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Management

Application of Optimized Technical Indicators: MACD and RSI

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ABSTRACT

Technical analysis has been continuously used by traders and investors to make investment decisions in developed markets. 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 investor. 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. This paper investigated the profitability of optimization of MACD and RSI indicators in the Indian equity market. Compared to other technical standard tools, optimized MACD and RSI tools can be of great help to Indian investors. Results shows that optimized RSI is preferred to optimized MACD owing to its limited forecast error. The paper seems to defy efficient market hypotheses.

I Introduction

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 investor. 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. India's household savings, one of the highest in the world at 31%, can be brought in equity market. India though with a population of approximately 125 crores is hardly invested in share market either directly or indirectly through Mutual funds. Out of 8000 companies listed on the Indian stock markets, less than 2500 are actively traded. Since the entire structure has a speculative culture, it exposes investors to greater risks and restricts real capital formation. Investors pay a very high cost of transaction, which can be pruned by approximately 50%.

The market for other forms of financial instruments, such as bonds and interest-rates, has not developed in India. The equity segment currently accounts for more than 81% of market activity in India. In developed countries, the trend is the opposite, with bonds accounting for more than 80% of trading in some markets. There's clearly a lack of broader participation. Of a population of over 125 crores, barely 20 million invest in equity markets. According to SEBI data, 10 cities contributed over 80% of trading volume in 2014. The volatile behavior in the equity markets also indicates that these are not only highly speculative but also lacks support from a large number of people.

There have been two main methods to analyze the securities market - the fundamental approach and the technical approach. 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. Fundamental analyst thinks that they are a function of rational factors, while technicians attribute it to psychological factors. The technical analysis approach to capital market evaluation has received little attention and acceptance as compared to fundamental analysis. But 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. It is possible that the efficacy of technical tools may vary across mature and emerging market settings owing to differences in their relative efficiency.

II Literature Review

In Chong and Ng (2008) it is [1] indicated that a buy sign is produced when the MACD is greater than 0.A sell sign is generated when the MACD sign is less than 0.In our study, the buy and sell orders of MACD are generated 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[2] 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[3] 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 [4]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 (2014) found that [5] 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 [6] 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 (2004) and Lento (2007) substantiated [7] technical analysis and reported excess returns over simple buy-and-hold policy by applying technical rules. Imad Moosa and Larry Li (2011)concluded that [8] some special features of the Chinese market give technicians the upper

hand, in the sense that their activities have a more significant impact on stock prices than those of the fundamentalists. Sanjay Sehgal and Meenakshi Gupta (2007) conclude that [9] technical indicators do not outperform Simple Buy and Hold strategy on net return basis for individual stocks. But technical indicators seem to do better during market upturns compared to market downturns. Thus compared to SBH strategy the technical analysis is not found economically feasible during the study period, as trading costs erodes most of the profits.

Antoniou et al (1997) have argued that technical analysis [10] 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 [11] 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 [12] 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 [13] 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 [14], [16]-[26] begins clearly to dominate. Dedhy Sulistiawan et al (2014) study examines [15] 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 & 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 2012 to March 2015.Metastock trading simulation software and Microsoft excel has been used to analyze the data. The paired t test is used to test the difference between different investment strategies. Transaction costs are considered as Rs 50 per trade which includes brokerage, taxes etc. which was prevalent in India during the course of study period. The paper selects 30 stocks of 5 different sectors from Indian equity which are continuously traded on National Stock exchange and some of them are part of Index of NSE (Nifty). They are as follows-

i.   Financials- Sate Bank of India, HDFC Bank, Yes Bank, ICICI Bank, Axis Bank, Bank of Baroda
ii.   Pharmaceuticals- Lupin, Sun Pharma, Cipla, Glenmark, Dr Reddy Laboratories, Aurobindo Pharma
iii. Automobiles- Tata Motors, Maruti, Hero Motocorp, Eicher, Ashok Leyland, TVS Motors
iv. Information Technology- Infosys, TCS, Wipro, Tech Mahindra, HCL Technologies ltd, Hexaware
v.   FMCG- Marico, ITC, Godrej Industries, Dabur, Colgate Palmolive, Mcleod Russel

On the basis of characteristics of MACD and RSI indicators,

following hypotheses are proposed to be tested: Hypothesis 1- Application of standard MACD and RSI indicators contribute to profitable investments than buy and hold strategy. Hypothesis 2- Optimized MACD and RSI indicators leads to successful investment strategy in Indian equity market. Hypothesis 3 – There is no significant difference in profit results of optimized MACD and RSI indicators for different sectors under study.

3.1 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.

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 day EMA

Relative Strength Index
Developed J. Welles Wilder, Relative Strength Index (RSI) is another oscillator examined here. The 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.

Optimization of MACD and RSI Indicators
In order to improve efficiency of MACD and RSI indicators, simulation of the two indicators was done in MetaStock, technical analysis software. For MACD, following range of values were taken for 12,26 and 9 lines- 1) Short Moving Average (12 line) -2 to 25 2) Long Moving Average (26 line)- 2 to 50 3) Signal Line (9 line) - 2 to 15 For RSI,following range of values were taken for 14 day period, 30 and 70 lines-

1) RSI period- 2 to 20 2) RSI low- 5 to 40 3) RSI high- 41 to 100

IV Results and Discussion
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.

Results of Table 1 shows stocks from financial sectors, table 2 shows data from pharma sectors, table 3 shows data from

automobiles sector, table 4 shows data from IT sector and table 5 shows data from FMCG sector. In all this tables column one is name of stock, column 2 is optimized 12 line value, column 3 is optimized 26 line value, column 4 is optimized signal 9 line value. Column 5 is number of trading cycles for optimized MACD. Column 6 represents trading results of optimized MACD. Column 7 represents trading results of MACD. Column 8 is number of trading cycles for optimized MACD. Column 9 represents trading results for standard RSI indicator. Column 10 represents number of trading cycles for standard RSI indicator. Column 11 represents trading results for optimized RSI indicator, Column 12 represents number of trading cycles for optimized RSI. Column 13 represents optimized RSI period. Column 14 represents lowest value for optimized RSI. . Column 15 represents highest value for optimized RSI. Column 16 represents trading results of buy and hold strategy.

From the table 1, it is found that only in case of Axis Bank standard MACD is able to outperform buy and hold. In all other banking stocks, buy and hold is outperforming standard MACD. In case of Standard RSI, buy and hold strategy is outperforming Standard RSI. Optimized MACD and Optimized RSI is outperforming buy and hold strategy in all banks. Also the number of trading cycles has been reduced due to optimized MACD and Optimized RSI. From the table 2, in all pharma stocks, buy and hold strategy is outperforming standard MACD and Standard RSI. In case of optimized MACD, only in case of Sun Pharma, optimized MACD is outperforming buy and hold strategy. In all other pharma stocks, buy and hold is outperforming optimized MACD. Optimized RSI is outperforming buy and hold strategy in all pharma stocks. Also the number of trading cycles has been reduced due to optimized MACD and Optimized RSI.

From the table 3, in all auto stocks, buy and hold strategy is outperforming standard MACD and Standard RSI. In case of optimized MACD, only in case of Maruti Ltd and Eicher Motors, buy and hold is outperforming optimized MACD. In all other stocks, optimized MACD is outperforming buy and hold strategy. Optimized RSI is outperforming buy and hold strategy in all auto stocks. Also the number of trading cycles has been reduced due to optimized MACD and Optimized RSI. From the table 4, in all IT stocks, buy and hold strategy is

Table 1: Profitability of financial sector

Stock Nam	sma	lma	signal r	tc	macd opt	12,26,9 re	tc	rsi result	tc	rsiopt res	tc	rsi opt per	rsi opt low	rsi opt hig	buy&hold
Axis Bank	10	22	14	22	240.8	152.38	99	-1.25	16	232.17	2	20	27	83	142.85
Yes Bank	6	26	20	17	213.13	-48.12	95	-20.8	17	369.13	5	20	35	53	114.85
SBI	24	32	4	26	158.78	-80.81	80	131.98	14	92.31	5	12	23	55	25.25
HDFC Banl	20	22	8	11	89.13	-42.87	75	45.63	8	145.35	2	18	35	75	88.73
BOB	14	32	16	16	135.73	-59.5	86	0.34	11	113.18	15	8	33	51	27.67
ICICI Bank	16	14	12	19	203.36	-73.92	81	-30.59	10	109.41	8	6	23	83	77
Average	15	24.7	12.333	18.5	173.4883	-25.4733	86	20.885	12.67	176.925	6.167	14	29.33333	66.66667	79.39167

Table 2: Profitability of Pharma sector

Stock Nam	sma	lma	signal r	tc	macd opt	12,26,9 re	tc	rsi result	tc	rsiopt res	tc	rsi opt per	rsi opt low	rsi opt hig	buy&hold
Lupin	20	42	8	9	207.96	-61.68	99	-67.48	16	264.95	1	16	39	87	264.34
sunpharm	20	36	8	20	210.98	-46.4	76	3.8	15	268.87	9	6	37	89	76.33
cipla	24	42	4	35	80.55	-57.01	80	-0.43	15	200.41	19	6	37	75	128.81
glenmark	18	30	4	18	116.13	-43.31	89	-43.04	18	174.24	7	6	37	89	153.67
Dr reddy	20	44	2	14	77.53	-56.91	76	-18.17	13	137.18	3	20	39	71	87.28
Aurobind(	14	32	16	15	618.29	-49.56	125	-52.19	21	1048.21	1	20	39	89	961.32
Average	19.33	37.7	7	18.5	218.5733	-52.4783	90.8	-29.585	16.33	348.9767	6.667	12.33333	38	83.33333	278.625

Table 3: Profitability of Automobile sector

Stock Nam	sma	lma	signal r	tc	macd opt	12,26,9 re	tc	rsi result	tc	rsiopt res	tc	rsi opt per	rsi opt low	rsi opt hig	buy&hold
Tatamotor	24	34	2	21	137.48	-88.53	97	96.73	6	212.47	4	12	39	79	98.17
maruti	10	34	2	13	113.61	-33.61	83	-11.67	9	245.66	3	14	27	83	164.87
herom	8	32	2	27	62.98	-52.62	72	-34.63	11	54.13	14	6	29	75	20.79
eicherm	12	40	2	9	250.78	-61.26	71	-70.87	10	583.09	2	18	37	85	551.87
ashokley	12	26	8	49	551.57	62.21	110	-70.35	16	323.68	1	20	27	83	146.69
tvs	12	36	14	11	671.47	-54.23	126	46.39	6	779.7	1	18	31	85	509.57
Average	13	33.7	5	21.67	297.9817	-38.0067	93.2	-7.4	9.667	366.455	4.167	14.66667	31.66667	81.66667	248.66

Table 4: Profitability of IT sector

Stock Nam	sma	lma	signal r	tc	macd opt	12,26,9 re	tc	rsi result	tc	rsiopt res	tc	rsi opt per	rsi opt low	rsi opt hig	buy&hold
infy	14	24	10	19	108.78	-3.92	72	49.81	12	39.22	7	6	23	79	-19.21
tcs	16	2	14	33	98.02	-41.04	78	25.43	16	85	4	12	39	79	108.53
wipro	8	32	2	13	84.67	-34.08	56	-8.11	15	89.4	1	18	23	79	40.6
tech m	22	16	10	25	153.56	-63.1	93	37.25	6	269	2	16	31	81	73.04
hclt	20	22	14	18	139.06	-58.88	100	-37.9	18	303.33	2	8	37	87	90.79
hexaware	20	38	10	12	234.62	-18.13	105	-46.67	14	150.11	2	8	37	87	166.01
Average	16.67	22.3	10	20	136.4517	-36.525	84	3.30166667	13.5	156.01	3	11.33333	31.66667	82	76.62667

Table 5: Profitability of FMCG sector

Stock Nam	sma	lma	signal r	tc	macd opt	12,26,9 re	tc	rsi result	tc	rsiopt res	tc	rsi opt per	rsi opt low	rsi opt hig	buy&hold
itc	20	32	12	23	132.05	-10.98	61	29.48	9	144.26	14	6	23	79	42.28
marico	20	34	2	24	196.7	-77.59	82	17.03	7	137.49	13	6	35	79	124.51
godrej	24	40	2	52	116.1	-91.75%	84	12.66	14	41.21	1	18	37	85	102.49
dabur	24	42	4	35	149.55	-55.61	77	-24.02	10	184.19	11	6	37	83	149.77
colpal	12	20	2	26	55.9	-33.39	74	-3.8	16	126.69	13	6	37	83	69.31
mcleodru	24	32	4	36	92.56	-12.72	76	5.53	12	36.37	3	12	23	55	-14.57
Average	20.67	33.3	4.3333	32.67	123.81	-31.8679	75.7	6.14666667	11.33	111.7017	9.167	9	32	77.33333	78.965

Table 6: Stocks Profitability Results

Stock Nam	sma	lma	signal	rtc	macd opt	12,26,9 res	tc	rsi result	tc	rsiopt res	tc	rsi opt per	rsi opt low	rsi opt hig	buy&hold
Axis Bank	10	22	14	22	240.8	152.38	99	-1.25	16	232.17	2	20	27	83	142.85
Yes Bank	6	26	20	17	213.13	-48.12	95	-20.8	17	369.13	5	20	35	53	114.85
SBI	24	32	4	26	158.78	-80.81	80	131.98	14	92.31	5	12	23	55	25.25
HDFC Ban	20	22	8	11	89.13	-42.87	75	45.63	8	145.35	2	18	35	75	88.73
BOB	14	32	16	16	135.73	-59.5	86	0.34	11	113.18	15	8	33	51	27.67
ICICI Bank	16	14	12	19	203.36	-73.92	81	-30.59	10	109.41	8	6	23	83	77
Lupin	20	42	8	9	207.96	-61.68	99	-67.48	16	264.95	1	16	39	87	264.34
sunpharm	20	36	8	20	210.98	-46.4	76	3.8	15	268.87	9	6	37	89	76.33
cipla	24	42	4	35	80.55	-57.01	80	-0.43	15	200.41	19	6	37	75	128.81
glenmark	18	30	4	18	116.13	-43.31	89	-43.04	18	174.24	7	6	37	89	153.67
Dr reddy	20	44	2	14	77.53	-56.91	76	-18.17	13	137.18	3	20	39	71	87.28
Aurobind	14	32	16	15	618.29	-49.56	125	-52.19	21	1048.21	1	20	39	89	961.32
Tatamoto	24	34	2	21	137.48	-88.53	97	96.73	6	212.47	4	12	39	79	98.17
maruti	10	34	2	13	113.61	-33.61	83	-11.67	9	245.66	3	14	27	83	164.87
herom	8	32	2	27	62.98	-52.62	72	-34.63	11	54.13	14	6	29	75	20.79
eicherm	12	40	2	9	250.78	-61.26	71	-70.87	10	583.09	2	18	37	85	551.87
ashokley	12	26	8	49	551.57	62.21	110	-70.35	16	323.68	1	20	27	83	146.69
tvs	12	36	14	11	671.47	-54.23	126	46.39	6	779.7	1	18	31	85	509.57
infy	14	24	10	19	108.78	-3.92	72	49.81	12	39.22	7	6	23	79	-19.21
tcs	16	2	14	33	98.02	-41.04	78	25.43	16	85	4	12	39	79	108.53
wipro	8	32	2	13	84.67	-34.08	56	-8.11	15	89.4	1	18	23	79	40.6
tech m	22	16	10	25	153.56	-63.1	93	37.25	6	269	2	16	31	81	73.04
hclt	20	22	14	18	139.06	-58.88	100	-37.9	18	303.33	2	8	37	87	90.79
hexaware	20	38	10	12	234.62	-18.13	105	-46.67	14	150.11	2	8	37	87	166.01
itc	20	32	12	23	132.05	-10.98	61	29.48	9	144.26	14	6	23	79	42.28
marico	20	34	2	24	196.7	-77.59	82	17.03	7	137.49	13	6	35	79	124.51
godrej	24	40	2	52	116.1	-91.75%	84	12.66	14	41.21	1	18	37	85	102.49
dabur	24	42	4	35	149.55	-55.61	77	-24.02	10	184.19	11	6	37	83	149.77
colpal	12	20	2	26	55.9	-33.39	74	-3.8	16	126.69	13	6	37	83	69.31
mcleodru	24	32	4	36	92.56	-12.72	76	5.53	12	36.37	3	12	23	55	-14.57
Average	16.93	30.3	7.7333	22.27	190.061	-36.8703	85.9	-1.3303333	12.7	232.0137	5.833	12.26667	32.53333	78.2	152.4537

Outperforming standard MACD. In case of Standard RSI, except Infosys, buy and hold strategy is outperforming Standard RSI. Optimized MACD and Optimized RSI is outperforming buy and hold strategy in all IT stocks except TCS. Also the number of trading cycles has been reduced due to optimized MACD and Optimized RSI. From the table 5, in all FMCG stocks, buy and hold strategy is outperforming standard MACD and standard RSI. Optimized MACD is outperforming buy and hold strategy in all FMCG stocks except COLPAL. Optimized RSI is outperforming buy and hold strategy in all IT stocks except Godrej. Also the number of trading cycles has been reduced due to optimized MACD and Optimized RSI.

From the table 6, it is found that buy and holds strategy is able to outperform, both the standard MACD and RSI indicators. Only in case of SBI and Infosys, standard RSI is able to outperform buy and hold strategy. And only in case of Axis Bank, standard MACD is able to outperform buy and hold strategy. So we can say from this analysis that only application of standard MACD and RSI indicators are not sufficient to trade profitably in Indian equity market. From the tables it is found that optimized MACD and RSI indicators are able to outperform buy and hold strategy. Only in case of Maruti, Eicher Motors, Lupin, Cipla, Glenmark, Dr, Reddy, and Aurobindo Pharma, buy and hold strategy is able to outperform optimized MACD indicator. But there also the difference in profits is minimum except in case of Eicher motors. In case of optimized RSI, only in case of TCS and Godrej Consumer Products limited, buy

and hold strategy is able to outperform optimized RSI indicator. But there also the difference in profits are minimum. Also as can be seen from the tables, trading cycles in case of standard MACD and RSI are high compared to that for optimized MACD and RSI. More the number of cycles more cost of transactions and shorter duration of holding. But optimized MACD and RSI indicators has resulted in far less number of trading cycles which reduces cost of transactions and also increases holding time of stocks.

4.1 Hypothesis Testing

T –test results indicates that there is a significant difference between the mean profitability of buy and hold strategy and standard MACD and Standard RSI, the same is confirmed from the stocks profitability results table 6, hence the first hypothesis the Application of standard MACD and RSI indicators contribute to earning extra income than buy and hold strategy is statistically rejected at 5% level of significance means that the buy and hold strategy is more profitable than the standard MACD and standard RSI indicators. The paired t test between buy and hold strategy and optimum MACD provides (Sig. value 0.016) statistical evidence for accepting that optimum MACD strategy is superior to buy and hold strategy for the selected stocks. There is a significant difference between the mean profitability of optimized RSI and buy and hold strategy and "t" test confirms the same, hence optimized RSI strategy leads to successful investment strategy in Indian equity market. There is a significant difference between the mean profitability of optimized MACD and RSI indicators, thus we

reject the hypothesis that there is no significant difference in results of optimized MACD and RSI indicators for different sectors under study at 10% level of significance. Compared to MACD the RSI have less MAD and MSE which proves that optimized RSI is preferred to MACD.

4.2 Implications

Investors always try to beat the market in their own way, though there is a saying of there is no profitable trading rule exists for traders in the market. Technical analysis using MACD and RSI indicators enables investor to know the current trend and direction of stock prices, trading cycles and profit percentage compared to conventional buy and hold strategy.Experimenting with the optimum MACD and RSI indicators results in a real time outlook of profitable trading strategies Vis a Vis with buy and hold approach, hence MACD and RSI can be taken as best tools of technical analysis for profitable investment strategy.

V Conclusion

Application of standard MACD and RSI indicators contribute to earning extra income than buy and hold strategy is statistically rejected at 5% level of significance means that the buy and hold strategy is more profitable than the standard MACD and standard RSI indicators. There is a significant difference between the mean profitability of optimized MACD and RSI indicators, thus we reject the hypothesis that there is no significant difference in results of optimized MACD and RSI indicators for different sectors under study at 10% level of significance. This research empirically proves that both the optimum MACD and optimum RSI indicators are useful for profitable investment strategy and accepts the hypothesis that optimized MACD and RSI indicators are more profitable than the conventional buy and hold strategy (EMH). Results indicate that the number of trading cycles has been significantly reduced by using optimized MACD and RSI Indicators. Compared to MACD the RSI have less MAD and MSE which proves that optimized RSI is preferred to MACD.

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