



Study on Relative Strength Index and Moving Average Convergence Divergence in Capital Market

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Abstract: Technical analysis is made by investors & traders for decision making of investments in both developing and developed markets. The main tools of technical analysis are MACD (Moving Average Convergence Divergence) and RSI (Relative Strength Index) which are used to determine future trend of prices of stock. In country like India, being a developing market, technical analysis usage by investors is limited to the use of MACD and other nominal indicators. The research covers sample representing the equity which are continually traded on the NSE. This research is helpful to determine the applicability of MACD and RSI indicators for a Profitable investment decision making on Indian Financial Market. The main objective of the research is to identify the potential contribution of standard MACD and RSI indicators vis-à-vis optimized MACD and RSI indicators. The main hypotheses of the research is that the application of standard MACD and RSI indicators contribute to profitable investments than buy and hold strategy (Efficient Market Hypotheses). The tools of data analysis include Excel Mathematical calculations. Research results indicate that the buy and hold strategy results in profitable investments than standard MACD and RSI indicators. According to the obtained results it is concluded that Optimized MACD and RSI indicators are more profitable than buy and hold strategy. And hence Optimized MACD and RSI indicators defy Efficient Market Hypotheses.

Index Terms - Component, formatting, style, styling, insert.

I. INTRODUCTION

India heavily relies on FII to support its markets. Daily FII data released by NSE / BSE affect the trend of Indian equity market. A strong financial market with broader participation of small Indian investors is essential for a sustainable economic growth of country. India's household saving can be brought in equity market. India though with such a high population is hardly invested in share market either directly or indirectly through Mutual funds. Out of so many companies listed on the markets, very less companies are actively traded. Since the entire structure has a speculative culture, it exposes investors to greater risks and restricts real capital formation.

Technical analysis has been continuously used by traders and investors to make investment decisions in developed markets. But in India, its use is relatively very less. Small Indian investor suffers losses in trading due to lack of knowledge of fundamental analysis and technical analysis. Fundamental analysis is difficult for an investor to understand. Also it is very difficult for Indian investor to decide which stock to buy. But technical analysis is relatively simpler. The tools of technical analysis are easy to understand and can be implemented by Indian investors. MACD and RSI as a technical tool can be of great help to an Indian investors. But in developing market like India, use of technical analysis by small investors is limited to use of standard MACD and other indicators developed by respective technicians. The paper studies these tools and uses it in Indian market to prove its viability in the Indian Market. Due to inefficiency of these standard tools, optimized MACD and RSI tools can be of great help to Indian investors.

The fundamental approach studies the firm's basic earnings and risk on the market price of its shares, whereas the technical approach concentrates on the patterns of stock market prices. The technical approach states that past share prices and volumes tend to follow a pattern and they can be used to predict future price movements. Forces of demand and supply determine the share prices. In recent years the popularity of technical analysis is increasing amongst academicians and practitioners. There has been some empirical research on technical analysis, for developed capital markets. However similar empirical work for developing markets especially India is limited. So, an empirical testing of technical indicators for Indian stock market is considered important.

II. REVIEW OF LITERATURE

In (2008) Chong & Ng it is indicated that a sign buy is produced when greater MACD than 0. A sell is generated when MACD sign is negative. In our study, the buy and sale orders of MACD are generating as follows: When the fast signal line crosses the slow signal line from below zero and also if it crosses above zero. A sell signal is generated when the fast signal line crosses the slow signal line from above zero and also if it crosses from below zero. R Rosilli et al (2013) studies the use of MACD in Spanish

market and concludes the effectiveness of MACD as a powerful indicator. They have developed software which gives buy/sell signal on the basis of MACD and other technical tools. The application of the optimized MACD and RVI indicators of technical analysis in decision making process on investing on the financial market significantly contributes maximization of profitability on investments in equity markets (Dejan Eric et al (2009)). The results imply that the MACD and RVI indicators are effective upon formulating and optimizing investment strategy on financial market in transitional country. V Subramanian et al (2014) in their paper concluded that with the help of technical analysis and by adopting simple trading rules, there are possibilities for an ordinary investor to earn more returns than returns under simple buy and hold policy. Hung-Wei Lai et al (2010) found that the “disposition,” “information cascade,” and “anchoring” effects each have significant impacts on trading signals in equity markets.

Technical analysis has become an interesting field among academics and chartists since the publication of Efficient Market Hypothesis (EMH) by Fama (1970). According to EMH, in an efficient market, stock price reflects fully all the available information and rational investors make better price discovery. Hence no strategy will give higher than simple buy-and-hold return in an efficient market. On the other hand, authors like Irwin and Park (2007) and Lento (2008) substantiated technical analysis and reported excess returns over simple buy-and-hold policy by applying technical rules.

Antoniou et al(1997) have argued that technical analysis which incorporates data on volume as well as returns may provide evidence of return predictability that technical analysis on returns alone will not. The rationale for this is based on the premise that volume contains information regarding the quality and arrival of information which is not contained in prices. Zoran Grubisic et al (2012) concluded that technical analysis is an excellent tool for evaluation of price patterns, but that the possibility of its use is limited to subjective way of forecasting future price movement of securities. Given the subjectivity, signals for purchase or sales may differ from the actual (future), which affects wrong investment decisions. Therefore, it is often used as an additional technique with the use of fundamental analysis. Moving averages are used primarily within the methods of technical analysis, because the analysis of existing trends provides the most accurate signals to buy or sell.

Terence Mills (1997) investigates the predictive ability of various simple technical trading rules by analyzing daily data on the London Stock Exchange FT30 index for the period 1935-1994. The results for the first forty years of sample are thus consistent, in almost every respect, with those of Brock et al. (1992) for the Dow in New York. It is in the last of sub-samples that the performance of the trading rules deteriorates badly. Indeed, it could be argued that it is only from the early 1980s that a buy and hold strategy begins clearly to dominate.

Dedhy Sulistiawan et al (2014) study examines whether technical analysis signals can detect trading opportunities in declining market. They found that technical analysis produces bigger returns than buy and hold returns in the bad time.

III. DATA AND METHODOLOGY

The main objective of the research is to identify the potential contribution of standard MACD and RSI indicators vis-à-vis optimized MACD and RSI indicators. The study is based on secondary data collected from various sources like SEBI manuals, NSE, BSE annual reports, journals and books on the subject. The research is historical in nature as it studies past data to analyze and interpret. The scope of study is limited to study and applicability of two technical analysis tools i.e. MACD and RSI on stocks trading on equity market in India and to suggest how it will help Indian investor to earn returns in excess of Index returns. The period of the study is three years from April 2020 to March 2022. Microsoft excel has been used to analyse the data.

The paper selects following stocks from Indian market from various sectors as follows:

- (i) Information Technology Sector – Infosys
- (ii) Automobile Sector – Mahindra and Mahindra
- (iii) Banking Sector – HDFC Bank

IV. TECHNICAL ANALYSIS TOOLS

Technical analysis is the analysis of market price movements and trading volume for the stock under investigation. The general goal of technical analysis is to identify regularities in the time series of prices by extracting nonlinear patterns from noisy data. Technical indicators are one of the main important segments of technical analysis. There are two main types of indicators: leading and lagging. Lagging indicators identify the movement and strength of the trend, while leading indicators identify the level of overbought and oversold of stock prices. MACD is a lagging indicator and RSI is a leading indicator.

V. MOVING AVERAGE CONVERGENCE DIVERGENCE (MACD)

Developed by Gerald Appel in the late seventies, the Moving Average Convergence/Divergence oscillator (MACD) is one of the simplest and most effective momentum indicators available. The MACD turns two trend-following indicators, moving averages, into a momentum oscillator by subtracting the longer moving average from the shorter moving average. The MACD Line is the 12-day Exponential Moving Average (EMA) less the 26-day EMA. Closing prices are used for these moving averages. A 9-day EMA of the MACD Line is plotted with the indicator to act as a signal line and identify turns. The MACD fluctuates above and below the zero line as the moving averages converge, cross and diverge. Traders can look for signal line crossovers, centerline crossovers and divergences to generate signals. Because the MACD is unbounded, it is not particularly useful for identifying overbought and oversold levels.

MACDS = 9 day exponential moving average (EMA)– “Signal line”

MACD = Difference between 26 and 12 days EMA

VI. RELATIVE STRENGTH INDEX

Developed J. Welles Wilder, Relative Strength Index (RSI) is another oscillators examined here. A stock is considered overbought when its RSI is above 70, while it is regarded as oversold when the RSI is below 30. When the RSI is above 50, it indicates a bullish signal, while the security is considered bearish when the RSI is below 50. In this article, the 14-day RSI, a popular length utilized by traders, will be studied. To implement the trading rule, a buy signal is triggered when the RSI crosses the center line from below, while a sell signal is triggered when the RSI crosses the center line from above.

Calculating the RSI requires the calculation of the RS.

- $RS = [EMA(\text{Upwards})/EMA(\text{Downwards})]$ over some common trading period (normally 14 days).
- EMA(Upwards) and EMA(Downwards) are calculated on the basis of the differences between indices/rates/yields/prices between the closing of trading days.
- $RSI = 100 - 100/(1+RS)$

VII. RESULTS AND DECISIONS

The selected stocks are continuously traded on NSE which are also traded in futures and options market as there is ample liquidity in such stocks. The period selected for analyzing the data is selected randomly so as to understand the applicability of this tools in any type of trend i.e. uptrend, downtrend, and lateral trend. The data analysis results are presented in tabular form according to different sectors.

- Data of Information Technology Sector

Data of Information Technology Co.

SL NO	STOCK	DATE	MACD	SIGNAL	RSI	ROC	PRICE	VARIATION %	NO. OF DAYS
1	INFY	16-Nov-21	Sell Cross over below zero line	SELL	30.94	-6.25	535.86	2.319	56
2	INFY	11-Jan-22	Buy Cross over above zero line	BUY	42.69	-4.33	523.71		
3	INFY	6-Jun-22	Sell Cross over above zero line	SELL	64.61	4.32	628.41	38.179	210
4	INFY	02-Jan-22	Buy Cross over above zero line	BUY	32.96	-5.40	454.78		
5	INFY	31-Mar-22	Sell Cross over above zero line	SELL	51.56	0.039	507.12	9.279	193
6	INFY	10-Oct-22	Buy Cross over below zero line	BUY	61.37	2.54	464.06		
7	INFY	23-Jan-22	Sell Cross over above zero line	SELL	82.84	15.25	583.93	4.54	97
8	INFY	18-Apr-22	Buy Cross over above zero line	BUY	45.47	-2.43	558.56		

- Data of Automobile Company

Data of Automobile Co.

S L N O	STOCK	DATE	MACD	SIGNAL	RSI	ROC	PRICE	VARIATION %	NO. OF DAYS
1	M&M	4-Dec-21	Sell Cross over above zero line	SELL	65.98	5.10	657.65		
2	M&M	11-Apr-22	Buy Cross over above zero line	BUY	53.39	1.10	618	6.415	342
3	M&M	7-Nov-22	Sell Cross over below zero line	SELL	55.66	3.34	688.98		
4	M&M	30-Nov-22	Buy Cross over below zero line	BUY	34.61	-11.1	592.55	16.273	23
5	M&M	2-Aug-22	Sell Cross over above zero line	SELL	58.16	3.22	707.3		
6	M&M	26-Sep-22	Buy Cross over below zero line	BUY	25.4	-5.27	623.58	13.426	55
7	M&M	4-May-22	Buy Cross over above zero line	BUY	67.71	8.91	854.3		
8	M&M	15-Oct-22	Sell Cross over below zero line	SELL	27.96	16.42	749	14.06	164

- Data of Banking Sector

Data of Banking Co.

SL. NO	STOCK	DATE	MACD	SIGNAL	RSI	ROC	PRICE	VARIATION %	NO. OF DAYS
1	HDFC	01-Mar-20	Buy Cross over below zero line	BUY	36.62	-4.22	1069.4	-20.81	
2	HDFC	09-Nov-20	Sell Cross over above zero line	SELL	43.97	0.673	1350.5		238
3	HDFC	23-Jan-21	Buy Cross over below zero line	BUY	55.71	3.77	1259.5	-35.98	
4	HDFC	01-Feb-22	Sell Cross over above zero line	SELL	72.72	12.99	1967.5		373
5	HDFC	21-Sep-22	Buy Cross over below zero line	BUY	37.33	-4.89	1839.4	-6.51	
6	HDFC	10-Dec-22	Sell Cross over above zero line	SELL	53.25	0.25	1967.5		80

VIII. IMPLICATIONS

From the data of information technology sector, it can be observed that:

- It is stated that on 16/11/21, MACD gave short signal whereas RSI and ROC has not gave the short signal as the signal was weak and the price moved from 535.86 to 523.71 (2.319) on 11/1/22, however it took 56 days.
- It is clear that on 6/6/22, MACD gave a short signal whereas signal whereas RSI has also given the strong buy signal as it crosses overbought zone and ROC signal was weak and the price moved from 628.41 to 454.78 (38.179) on 02/01/22, however it took 210 days.
- It is clear that on 02/1/22, MACD gave a sell signal whereas RSI and ROC has not give the sell signal as the signal was weak and the price moved from 507.12 to 464.06 (9.279) on 10/10/22, however it took 193 days.
- It is stated that on 23/1/22, MACD has not gave a sell signal whereas RSI overbought zone it indicates there is chances of decrease in price of the share and ROC has gave the sell signal as the signal and the price moved from 583.93 to 558.56 (4.54) on 18/4/22, however it took 97 days

From the data of automobile sector, it can be observed that:

- From the above table it is stated that on 4/12/21, RSI gave a strong sell signal whereas MACD is near to sell signal and ROC has not given sell signal as the signal was weak. The price moved from 657.65 to 618 with price variation of (6.415%) on 11/4/22, however it took 342 days.
- From the above table it is stated that on 7/11/22, MACD gave a sell signal whereas RSI and ROC has not given sell signal as the signal was weak. The price moved from 688.98 to 592.55 with price variation of (16.273%) and on 30/11/22, however it took 23 days.
- From the above table it is stated that on 2/8/22, MACD gave a sell signal whereas RSI and ROC has not given sell signal as the signal was weak. The price moved from 707.30 to 623.58 with price variation of (13.426%) and on 26/9/22, however it took 55 days
- From the above table it is stated that on 4/5/22, RSI gives a strong sell signal as it reaches overbought zone whereas MACD and ROC has not given sell signal as the signal was weak. The price moved from 845.3 to 749 with price variation of (14.06%) on 15/10/22, however it took 164 days

From the data of banking sector, it can be observed that:

- From the above table, it is clear that on 01/3/20, MACD and RSI gives a buy signal but whereas ROC has not given the buy signal. As the signal was weak and the price moved from 1069.45 to 1350.5 with a variation of (-20.81%) on 9/11/20, however it took 238 days
- From the above table, it is clear that on 23/1/22, MACD gives buy signal but whereas RSI and ROC has not given the signal to buy as the signal was weak and the price moved from 1259.75 to 1967.55 with a price variation of (-35.98%) on 01/02/22, however it took 373 days.
- From the above table, it is clear that on 21/09/2022, MACD and RSI gave buy signal. However ROC has not given buy signal. As the buy signal was strong and the price moved from 1839.4 to 1967.55 (-6.51%) on 10/12/2022, however it took 80 days to move

IX. CONCLUSIONS

INFOYSIS has indicated MACD signal for three vocations however, RSI and ROC has not given strong indicators but in one vocation MACD has not given indicator whereas RSI has reached its overbought zone so, it indicates to investors go for short position.

HDFC BANK has indicated MACD and RSI signal for two vocations however, ROC has not given strong indicators indicator so, it indicates to investors that go for long position.

M&M has indicated MACD signal for two vocations and RSI for two vocations however, ROC has not given strong indicator but in one vocation RSI reaches overbought zone and given strong signal with high price variation compare to other signals so, it strongly indicates to investors that go for short position

X. REFERENCES

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