RISK-RETURN ANALYSIS OF MOMENTUM BUYING & SELLING USING EMA OF EQUITY PRICES IN INDIA

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ABSTRACT : Present study has been conducted to examine the risk and return on equity prices using Exponential Moving Average (EMA) for the period of twelve years starting from January 1, 2006. The study is based on 31 companies out of 50 companies which constitute NSE NIFTY Index whose data was available for the whole period. The returns on buys as well as sell positions were significant in 49.39 percent, 70.79 percent and 51.61 percent cases but the aggregate return of momentum buying and selling were insignificant in most of the cases on the basis of EMA 5-20, EMA 5-50 and EMA 5-200 respectively. The study also observed positive alpha in cases of 18 stocks, 20 stocks and 20 stocks out of the 31 stocks taken in the study on the basis of EMA 5-20, EMA 5-50 and EMA 5-200 respectively but the value were low. The study concluded that it is not possible to beat the market return on the basis of momentum buying and selling indicated by EMA 5-20, EMA 5-50 and EMA 5-200.

Keywords: Fundamental Analysis, Technical Analysis, Efficient Market Hypothesis, SMA, EMA.

INTRODUCTION

The growth of the economy can be achieved by efficiently allocating the savings into productive investments. The main objective of investment is to increase the rate of return with other objectives such as security, liquidity and hedging against inflation. Investment decision includes framing the investment policy, analyzing the various investment options, valuation of the securities using fundamental and technical analysis, construction of portfolio, continuous appraisal and evaluation of the portfolio.

Fundamental analysis is the process of determining the true or intrinsic value of an asset but technical analysis is the study of historical prices and volume to know the future trends of security prices. Momentum is a key indicator of the technical analysis which indicates buying and selling signals which may enhance the probability of a trade to be profitable. Momentum indicators are very useful techniques for analysts but these techniques should be used with other technical indicators that indicate the directions of trends. When a direction/trend has been identified, momentum indicators are important and useful on the grounds that these indicators point out the strength of price movement trends and when prices may take the reversal trend. In the present study Exponential Moving Averages (EMA) is used to recognise the momentum so that buying and selling trades can be initiated to earn higher return in comparison to buy and hold investment decision.

REVIEW OF LITERATURE

A number of studies rely on structural asset pricing models such as CAPM, Fama and French's three-factor version of capital asset-pricing model which could explain most of the abnormalities including long-term contrarian profits but could not explain short-term momentum returns. Grundy and Martin studied the risk sources of momentum strategies and concluded that while factor models can explain most of the variability of momentum returns but fail to explain mean returns. There is substantial evidence that stock prices do not follow random walks and that returns are predictable. Carhart (1997) was first to think about momentum as a benchmarked style or factor to explain returns and augmented the three factor Fama-French model with a fourth factor based on momentum used this model to evaluate mutual fund performance. The study found that momentum factor made a large contribution to the explanatory power of the model and indicates that momentum stocks are correlated with each other. Bessembinder and Chan (1998) confirmed the basic results of market efficiency analysis and found that the forecast power was not solely attributed to return measurement errors arising from non synchronous trading but the study argued that this evidence can coexist with the concept of market efficiency. Gencay (1998) examined the profitability of simple technical trading rules based on non-parametric models which maximize the total returns of an investment strategy using the simple moving average (SMA-1,50 and LMA-1,200 DMA) to examine the linear and nonlinear predictability of security return of Dow Jones Industrial Average's daily data series from 1897 to 30th June 1988. The data set was analyzed in four sub sample periods i.e. 1817-1914 (1st world war period), 1915-1938 (depression period), 1939-1962 (period of 2nd world war) and 1963-1988. The results of the study showed that the use of the past buy–sell signals in the nonlinear conditional mean estimate provided only a great improvement in the forecast performances relating to the benchmark model. The OLS and GARCH-M (1, 1) models with past buy–sell signals provided an average of 1.65% and 2.95% improvements over the benchmark model with past return. The evidence across sub samples indicated that the two moving average rules provide at least 10% forecast improvement in the volatile year of (1980-1988) and the performance of these rules is more moderate in the 1939-1950 periods in which there was no clear trend.

Ratner and Leal (1998) analyzed the expected profit of technical trading strategies among ten emerging equity markets of Latin America and Asia i.e. Argentina, Brazil, Chile, Mexico, India, Korea, Malaysia, Philippines, Taiwan and Thailand. The study used daily inflation adjusted returns for the period from January 1982 to April 1995. It was found that Taiwan, Mexico and Thailand may be profitable in technical trading strategies but no strong evidence was found of profitability for the other markets on the basis of technical trading strategies. Charles,Myers and Swaminathan (1999) modeled the time-series relation between price and intrinsic value as a co-integrated system, so that price and value have long-term convergent. The study also observed that during 1963-1996, traditional market multiples (e.g., B/P, E/P, and D/P ratios) have little predictive power. Lebaron (1999)

studied the weekly and daily foreign exchange series on the German Mark (DM) and Japanese Yen (JN) for the time period 1979-1992 to predict the foreign exchange profitability with the help of simple moving average and found that technical indicator rule produce unusually large amount of profit in foreign exchange series and generate large Sharpe ratio and frequent trading reduce transactional cost. Mitra (2002) studied on "Profiting from Technical Analysis in Indian Stock Market" to find out a trading strategy that was profitable even after transaction cost. The study was based on daily closing prices of ACC, Reliance industries, State Bank of India, and TISCO from the stock market published quotes during the period Dec. 1995 to Feb. 1999. The study concluded that investors were not always right in enjoying the trading, but need to have an analytical and systematic approach to make trading profit on a cumulative basis on the basis of moving average crossover and use of filter rules. Luoma et al. (2004) found significant positive results of theory of supply and demand in technical analysis of the price–volume behaviour of equity stocks and concluded that behaviour of seller and buyers determine the equity prices. Asness et al. (2009) found that momentum was present in eight different international markets and asset classes that include four national equity markets of individual stocks, country index futures, commodities, government bonds across countries, and currencies. The study also concluded that the momentum strategies in these different markets and asset classes were highly correlated and existence of some common theme or source to momentum.

Gupta et al. (2009) suggested that the optimization techniques can be useful tools to generate extra momentum returns. The Single Index model with adjusted beta was found the best optimizing tool in terms of generating superior momentum returns compared to the equal- or value-weighted momentum approach. Mitra (2011) analyzed the profitability of moving average based on trading rules in the Indian market. The study was based on four stock index series i.e. S&P CNX Nifty, CNX Nifty Junior, CNX IT Index for the period 1st January, 1998 to 31st March, 2008. The study found that most technical trading rules were able to capture the direction of market movement reasonably well and earned significant positive returns both in long and short position but these returns cannot be exploited fully due to real world transaction costs. C. Boobalan (2014) found that technical analysis was very helpful in the prediction of short and medium term price movement, on the basis of stock prices of five Indian companies (Wipro, SBIN, GAIL, ONGC, ITC) with the use of technical indicator and tools (candlestick chart, EMA, MACD and RSI) from February 2011 to 3rd March 2014. Zhang et al. (2016) examined the daily closing prices of all 500 components of S&P 500 American stock market and 300 components in the CSI 300 of China from 2nd January 2004 to 20th April 2012 and found asymmetric phenomenon of the trends in American stock market. The study also concluded that the absolute trend returns in Chinese stock market were higher than American stock market. The study also found that the changing velocities of trends in Chinese stock market was higher than American stock market and the momentum effect in Chinese stock market was stronger than American stock market so this was the main reason behind irrational individual investor who follows the trends blindly in China.

RESEARCH METHODOLOGY

This section presents the data and methodology used in the study. The present study divides the data and methodology section into three sub-sections such as research objective, research hypothesis, research data and tools.

Objectives of the Study: Main objective of the present study is to examine the risk and return on momentum buying and selling using EMA of equity prices in India. To achieve the main objective the study, the EMA has been used to measure the returns generated by the technical indicators over buy and hold strategy for Nifty 50 index. CAGR is used to compare the return of various companies. Sharpe and Alpha is used to measure the risk and efficiency involved in technical trading.

Research Hypotheses:

H_{01}: The returns generated by EMA (5-20) has no significant difference with passive strategy (i.e. buy and hold strategy).

H_{02}: The return generated by EMA (5-50) has no significant difference with passive strategy (i.e. buy and hold strategy).

H_{03}: The return generated by EMA (5-200) has no significant difference with passive strategy (i.e. buy and hold strategy).

Research Data and Tools:

Sources of Data: Twelve years daily closing prices companies which are part of Nifty Fifty Index from 1st January 2006 to 31st December 2017 are used. There are 31 companies used in the present study, whose data is available on NSE (Nifty Fifty) during the whole period of study.

Standard Tools:

T-Statistics: T-statistics is used for analyzing the returns from any technical indicator that is different from the buy and holds strategy and measure difference between the mean buy returns and mean sell return. The Brock test statistics is as follows:

$$\mathbf{t} = \frac{\mathbf{x(b)-x(h)}}{\sqrt{\mathbf{Var(b)/N_h + Var(b)/N_b}}} \quad \ldots\ldots (2)$$

Where X (b) represents the mean buy return and X (h) denotes the mean return of the buy and hold strategy. Var (b) is variance of buy returns. T-test is also used for the mean sell returns.

Technical Analysis Tools:

Exponential Moving Average: The study used the EMA(5-20), EMA(5-50), EMA(5-200) crossover strategy. The formula is given as follows:

EMA_t= Price (t)*K+EMA(y)*(1-K)…….. (3)

Where t is current day, y denotes previous day, K=2/ (N+1) and N is number of day. EMA gives more weight to current price because current prices are more relevant in forecasting the security prices which maximizes the trading return. Buy signals generated when short runs exponential moving average cut the long run moving average from below. Sell signals generated when short runs exponential moving average cut the long run moving average from above.

Effectiveness of Technical Indicators: To measure the effectiveness of technical indicators, the study follow the Brock et al. (1992) who gave the suggestion that technical signals have predictive power if it generates positive (negative) returns for buy (sell) days. The average returns are statistically significant over the buy and hold strategy.

This section present and analyze the empirical results of the study. This section describes the results of EMA and Risk and Return analysis of EMA.

EMPIRICAL RESULTS

The study tests the hypothesis by reporting the results of technical indicators by describing the average buy (sell) returns in comparison to buy and hold strategy and measurement of risk and return by using the Alpha and Sharpe ratio.

RESULTS OF EMA ANALYSIS

Table I exhibits the returns of momentum based buying and selling indicated by Exponential Moving Average (EMA 5-20) technique of all the stocks taken for the period of 12 years (i.e. from 1st January, 2006 to 31 December, 2017. The study found that the presence of momentum but the returns on buy as well as on sell positions based on momentum was insignificant in 51.61% cases i.e. in 16 stocks out of 31 stocks which means only in case of 49.39% cases the values were found significant. In other words, it may be concluded that the returns can be increased by active trading instead of buy and hold strategy in case of only 49.39% companies. The returns were found significant only in case of 15 stocks out of 31 stocks which is the sample size for the study under consideration by using the momentum analysis EMA 5-20 trading rule on the given data set. Out of the stocks in which the returns were observed significant, were Aurobindo Pharma Ltd. and ITC Ltd. at 10% level of significance by using the momentum buying strategy. The returns were found significant for 'momentum selling' strategy at 10% level of significance in case of Axis Bank Ltd., Indusind Bank Ltd and Sun Pharmaceutical India Ltd whereas in case of Eicher Motors, HCL Technologies, HDFC Bank Ltd., Hero Motocorp Ltd., Hindustan Unilever Ltd., Kotak Mahindra Bank Ltd. and Tata Consultancy Services Ltd. the returns were found significant at 5% level of significance on the basis of momentum selling using EMA 5-20 but in the cases of 4 stocks i.e Asian Paints, Cipla Ltd., ITC Ltd. and Lupin Ltd. were found significant at 1% level of significance using the same momentum selling based on EMA 5-20 technique, which means the returns were significant in 15 stocks (49.39% cases) but the level of significance differs. When the aggregate strategy i.e. weighted returns of both the 'momentum buying' and 'momentum selling' was used the results were found insignificant for all the 31 stocks. The Null hypothesis for 16 stocks which were found insignificant is accepted i.e. the return from EMA 5-20 is either equal to or less than that of return of buy-hold i.e. passive approach. Whereas null hypothesis was rejected for 15 stocks which were found significant i.e. the return from the active strategy using EMA 5-20 was more than of market return on the basis of momentum buying and selling. The study concluded that there is no significant difference between the returns generated using EMA (5-20) and buy and hold investment strategy taking into consideration the weighted returns of both the 'momentum buying' and 'momentum selling' were found insignificant for all the 31 stocks taken in the present study.

Table I: Results of Momentum in Equity Prices Based on EMA 5-20 Technique

Companies	No. (Buy)	No. (Sell)	Long (B)	Short (S)	Aggregate of Weighted Long-Short (B-S)
Ambuja Cement	1643	1332	0.00029 -0.1992	0.00057 -1.2587	-0.00009 -0.11528
Asian Paints	1960	1015	0.00108 0.1447	0.00087 -2.7168*	0.00041 0.58416
Aurobindo Pharma Ltd.	1770	1205	0.00192 1.3221***	-0.00048 -0.4393	0.00134 1.24669
Axis Bank Ltd.	1766	1209	0.00085 0.1178	0.00065 - 1.3529***	0.00024 0.23232
Bajaj Finance Ltd.	1851	1124	0.00207 1.0855	-0.00002 -1.1433	0.00130 1.18263
Bharat Petroleum Co. Ltd.	1653	1322	0.00070 0.0555	0.00061 -1.5782	0.00012 0.13343
Bosch Ltd.	1776	1199	0.00084 0.1339	0.00039 0.3535	0.00034 0.51799
Cipla Ltd.	1687	1288	-0.00033 -1.3627	0.00138 -2.7789*	-0.00078 -1.13275
Dr. Reddy's Laboratory	1762	1213	0.00066 0.2306	0.00035 -1.3156	0.00025 0.34650
Eicher Motors	1946	1029	0.00192 0.4005	0.00112 -2.5739**	0.00087 0.81325
GAIL (India) Ltd.	1696	1279	-0.00001 -0.7551	0.00104 -1.8880	-0.00045 -0.55608
H C L Technologies	1765	1210	0.00011 -0.7838	0.00140 -2.2417**	-0.00051 -0.54311
HDFC Bank Ltd.	1938	1037	0.00078 -0.1734	0.00103 -2.3844**	0.00015 0.18821
Hero Motocorp Ltd.	1644	1331	0.00017 -0.5693	0.00090 -2.1632**	-0.00031 -0.43745
Hindustan Unileaver	1735	1240	0.00058	0.00075	0.00002

Ltd.			-0.1392	-2.2115**	0.03683
H.P.C.L.	1621	1354	0.00112 0.6798	-0.00005 -0.6447	0.00063 0.67284
I T C Ltd.	1784	1191	-0.00015 -1.4264***	0.00167 -3.2629*	-0.00076 -1.07108
Indian Oil Corp. Ltd.	1515	1460	0.00049 0.2104	0.00019 -0.7339	0.00015 0.18734
Indusind Bank Ltd.	1881	1094	0.00146 0.4316	0.00054 -1.4271***	0.00073 0.61934
Infosays Ltd.	1669	1306	0.00028 -0.1059	0.00042 -1.0799	-0.00002 -0.03276
Kotak Mahindra Bank Ltd.	1858	1117	0.00090 -0.1046	0.00109 -1.8913**	0.00015 0.14294
Lupin Ltd.	1801	1174	0.00040 -0.7251	0.00148 -3.1840*	-0.00034 -0.44699
Mahindra & Mahindra Ltd.	1763	1212	0.00055 -0.0687	0.00066 -1.4167	0.00006 0.06613
Maruti Suzuki India Ltd.	1839	1136	0.00147 1.0021	0.00002 -1.1387	0.00090 1.08949
O.N.G.C. Ltd.	1505	1470	-0.00041 -0.8471	0.00069 -1.1692	-0.00055 -0.70310
State Bank of India	1589	1386	0.00066 0.3231	0.00017 -0.7492	0.00027 0.31205
Sun Pharmaceutical India Ltd.	1800	1175	0.00042 -0.4959	0.00116 -2.6442***	-0.00020 -0.26559
Tata Consultancy Service Ltd.	1756	1219	0.00020 -0.7382	0.00123 -2.5029**	-0.00038 -0.50027
Tata Motors Ltd.	1629	1346	0.00089 0.6108	-0.00015 -0.2706	0.00056 0.54811
Ultratech Cement Ltd.	1728	1247	0.00133 0.9243	0.00002 -1.0300	0.00076 0.95336
Wipro Ltd.	1612	1363	0.00035 0.1314	0.00018 -0.6261	0.00011 0.14013

Table II exhibits the results of momentum analysis in equity prices based on the Exponential Moving Average (EMA 5-50) technique for the period of 12 years i.e. from 1st January, 2006 to 31 December, 2017.The study observed the momentum in equity prices based on EMA 5-50 trading rules and found the return were insignificant in 29.03 % cases i.e. in 9 stocks out of 31 stocks. But in 22 stocks out of 31 stocks the momentum analysis was found significant on the basis of EMA 5-50 trading rule. In other words it may be concluded that the returns can be increased by active trading instead of buy-hold strategies by using EMA analysis.

Out of the stocks in which the returns were found significant were Aurobindo Pharma Ltd. and Bajaj Finance Ltd. stocks at 5% level of significance for 'momentum buy' strategy. While analyzing for 'momentum selling' strategy the results were found significant for Axis Bank Ltd., Gail (India) Ltd., Infosys Ltd., Kotak Mahindra Bank Ltd., Maruti Suzuki India Ltd. and Ultratech Cement Ltd. at 10% level of significance whereas the return in Asian Paints, Bharat Petroleum Company Ltd., Cipla Ltd., Dr. Reddy's Laboratory, HCL Technologies, HDFC Bank Ltd., Hero Motocorp Ltd., Indusind Bank Ltd., Lupin Ltd. and Tata Consultancy Services Ltd. were found significant at 5% level of significance. While analysing the same strategy the stocks of Eicher Motors, Hindustan Unilever Ltd., ITC ltd. and Sun Pharmaceutical India Ltd. were found significant at 1% level of significance. So the stocks returns were found significant for momentum analysis based on EMA 5-50 technique but the level of significance differs. When the weighted aggregate strategy i.e. both 'momentum buying' and 'momentum selling' was used based on EMA 5-50 technique the results were found insignificant for all the 29 stocks and were found significant only for Aurobindo Pharma Ltd. at 10% level of significance and for Bajaj Finance Ltd. at 5% level of significance. Null hypothesis for 9 stocks which were found insignificant is accepted i.e. the return from EMA 5-50 is either equal to or less than that of return of buy-hold i.e. passive approach. Whereas null hypothesis is rejected for 22 stocks which are found significant i.e. the return from the active strategy using EMA 5-50 is more than of market return. The study concluded that there is no significant difference between the returns generated using EMA (5-20) and buy and hold investment strategy taking into consideration the weighted returns of both the 'momentum buying' and 'momentum selling' were found insignificant for 29 stocks out of the 31 stocks taken in the present study.

Table II: Results of Momentum in Equity Prices Based on EMA 5-50

Companies	No. (Buy)	No. (Sell)	Long (B)	Short (S)	Aggregate of Weighted Long-Short (B-S)
Ambuja Cement	1753	1222	0.00071 0.4721	-0.00001 -0.5074	0.00042 0.50524
Asian Paints	2142	833	0.00113 0.2514	0.00070 -2.2193**	0.00061 0.79781
Aurobindo Pharma Ltd.	1809	1166	0.00214 1.6492**	-0.00090 -0.0446	0.00165 1.51645***
Axis Bank Ltd.	1855	1120	0.00076 -0.0175	0.00079 -1.3994***	0.00017 0.16067
Bajaj Finance Ltd.	1980	995	0.00253 1.7471**	-0.00121 -0.0578	0.00209 1.81067**
Bharat Petroleum Co. Ltd.	1835	1140	0.00063 -0.0464	0.00071 -1.5737**	0.00012 0.12884
Bosch Ltd.	1914	1061	0.00114 0.9757	-0.00021 -0.6835	0.00081 1.18566
Cipla Ltd.	1714	1261	0.00000 -0.7427	0.00097 -2.2099**	-0.00041 -0.60178
Dr. Reddy's Laboratory	1782	1193	0.00049 -0.0779	0.00060 -1.6825**	0.00006 0.07698
Eicher Motors	2051	924	0.00186 0.3257	0.00116 -2.3948*	0.00092 0.80689
GAIL (India) Ltd.	1773	1202	0.00017 -0.4626	0.00084 -1.5680***	-0.00024 -0.28416
H C L Technologies	1850	1125	0.00035 -0.4538	0.00110 -1.7338**	-0.00020 -0.20140
HDFC Bank Ltd.	2110	865	0.00080 -0.1496	0.00104 -2.0155**	0.00026 0.29166
Hero Motocorp Ltd.	1788	1187	0.00023 -0.4834	0.00090 -2.0352**	-0.00022 -0.30506
Hindustan Unileaver Ltd.	1844	1131	0.00036 -0.5784	0.00113 -2.7418*	-0.00021 -0.30735
H.P.C.L.	1733	1242	0.00096 0.4887	0.00006 -0.7586	0.00053 0.56444
I T C Ltd.	1920	1055	0.00014 -0.8429	0.00137 -2.8072*	-0.00040 -0.54987
Indian Oil Corp. Ltd.	1611	1364	0.00013 -0.3086	0.00059 -1.2593	-0.00020 -0.24149
Indusind Bank Ltd.	1983	992	0.00124 0.1441	0.00090 -1.6609**	0.00052 0.43116
Infosays Ltd.	1715	1260	0.00014 -0.3567	0.00062 -1.3554***	-0.00018 -0.23956
Kotak Mahindra Bank Ltd.	2045	930	0.00095 -0.0343	0.00102 -1.6235***	0.00033 0.28130
Lupin Ltd.	1909	1066	0.00068 -0.2434	0.00108 -2.5485**	0.00005 0.06542
Mahindra & Mahindra Ltd.	1785	1190	0.00064 0.0723	0.00053 -1.2493	0.00017 0.19110
Maruti Suzuki India Ltd.	1875	1100	0.00126 0.6188	0.00033 -1.5102***	0.00067 0.81271
O.N.G.C. Ltd.	1500	1475	0.00001 -0.1933	0.00026 -0.5667	-0.00013 -0.16040
State Bank of India	1653	1322	0.00044 0.0115	0.00042 -1.0341	0.00006 0.06443
Sun	1918	1057	0.00037	0.00134	-0.00023

Pharmaceutical India Ltd.			-0.5961	-2.7686*	-0.30120
Tata Consultancy Service Ltd.	1796	1179	0.00054 -0.1508	0.00075 -1.7780**	0.00003 0.03579
Tata Motors Ltd.	1654	1321	0.00114 0.9594	-0.00049 0.0793	0.00086 0.83714
Ultratech Cement Ltd.	1820	1155	0.00108 0.5180	0.00030 -1.3551***	0.00055 0.67046
Wipro Ltd.	1632	1343	0.00076 0.8232	-0.00031 0.0497	0.00056 0.71546

Table III, shows the results of returns of momentum buying and selling indicated by Exponential Moving Average (EMA 5-200) technique of all the stocks taken for the period of 12 years (i.e. from 1st January, 2006 to 31 December, 2017).

The study found the presence of momentum in equity prices but the returns on buying as well as on selling positions based on momentum using the EMA 5-200 trading technique were found insignificant in 48.39 % cases i.e. in 15 stocks out of 31 stocks which means only 16 stocks out of 31 were found significant after using the EMA 5-200 trading technique of momentum analysis on the given data set. In other words it may be concluded that the markets can be beaten by active trading instead of buy and hold i.e. passive investment strategy. Only Aurobindo Pharma Ltd. stock's returns were found significant at 10% level of significance on 'momentum buying' strategy and all the stocks return were found insignificant for 5% and 1% level of significance over the same 'momentum buying' strategy. While analyzing for 'momentum selling' strategy the results were found significant for Bharat Petroleum Co. Ltd. and HPCL at 10% level of significance whereas Asian Paints, Bosch Ltd., Cipla Ltd., Eicher Motors, HDFC Bank Ltd., Indusind Bank Ltd., Infosys Ltd., Lupin Ltd., Mahindra & Mahindra Ltd. and Sun Pharmaceutical India Ltd. was found significant at 5% level of significance. Using the same strategy at 1% level of significance the results were found significant for Hero Motocorp Ltd., Hindustan Unilever Ltd. and ITC Ltd. When the aggregate strategy i.e. weighted returns of both the 'momentum buying' and 'momentum selling' was used the results were found insignificant for all the 30 stocks and found significant only for Aurobindo Pharma Ltd. at 10% level of significance. It may be further concluded that the 16 stocks in which returns were significant but the level of significance differs. So the null hypothesis for 15 stocks which were found insignificant is accepted i.e. the return from momentum analysis based on EMA 5-200 technique was either equal to or less than that of return of market returns, whereas null hypothesis was rejected for 16 stocks which were found significant i.e. the return from the active strategy using momentum analysis based on EMA 5-200 technique was more than that of market returns. The study concluded that there is no significant difference between the returns generated using EMA (5-20) and buy and hold investment strategy taking into consideration the weighted returns of both the 'momentum buying' and 'momentum selling' were found insignificant for 30 stocks out of the 31 stocks taken in the present study.

Table III: Results of Momentum in Equity Prices Based on EMA 5-200

Companies	**No. (Buy)**	**No. (Sell)**	**Long (B)**	**Short (S)**	**Aggregate of Weighted Long-Short (B-S)**
Ambuja Cement	2025	950	0.00029 -0.2082	0.00066 -1.1184	-0.00001 -0.01236
Asian Paints	2615	360	0.00090 -0.2455	0.00181 -2.2886**	0.00057 0.46990
Aurobindo Pharma Ltd.	1903	1072	0.00199 1.4944***	-0.00091 -0.0318	0.00160 1.40640***
Axis Bank Ltd.	1917	1058	0.00086 0.1424	0.00059 -1.1765	0.00034 0.30681
Bajaj Finance Ltd.	2229	746	0.00185 0.8392	-0.00043 -0.5937	0.00149 1.08827
Bharat Petroleum Co. Ltd.	2161	814	0.00054 -0.1880	0.00097 -1.5234***	0.00013 0.12390
Bosch Ltd.	2205	770	0.00059 -0.1358	0.00084 -1.9751**	0.00022 0.28955
Cipla Ltd.	1962	1013	0.00014 -0.5061	0.00094 -2.0249**	-0.00023 -0.32105
Dr. Reddy's Laboratory	1941	1034	0.00078 0.4538	0.00008 -0.8648	0.00048 0.64829
Eicher Motors	2386	589	0.00160 -0.0712	0.00182 -2.1661**	0.00092 0.59850
GAIL (India) Ltd.	1840	1135	0.00036	0.00058	0.00000

			-0.1387	-1.2734	0.00213
H C L Technologies	2131	844	0.00086 0.3962	0.00007 -0.5527	0.00060 0.49468
HDFC Bank Ltd.	2506	469	0.00063 -0.3536	0.00212 -1.9847**	0.00020 0.13817
Hero Motocorp Ltd.	1976	999	-0.00013 -1.1550	0.00173 -3.0269*	-0.00067 -0.87280
Hindustan Unileaver Ltd.	2167	808	0.00024 -0.8517	0.00176 -3.1756*	-0.00031 -0.39806
H.P.C.L.	1753	1222	0.00055 -0.0458	0.00064 -1.3712***	0.00006 0.06748
I T C Ltd.	2224	751	0.00033 -0.4942	0.00132 -2.4256*	-0.00009 -0.11060
Indian Oil Corp. Ltd.	1765	1210	0.00051 0.2480	0.00011 -0.5745	0.00026 0.30683
Indusind Bank Ltd.	2223	752	0.00091 -0.2966	0.00176 -1.8894**	0.00024 0.16028
Infosays Ltd.	1739	1236	-0.00014 -0.8443	0.00102 -1.9668**	-0.00051 -0.68397
Kotak Mahindra Bank Ltd.	2428	547	0.00104 0.1068	0.00068 -0.9092	0.00072 0.41676
Lupin Ltd.	2193	782	0.00082 -0.0140	0.00084 -1.9202**	0.00038 0.43056
Mahindra & Mahindra Ltd.	1996	979	0.00016 -0.7242	0.00149 -2.1063**	-0.00039 -0.39386
Maruti Suzuki India Ltd.	2045	930	0.00127 0.6382	0.00014 -1.1970	0.00083 0.93963
O.N.G.C. Ltd.	1574	1401	0.00008 -0.0838	0.00020 -0.4626	-0.00005 -0.06226
State Bank of India	1767	1208	0.00056 0.1979	0.00025 -0.7465	0.00023 0.25287
Sun Pharmaceutical India Ltd.	2217	758	0.00073 0.0279	0.00067 -1.6704**	0.00037 0.43889
Tata Consultancy Service Ltd.	2166	809	0.00072 0.1941	0.00037 -0.9543	0.00042 0.42640
Tata Motors Ltd.	1788	1187	0.00069 0.3747	0.00000 -0.3977	0.00041 0.38780
Ultratech Cement Ltd.	2257	718	0.00085 0.1352	0.00055 -1.2566	0.00051 0.49858
Wipro Ltd.	1746	1229	0.00025 -0.0411	0.00031 -0.7539	0.00002 0.02489

RESULTS OF RISK RETURN ANALYSIS USING EMA

Table IV shows the risk-return analysis of long-short investment strategy using EMA, the study found that the gross compound annual growth rate (CAGR) ranges between 14.30% (Aurobindo Pharma) to -19.41% (Hero Motocorp Ltd.) during the period of the study but the net CAGR was between 13.99% (Aurobindo Pharma) to -11.56% (Sun Pharmaceuticals). The net CAGR of an active portfolio based on momentum analysis based on EMA5-20 trading technique exceeds the returns from passive portfolio approach of 'buy and hold' over the 18 the stocks ending calendar year 2017 but 13 stocks have not given higher return using momentum analysis based on EMA 5-20 technique over the passive portfolio approach.

The study also observed that out of the 31 stocks selected in the study under consideration, in case of only 18 stocks have positive alpha. It was interesting to note that the top 5 rankers i.e. Aurobindo Pharma, Bajaj Finance Ltd., Maruti Suzuki India, Eicher Motors Ltd. and Ultratech Cement Ltd. stocks have earned excess return over the buy and hold strategy during the whole period of study i.e. twelve years but lowest value of alpha was observed in case of Cipla Ltd. and ITC Ltd. with negative values. The Aurobindo Pharma has been positioned at 1st rank on the basis of gross as well as net return because the Aurobindo Pharma has given the maximum return but Cipla Ltd. has the lowest return and put at the last rank i.e. 31st on the same basis using EMA 5-20. In terms of generating Sharpe ratio, the Aurobindo Pharma Stock has been ranked first followed by Bajaj Finance Ltd. at 2nd rank. The lowest Sharpe ratio was found of in case of Cipla Ltd. stock which was negative and has 31st rank and ITC Ltd. was ranked at 30th rank on the basis of both gross and net returns. The study also analysed the transaction cost for all stocks and found that the highest transaction cost occurs for Cipla Ltd. and the lowest transaction cost was for Maruti Suzuki India.

Table V depicts the risk-return analysis of long-short investment strategy using EMA, the study found that the gross compound annual growth rate (CAGR) ranges between 621.08% (Bajaj Finance Ltd.) to -9.67% (GAIL (India) Ltd.) but net CAGR ranged between 614.38% (Bajaj Finance Ltd.) to -82.68% (GAIL (India) Ltd.).The net CAGR of an active portfolio based on momentum analysis using EMA5-50 trading technique was higher in comparison to 'buy and hold' investment strategy in case of 20 stocks out of 31 stocks selected in the study ending the calendar year of 2017 but in case of 11 stocks do not have higher return than 'buy and hold' investment strategy on the basis signals indicated by EMA 5-50.

The study also observed that 20 stocks have generated positive alpha out of the 31 stocks used in the study, the lowest alpha was observed in case of Cipla Ltd with negative value. On the basis of gross as well as net return, Bajaj Finance Ltd. stock has ranked 1st having maximum return while stock of Cipla Ltd. has ranked last i.e. 31st having lowest return on the same basis using EMA 5-50. In terms of generating Sharpe ratio, the Bajaj Finance Ltd. stock has been ranked first followed by Aurobindo Pharma stock at 2nd rank. The lowest Sharpe ratio was found of in case of Cipla Ltd. stock and ranked at 31st rank and ITC Ltd. was ranked at 30th rank on the basis of both gross and net returns. The study also analysed the transaction cost for all stocks and found that the highest transaction cost occurs for HCL Tech. Ltd. stock and the lowest transaction cost is for Bajaj Finance Ltd. stock.

Table IV: Risk-Return Analysis of Long-Short Strategy EMA 5-20

Companies	No. of Trades[1]	Trade Repetition Time[2] (in days)	Gross Return (%)			T C (%)[3]	Net Return (%)			Sharpe[4.5] Ratio (%)	Alpha[6] (Index Return)
			Aggregate	CAGR	Rank	Aggregate	Aggregate	CAGR	Rank		
Ambuja Cement	376	8.04	-28.00	-2.70	22	19.10	-47.1	-5.17	22	-140.20	-48.33
Asian Paints	340	8.89	122.88	6.91	9	17.40	105.48	6.19	9	368.83	102.48
Aurobindo Pharma	316	9.57	397.31	14.30	1	16.10	381.21	13.99	1	872.52	378.39
Axis Bank Ltd.	380	7.96	72.19	4.63	13	19.20	52.99	3.61	13	120.32	50.70
Bajaj Finance Ltd.	306	9.88	385.50	14.07	2	15.60	369.9	13.79	2	846.50	366.10
Bharat P.C.L.	356	8.49	34.50	2.50	17	18.10	16.4	1.27	17	39.12	14.43
Bosch Ltd.	324	9.33	101.85	6.03	10	16.60	85.25	5.27	10	302.72	83.29
Cipla Ltd.	422	7.17	-232.46	--	31	21.40	-253.86	----	31	-874.26	-255.08
Dr. Raddy's Lab.	334	9.05	73.80	4.71	12	17.00	56.8	3.82	12	185.04	55.20
Eicher Motors Ltd.	304	9.95	258.85	11.24	4	15.50	243.35	10.83	4	580.57	238.47
GAIL (India) Ltd.	420	7.20	-134.70	--	27	21.30	-156	--	27	-464.05	-157.32
H.C.L. Tech. Ltd.	388	7.79	-150.84	--	28	19.70	-170.54	--	28	-450.26	-172.43
H.D.F.C. Bank Ltd.	352	8.59	44.24	3.10	16	17.80	26.44	1.97	15	79.04	23.86
Hero Motocorp Ltd.	392	7.71	-92.54	-19.41	24	19.90	-112.44	--	24	-375.38	-113.92
Hindustan Unilever	368	8.22	7.36	0.60	20	18.70	-11.34	-0.99	20	-47.24	-13.28
H.P.C. Ltd.	330	9.16	187.21	9.19	7	16.80	170.41	8.64	7	420.39	168.66
I.T.C. Ltd.	418	7.23	-225.22	--	30	20.90	-246.12	--	30	-856.15	-247.84
Indian Oil Corp. Ltd.	398	7.60	45.86	3.20	14	19.90	25.96	1.94	16	70.36	24.93
Indusind Bank Ltd.	326	9.28	215.77	10.06	6	16.60	199.17	9.56	6	425.24	195.83
Infosys Ltd.	374	8.09	-7.20	-0.62	21	19.00	-26.2	-2.50	21	-87.76	-27.22
Kotak Mahindra Bank	298	10.15	45.64	3.18	15	19.20	26.44	1.97	14	56.51	23.54
Lupin Ltd.	420	7.20	-102.15	--	25	19.80	-121.95	--	25	-389.09	-124.40
Mahindra & Mahindra	378	8.00	17.62	1.36	19	19.20	-1.58	-0.13	19	-9.19	-3.35

Maruti Suzuki India	300	10.08	267.49	11.46	3	15.30	252.19	11.06	3	763.00	249.46
O.N.G.C. Ltd.	420	7.20	-163.32	--	29	21.20	-184.52	--	29	-549.78	-184.92
State Bank of India	360	8.40	81.28	5.08	11	18.20	63.08	4.16	11	165.04	61.79
Sun Pharmaceuticals	342	8.84	-59.83	-7.31	23	17.30	-77.13	-11.56	23	-250.79	-79.26
Tata Consultancy	402	7.52	-114.43	--	26	20.40	-134.83	--	26	-429.48	-136.68
Tata Motors Ltd.	366	8.26	165.40	8.47	8	18.60	146.8	7.82	8	339.45	145.56
Ultratech Cement Ltd.	324	9.33	227.27	10.39	5	16.50	210.77	9.91	5	626.12	208.46
Wipro Ltd.	382	7.92	32.15	2.35	18	19.40	12.75	1.01	18	36.44	11.93

1) Number of trades is reached as follows: e.g., buying "X" quantity on day one to be long and there after selling "2X" quantity i.e. one quantity for becoming neutral and another quantity to be short by "X" quantity. 2) Trade Repetition Time is an average number of days between two consecutive trades and has direct bearing on the transaction cost. 3) T C (transaction cost): is estimated at 0.01 percent of average trade value (average of INDEX over years) × numbers of trades. The transaction cost is usually variable between clients based on their volume of trade and almost nil for members of stock exchanges, where they buy a seat against one-time payment. Hence, transaction cost is being assumed. 4) Sharpe Ratio= (Net Returns - Index Return)/ Standard deviation, 5) Annual Standard Deviation= SD of daily returns multiplied by square root of average numbers of days in a year for to the given index. 6) Alpha Ratio= (Net Returns - Index Return).

Table V: Risk-Return Analysis of Long-Short Strategy EMA (5-50)

Companies	No. of Trades[1]	Trade Repetition Time[2] (in days)	Gross Return (%)			T C (%)[3]	Net Return (%)			Sharp[4,5] Ratio (%)	Alpha[6] (Index Return)
			Aggregate	CAGR	Rank	Aggregate	Aggregate	CAGR	Rank		
Ambuja Cement	198	15.27	124.81	6.98	12	10.20	114.61	6.57	12	328.94	113.38
Asian Paints	186	16.26	182.82	9.05	7	9.50	173.32	8.74	8	612.99	170.32
Aurobindo Pharma	156	19.38	491.42	15.96	2	8.10	483.32	15.83	2	1107.97	480.50
Axis Bank Ltd.	218	13.87	52.04	3.55	15	11.20	40.84	8.89	7	91.49	38.55
Bajaj Finance Ltd.	128	23.63	621.08	17.90	1	6.70	614.38	17.80	1	1411.79	610.58
Bharat P.C.L.	208	14.54	34.67	2.51	17	10.70	23.97	1.81	16	59.64	22.00
Bosch Ltd.	152	19.89	240.56	10.75	5	7.90	232.66	10.54	5	838.48	230.70
Cipla Ltd.	244	12.39	-122.85	--	31	12.60	-135.45	--	31	-468.43	-136.67
Dr. Raddy's Lab.	226	13.38	16.41	1.27	19	11.60	4.81	0.39	17	10.77	3.21
Eicher Motors Ltd.	178	16.99	274.57	11.63	3	9.20	265.37	11.40	3	634.18	260.49
GAIL (India) Ltd.	238	12.71	-70.48	-9.67	29	12.20	-82.68	-13.60	29	-247.78	-84.00
H.C.L. Tech. Ltd.	274	11.04	-58.96	-7.16	24	14.00	-72.96	-10.34	25	-195.45	-74.85
H.D.F.C. Bank Ltd.	211	14.33	78.56	4.95	14	10.80	67.76	4.41	14	215.93	65.18
Hero Motocorp Ltd.	244	12.39	-66.23	-8.64	27	12.50	-78.73	-12.09	27	-264.30	-80.21
Hindustan Unilever	242	12.50	-62.53	-7.85	26	12.40	-74.93	-10.88	26	-273.52	-76.87
H.P.C. Ltd.	194	15.59	158.50	8.24	10	9.90	148.6	7.88	10	366.03	146.85
I.T.C. Ltd.	252	12.00	-117.78	--	30	12.80	-130.58	--	30	-457.02	-132.30
Indian Oil Corp. Ltd.	248	12.19	-59.41	-7.24	25	12.80	-72.21	-10.12	24	-206.67	-73.24
Indusind Bank Ltd.	206	14.68	155.80	8.14	11	10.50	145.3	7.76	11	308.26	141.96
Infosys Ltd.	208	14.54	-52.93	-6.08	23	10.60	-63.53	-8.06	2	-208.10	-64.55
Kotak Mahindra Bank	230	13.15	99.29	5.92	13	11.80	87.49	5.38	13	203.04	84.59
Lupin Ltd.	218	13.87	15.27	1.19	20	11.10	4.17	0.34	19	5.39	1.72
Mahindra & Mahindra	230	13.15	51.39	3.52	16	11.80	39.59	2.82	15	103.74	37.82

Maruti Suzuki India	164	18.44	200.49	9.60	6	8.60	191.89	9.33	6	578.56	189.16
O.N.G.C. Ltd.	238	12.71	-37.25	-3.80	22	12.20	-49.45	-5.52	22	-148.21	-49.85
State Bank of India	246	12.29	16.94	1.31	18	12.60	4.34	0.35	18	8.16	3.05
Sun Pharmaceuticals	238	12.71	-69.67	-9.47	28	12.20	-81.87	-13.28	28	-265.79	-84.00
Tata Consultancy	262	11.54	8.35	0.67	21	13.40	-5.05	-0.43	21	-21.67	-6.90
Tata Motors Ltd.	198	15.27	254.42	11.12	4	10.20	244.22	10.85	4	566.64	242.98
Ultratech Cement Ltd.	214	14.13	163.03	8.39	9	11.10	151.93	0.01	20	449.39	149.62
Wipro Ltd.	186	16.26	165.15	8.47	8	9.60	155.55	8.13	9	472.47	154.73

1) Number of trades is reached as follows: e.g., buying “X” quantity on day one to be long and there after selling “2X” quantity i.e. one quantity for becoming neutral and another quantity to be short by “X” quantity. 2) Trade Repetition Time is an average number of days between two consecutive trades and has direct bearing on the transaction cost. 3) T C (transaction cost): is estimated at 0.01 percent of average trade value (average of INDEX over years) × numbers of trades. The transaction cost is usually variable between clients based on their volume of trade and almost nil for members of stock exchanges, where they buy a seat against one-time payment. Hence, transaction cost is being assumed. 4) Sharpe Ratio= (Net Returns - Index Return)/ Standard deviation, 5) Annual Standard Deviation= SD of daily returns multiplied by square root of average numbers of days in a year to the given index. 6) Alpha Ratio= (Net Returns - Index Return).

Table VI: Risk-Return Analysis of Long-Short Strategy EMA (5-200)

Companies	No. of Trades[1]	Trade Repetition Time[2] (in days)	Gross Return (%)			T C (%)[3]	Net Return (%)			Sharpe[4.5] Ratio (%)	Alpha[6] (Index Return)
			Aggregate	CAGR	Rank	Aggregate	Aggregate	CAGR	Rank		
Ambuja Cement	126	24.00	-3.47	-0.30	24	6.60	-10.07	-0.88	23	-32.77	-11.30
Asian Paints	66	45.82	169.11	8.60	7	3.60	165.51	8.48	7	584.88	162.51
Aurobindo Pharma	56	54.00	477.04	15.73	1	3.10	473.94	15.67	1	1086.34	471.12
Axis Bank Ltd.	98	30.86	102.61	6.06	13	5.20	97.41	5.83	13	225.72	95.12
Bajaj Finance Ltd.	66	45.82	444.76	15.17	2	3.60	441.16	15.11	2	1011.27	437.36
Bharat P.C.L.	106	28.53	38.96	2.78	19	5.60	33.36	2.43	19	85.09	31.39
Bosch Ltd.	104	29.08	66.08	4.32	17	5.50	60.58	4.03	17	213.06	58.62
Cipla Ltd.	118	25.63	-67.96	-9.06	27	6.20	-74.16	-10.68	27	-258.36	-75.38
Dr. Raddy's Lab.	72	42.00	143.18%	0.12	22	3.90	-2.4682	-0.21	22	-13.63	-4.06
Eicher Motors Ltd.	50	60.48	273.54	11.61	3	2.90	270.64	11.53	3	647.01	265.76
GAIL (India) Ltd.	118	25.63	0.53	0.04	23	6.20	-5.67	-4.49	26	-20.63	-6.99
H.C.L. Tech. Ltd.	74	40.86	177.16	8.87	6	4.00	173.16	8.74	6	447.24	171.27
H.D.F.C. Bank Ltd.	110	27.49	59.05	3.95	18	5.80	53.25	3.62	18	167.86	50.67
Hero Motocorp Ltd.	154	19.64	-198.37	--	31	8.00	-206.37	--		-684.88	-207.85
Hindustan Unilever	120	25.20	-91.02	-18.18	28	6.30	-97.32	-25.99	28	-353.19	-99.26
H.P.C. Ltd.	126	24.00	19.19	1.47	20	6.60	12.59	0.99	20	27.03	10.84
I.T.C. Ltd.	114	26.53	-26.16	-2.50	26	5.80	-31.96	-3.16	25	-116.33	-33.68
Indian Oil Corp. Ltd.	90	33.60	77.01	4.87	14	4.80	72.21	4.63	14	200.88	71.18
Indusind Bank Ltd.	110	27.49	69.97	4.52	15	5.70	64.27	4.22	16	132.30	60.93
Infosys Ltd.	138	21.91	-150.53	--	30	7.20	-157.73	--		-511.78	-158.75
Kotak Mahindra Bank	82	36.88	214.97	10.03	5	4.40	210.57	9.90	5	498.44	207.67
Lupin Ltd.	88	34.36	112.70	6.49	11	4.70	108	6.29	11	330.15	105.55
Mahindra & Mahindra	174	17.38	-114.59	--	29	9.00	-123.59	--		-343.88	-125.36
Maruti Suzuki India	62	48.77	246.41	10.91	4	3.40	243.01	10.82	4	734.92	240.28
O.N.G.C. Ltd.	94	32.17	-14.54	-1.30	25	5.00	-19.54	-1.79	24	-59.29	-19.94
State Bank of India	82	36.88	69.22	4.48	16	4.40	64.82	4.25	15	169.68	63.53

Sun Pharmaceuticals	60	50.40	111.16	6.43	12	3.30	107.86	6.29	11	334.58	105.73
Tata Consultancy	94	32.17	125.60	7.02	9	5.00	120.6	6.82	9	373.15	118.75
Tata Motors Ltd.	100	30.24	122.74	6.90	10	5.30	117.44	6.69	10	270.98	116.20
Ultratech Cement Ltd.	78	38.77	152.90	8.04	8	4.20	148.7	7.89	8	439.69	146.39
Wipro Ltd.	126	24.00	5.89	0.48	16	6.60	-0.71	-0.06	21	-4.66	-1.53

1) Number of trades is reached as follows: e.g., buying "X" quantity on day one to be long and there after selling "2X" quantity i.e. one quantity for becoming neutral and another quantity to be short by "X" quantity. 2) Trade Repetition Time is an average number of days between two consecutive trades and has direct bearing on the transaction cost. 3) T C (transaction cost): is estimated at 0.01 percent of average trade value (average of INDEX over years) × numbers of trades. The transaction cost is usually variable between clients based on their volume of trade and almost nil for members of stock exchanges, where they buy a seat against one-time payment. Hence, transaction cost is being assumed. 4) Sharpe Ratio= (Net Returns - Index Return)/ Standard deviation, 5) Annual Standard Deviation= SD of daily returns multiplied by square root of average numbers of days in a year to the given index. 6) Alpha Ratio= (Net Returns - Index Return).

Table VI depicts the risk-return analysis of long-short investment strategy using EMA; the study found that CAGR ranges between 15.73% (Aurobindo Pharma) to -18.18% (Hindustan Unilever) but net CAGR ranged between 15.67% (Aurobindo Pharma) to -25.99% (Hindustan Unilever). The net CAGR of an active portfolio based on momentum analysis using EMA5-200 trading technique was higher than the returns from 'buy and hold' investment strategy in case of the 20 stocks ending the calendar year of 2017 buy 11 stocks do not have higher return using EMA 5-200 technique over the passive portfolio approach.

In this study, 20 stocks have generated positive alpha out of the 31 stocks used in the study during the period of study. The study also observed that Aurobindo Pharma and Bajaj Finance ltd. stocks have shown a very good excess return over the buy and hold strategy during all twelve years of the study but the lowest return was found lowest in case of Hero Motocorp ltd. and Infosys ltd. stocks with negative values. In terms of generating Sharpe ratio the stock of Aurobindo Pharma has given the maximum return and put at 1st rank while the Hero Motocorp ltd. stock has the lowest return and put at the last rank i.e. 31st on the basis of raking based on alpha ratio using EMA 5-200. On the basis of Sharpe ratio the stock of Aurobindo Pharma has ranked first followed by stock of Bajaj Finance. The lowest Sharpe ratio was in the stock of Hero Motocorp ltd. stock with negative value and ranked at 31st on the basis of both gross and net returns. The study also analysed the transaction cost for all stocks and found that the highest transaction cost was in case of Mahindra & Mahindra stock and the lowest transaction cost was for stock of Eicher Motors ltd.

CONCLUSION

The results of momentum analysis based on EMA 5-20, 5-50 and 5-200 during the period of study shows the significant returns over the buy-hold or passive portfolio strategy in case of many companies. Further the results presents that among the companies showing the significant returns using EMA technique of momentum analysis, the degree of level of significance differs. In case of risk return analysis, the results shows that the gross and net CAGR of an active portfolio based on momentum analysis using EMA trading technique far exceeds the returns from passive portfolio approach of 'buy and hold' strategy in case of many companies. In case of generating alpha value many companies generate positive, many generate negative and some generate highly positive, some generate highly negative values for alpha. In case of sharpe ratio the results are a mixture of very high, very low, high and low values. Although the null hypotheses is accepted in many cases and also rejected in many cases, here we cannot conclude the results as purely significant or insignificant. So the results are not so significant and strong to permit a laymen or an initial investor to go for a generality that all technical indicators are profitable. So the study concludes that technical traders should use combination of technical tools because the performances of multiple technical tools are dissimilar in different cases. On the basis of these results it can be concluded that it is not possible to earn higher returns by momentum analysis using EMA (5-20, 5-50 and 5-200) which is an indication that Indian stock markets are efficient in weak form of market efficiency during the period of study which means in the long period it is not possible to beat the market returns only with the help of the momentum analysis.

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