilder’s recommendation. Different RSI settings and parameters might yield varying results as suggested by Dr. Bansal, which were not explored in this research.

7.5 Future Research Directions

Future studies could focus on developing more sophisticated automated algorithms capable of accurately detecting RSI divergences, potentially supplemented by machine learning techniques to reduce subjectivity and enhance accuracy.

Extending the analysis to other stock indices, asset classes, and international markets would help determine the generalizability of RSI divergence efficacy across different market conditions and environments.

Investigating the impact of using various RSI periods (e.g., 7-day, 21-day) and combining RSI with other technical indicators might provide a more comprehensive understanding and improve predictive accuracy.

Implementing real-time trading simulations and back-testing strategies using historical data across different markets can offer practical insights and refine divergence-based trading strategies.

Further research could delve into the impact of specific economic events, regulatory changes, and technological advancements on the efficacy of RSI divergences, providing a more detailed contextual understanding.

7.6 Ethical Considerations

Throughout this research, ethical considerations were stringently observed to ensure the integrity and credibility of the findings. Data integrity was maintained by sourcing historical data from official database, ensuring accuracy and authenticity. Transparency in the research methodologies, analytical framework, and findings facilitated validation by industry expert – Jyoti Bansal. Efforts were made to avoid misleading conclusions by objectively interpreting the results and properly citing all theoretical frameworks and secondary data sources, respecting intellectual property rights.

7.7 Final Thoughts

In conclusion, this study offers a comprehensive and empirical analysis of RSI divergences within the NIFTY50 index, highlighting their formation characteristics, reliability, and practical applicability. The robust methodology, combined with detailed empirical analysis and practical validation, underscores the potential of RSI divergences as a valuable tool for market analysis and trading decisions. While limitations exist, the insights gained contribute significantly to the understanding of RSI divergences, providing a solid foundation for future research and practical applications in financial market trading.

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