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7.1 INTRODUCTION

A man’s desire for money is bigger than the ocean. In the lust to earn more, one hunts for different sources to make money. Some people go for gambling, horse racing and betting, while others prefer a more dignified and risky task of speculating in the stock market. Many people have tried their best to solve this puzzle in the hope that good forecasts will bring them great fortunes. And the past has proved that this market has brought great fortunes to only few people. Their attempts have given birth to different schools of thought for making money from the stock market and technical analysis is one such school of thought.

Technical analysis is the process of analyzing security's historical prices in an effort to determine probable future prices. This is done by comparing current price movement (i.e. current expectations) with comparable historical price movement to predict a reasonable outcome. The basic foundation lies in the relationship of price and volume. Technical traders do not attempt to measure security's intrinsic value, but instead use charts and other tools to identify patterns that can suggest future movement. This school of thought is applicable to all the markets, say stock market, commodities market and currency market.

The technical analysis is the oldest among all market theories. It is widely used in stock markets, commodity markets and foreign exchange markets. All business channels have technical analysts and traders on their daily programmes. All broking research houses pay hefty salaries to technical analysts. Many technical analysis softwares comprising varied trading tools have been introduced. It is gaining more popularity with its extensive usage by the market participants as found by Smidt (1965a), The Group of Thirty (1985), Brorsen and Irwin (1987), Frankel and Froot (1990), Taylor and Allen (1992), Menkhoff (1997), Lui and Mole (1998), Cheung and Wong (2000), Cheung, Chinn, and Marsh (2000), Cheung and Chinn (2001), Oberlechner (2001) and Menkhoff and Taylor (2007). Despite its widespread use among market participants, academicians have shown their reluctance to accept it. This
is due to the absence of adequate statistical evidence that technical analysis can help in earning significant profits. Also, a large number of technical tools have been developed in the last century but only few have been statistically tested and accepted by academia.

Hence, it becomes imperative to test the profitability of technical tools w.r.t to Indian stock markets. Along with, it is necessary to test the presumption of academicians who consider passive investment as the best tool for investing. Thus, the present study attempts to investigate the performance of technical tools, index investing and strategic combinations of both in Indian stock market.

7.2 OBJECTIVES OF THE STUDY

The study primarily aims at examining the profitability of traditional technical trading tools i.e. patterns, index investing and their strategic combinations. Following are the specific objectives:

1. To investigate whether the use of head and shoulders pattern can generate superior returns in select Indian stocks.
2. To test the profitability of candlestick reversal patterns in nifty futures and select Indian stocks.
3. To suggest strategic combinations to traders for enhancing profitability in stock trading.

7.3 RESEARCH METHODOLOGY

The profitability of head and shoulders pattern and candlestick reversal patterns is examined using daily opening, high, low and closing prices of one month nifty futures contract and stocks comprising CNX Nifty Index from January 1, 2000 till March 31, 2014, covering two bull and two bear periods. When a stock is replaced in CNX Nifty, it is also replaced in this study. So, a stock which is actually in CNX Nifty is used for analysis in this study. During this period, there were fifty one changes made in Nifty 50. Hence, the daily data of ninety seven stocks along with nifty futures is used to achieve first two objectives. The data is sourced from the website of national stock exchange, India and adjusted for corporate actions like bonus, split and rights issue.
The third objective aims at suggesting strategic combinations for enhancing profitability in stock market. For this purpose, all the stock indices at NSE are selected. Firstly, the profitability of all indices is evaluated and then, head and shoulders top pattern is incorporated to check if it enhances the profits of passive investors. Till March 31, 2014, there were 36 stock indices at NSE. They are CNX Nifty, CNX Nifty Junior, LX 15, CNX 100, CNX 200, CNX 500, CNX Midcap, Nifty Midcap 50, CNX Smallcap, CNX Auto, CNX Bank, CNX Energy, CNX Finance, CNX FMCG, CNX IT, CNX Media, CNX Metal, CNX Pharma, CNX PSU Bank, CNX Realty, CNX Commodities, CNX Consumption, CNX Infra, CNX MNC, CNX PSE, CNX Service sector, CNX Nifty SHARIAH, CNX 500 SHARIAH, CNX100 Equal Weight, CNX Defty, CNX Dividend opportunities, CNX Alpha, CNX High Beta, CNX Low Volatility, CNX NV20, and CNX NI15. Their profitability is evaluated using total return index values (TRI). The TRI values reflect the returns arising from dividend receipts and price movement of the constituent stocks. The TRI values of all indices are taken from bloomberg database. The implicit yield of 91-day treasury bills of Government of India is taken as a proxy of risk free rate (Connors and Sehgal, 2001). The data of 91-day treasury bills is taken from the website of Reserve Bank of India (www.rbi.gov.in). CNX Nifty is taken as market proxy. The remaining required data w.r.t to size, value and momentum factors for Indian markets is obtained from the website of IIM Ahmedabad1 (Agarwalla et al., 2013).

The various tools used to analyze the performance include daily raw returns, annualized return, annualized standard deviation, Sharpe Ratio, Jensen Alpha and Carhart alpha. For the purpose of data analysis, various statistical techniques like binomial test, bootstrapped skewness adjusted t-test and regression analysis have been applied. The binomial test and bootstrapped skewness adjusted t-test are conducted using R Statistical Software (Version 3.3.1), a language and environment for statistical computing and graphics. The regression analysis is carried using E-Views Software (Version 8), a windows based econometric software by IHS Global Inc. software solutions.

The binomial test is employed to test the statistical significance of winning trades i.e. whether the winning trades are as frequent as losing trades or not. The null hypothesis $H_0: p=0.5$ for the frequency of winning trades is tested here because the winning rate of a pattern is compared to that of a random system, which has 50 percent chance of producing a winning trade. If the ratio of winning trades is more than 0.5 and null hypothesis is rejected, then it shows that ratio of winning trades is superior over any random system.

The bootstrapped skewness adjusted t-test is used to test the statistical significance of profits earned upon the formation of a pattern. If the average return is positive and null hypothesis is rejected, then the pattern is considered successful in generating significant returns. The test has been suggested by Lyon et al. (1999), because firstly, there is presence of skewness in the stock returns data and secondly, skewness is more serious problem than kurtosis (Sophister, 1928; Neyman and Pearson, 1928 and Nair, 1941).

The regression analysis has been used to apply two models i.e. capital asset pricing models (CAPM) and carhart four factor model. If the risk adjusted excess return obtained upon using these models is superior and significant, then it means that the pattern is successful in generating significant profits for the traders after adjusting for all risk factors.

7.4 MAJOR FINDINGS OF THE STUDY

The major findings that have emerged from the study are summarized below:

7.4.1 To investigate whether the use of head and shoulders pattern can generate superior returns in select Indian stocks.

The profitability of head and shoulders price pattern is investigated using combination of two entry rules and ten exit rules. The study considers both head and shoulder top and bottom patterns. The significance of the returns conditioned on head and shoulders pattern is tested using Carhart four factor model.

- Firstly, the profitability of traditional version of head and shoulders top and bottom pattern, as adopted by Lo et al. (2000), Savin et al. (2007) and Choong
and Poong (2014), is examined using the entry rule used by them. The results obtained are consistent with their findings that the pattern fails in generating significant profits.

- Another entry rule i.e. entry rule II is adopted which involves opening the trading position at the breakdown/breakout price level. It is found that the new entry rule helps in generating significant superior profits using majority of exit rules in case of head and shoulders top pattern. Among them, endogenous exit rule II outperforms by generating highest risk adjusted excess returns. In case of head and shoulders bottom pattern, only endogenous exit rules I & II deliver significant profits.

- In the later part, the study investigates the modified version of pattern with an aim to enhance its profitability using same entry and exit rules. It is found that the profitability of head and shoulders top pattern improves significantly over its traditional version as its delivers significant returns for entry rules I and II.

- The modified version of the head and shoulders bottom pattern fails to show any improvement in the profitability as the risk adjusted excess returns deteriorate. Thus, the study recommends the traders to adopt the modified version of head and shoulders top pattern only.

- An overview of two entry rules show that the entry rule II is better over the rule I. This is because of two reasons. Firstly, the trade is entered early at a better price, which results in higher profits. Secondly, if the price moves in the opposite direction, the amount of loss gets reduced. Thus, the losses get minimized and profits increase, thereby resulting in greater profits.

- Among the different exit rules, the endogenous rules perform better and that too the second one shows the superior performance. This is probably because of three factors i.e. initial stop loss, trailing stop loss and target price. The initial stop loss prevents the trade from going into a major loss as the trading position is squared off with a small loss. The trailing stop loss helps in carrying the trading position forward to the target price and suggests closing the trading position, the moment price starts going in opposite direction. The target price
tells in advance about the probable price where the trade should be closed at profit.

Thus, a trading position should not be blindly initiated and closed on any day at any price as it will lead to loss. The right combination of the entry and exit rule is the key to earn significant profits from the market.

7.4.2 To test the profitability of candlestick reversal patterns in nifty futures and select Indian stocks.

This section involves investigating the profitability of candlestick reversal patterns in Indian stock markets. The study considers both bullish and bearish reversal patterns. Their profitability is evaluated by assuming that a trading position is initiated at the opening price on the day following the pattern and held for one till ten days. A long position is made on the completion of bullish reversal pattern while a short position is opted on the completion of bearish reversal pattern. The performance of seven different trading strategies based on these patterns are tested using bootstrapped skewness adjusted t-test and binomial test. The profitability of patterns is discussed as follows:

- **Hammer** is successful in generating significant profits as shown by trading strategy C.S.3, C.S.4, C.S.6 and C.S.7. It is recommended to trade hammer pattern using the stop loss rule of exiting at pattern’s low in the event of loss. The larger the size of hammer, the higher the probability that profits will be larger.

- **Inverted hammer** generates superior profits for trading strategy C.S.3 & C.S.4. It is recommended to trade inverted hammers of size five per cent or less using stop loss rule of exiting at its low.

- **Bullish Engulfing** fails miserably in generating superior returns for the traders and is not recommended for trading.

Considering the significance and extent of profits, it is recommended that one should trade in bearish harami patterns of lesser size, whose price range does not exceed ten percent and use the stop loss rule of exiting at pattern’s low in the event of loss.

- **Piercing Pattern** fails miserably in generating superior returns for the traders and is not recommended for trading.

- **Tweezers Bottom** is not profitable to trade and should be avoided.

- **Morning Star** fails to yield significant profits and superior frequency of winning trades using any trading strategy.

- **Three Outside Up** is not successful in generating significant profits for the investors as it displays poor performance across majority of the trading strategies and holding periods.

- **Three Inside Up** fails to deliver promising returns to the traders using most of the trading strategies. Only few holding days of trading strategy C.S.3 display significant profits.

- **Three White Soldiers** has occurred only fifteen times in the entire sample period, which shows that it occurs rarely in the Indian markets. An overview over the average returns of trading strategy C.S.1, C.S.2 and C.S.3 shows that the pattern does not generate superior returns for the investors and hence, should be avoided for trading.

- **Hanging Man** generates significant profits using trading strategy C.S.3, C.S.4 and C.S.5. It is recommended to trade those hanging man patterns whose size is not more than ten percent of the closing price along with the stop loss rule of exiting at pattern’s high in the event of loss.

- **Shooting Star** does not provide very impressive returns in Indian stock markets but the profits are significant for trading strategies C.S.1, C.S.2 & C.S.3. It is suggested that one should close the short positions on the first day itself.

- **Bearish Engulfing** exhibits superior performance using trading strategy C.S.3 and C.S.4. It is suggested that one should trade them using the stop loss rule of
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exiting at pattern’s high and hold the profitable trading positions till ten days. The pattern’s whose size is more than ten percent should be avoided.

- **Bearish Harami** generates superior profits for the traders. It is recommended that traders should trade them using stop loss rule of exiting at pattern’s high and focus only those pattern whose price range is not more than ten percent of the closing price.

- **Dark Cloud Cover** having size less than ten percent of the closing price should be used for trading along with stop loss rule of exiting at pattern’s high.

- **Tweezers Top** is successful in generating superior returns for traders and can be traded using trading strategy C.S.3 and C.S.4.

- **Evening Star** fails in generating significant superior profits for the traders and hence, should be avoided for trading.

- **Three Outside Down** is not successful in generating superior return for the traders.

- **Three Inside Down** fails to deliver significant returns in trading.

- **Three Black Crows** fails in generating any significant profits for the traders as it leads to loss across various holding periods and trading strategies.

The study shows that a trading position should not be blindly made on the formation of these patterns as shown by trading strategy C.S.1 as it may lead to loss, which is consistent with the findings of Marshal et al. (2006, 2008) and Lu (2014).

The study finds strong support emphasizing the importance of using stop loss rule in trading. The use of five percent stop rule, as advocated by Goo et al. (2007) and implemented in trading strategy C.S.2, improves the performance of few patterns like inverted hammer, bullish harami, morning star, three outside up, shooting star, bearish engulfing, bearish harami, evening star, three outside down and three inside down. It yields significant gain in case of shooting star pattern for one and two day holding period only. The change in the stop loss rule to pattern’s high/low, as implemented in trading strategy C.S.3, significantly improves the profitability and results in significant
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profits. This is can be witnessed by its superior performance among all the successful patterns. Thus, the study reflects the importance of using correct stop loss in trading to increase the profitability.

7.4.3 To suggest strategic combinations to traders for enhancing profitability in stock trading.

This section focuses on two aspects. Firstly, an examination of long run performance of all the stock indices at NSE (National Stock Exchange, India) is done and the best performing index in each category is determined. Secondly, strategic combination of head and shoulders top pattern with various stock indices is built to maximize returns for index investors.

7.4.3.1 Examine the long run performance of all the stock indices at NSE (National Stock Exchange, India) and evaluate the best performing index in each category, thereby, recommending the best index for a passive investor.

An examination of long run performance of all the 36 stock indexes at NSE (National Stock Exchange, India) is done from their respective base date and a common date i.e. January 1, 2004 using total return index values. The findings are:

- CNX Nifty, the flagship index of NSE, is successful in generating superior return over risk free rate, proving that Indian equity markets tend to generate better returns as compared to 91-day treasury bills of Government of India.

- On analyzing performance from respective base date using capital asset pricing model, it is found that CNX IT, CNX Low Volatility, CNX NV20 and CNX NI15 generated statistically significant positive risk adjusted excess returns, thereby exhibiting superior stock selection ability.

- On using Carhart four factor model, only CNX IT and CNX NI15 are successful in generating significantly positive returns. However, Jensen alpha (obtained using CAPM model) of CNX Low Volatility turned into insignificant Carhart alpha, meaning that the excess returns were obtained as a result of additional factors (like value, size and momentum) but not due to superior stock selection strategy. Also, CNX High Beta, CNX Commodities, CNX 200 and CNX Realty generated significantly negative alphas, thereby emphasizing that high beta, commodity and realty stocks should be avoided for investment.
Considering the economic significance, few sectors like Auto, FMCG, Finance, Banking and Pharma have performed better than others over long run.

A closer insight over strategy indices gives a clear verdict that investment strategy focusing growth stocks should be adopted. So, a passive investor, planning to invest in any one index should invest in CNX NI15 while he should avoid investing in only one sector and keep shifting among the sectors with the change in the market conditions as it is doubtful that a specific sector will always outperform in all the market conditions.

The results of joint hypothesis suggest that apart from five indices namely CNX NIFTY Junior, CNX Midcap 50, CNX Energy, CNX Service sector and CNX Alpha, CNX Nifty cannot be used to replicate others due to significant differences in return and risk characteristics.

7.4.3.2 Build strategic combination of head and shoulders top pattern with various stock indices to maximize returns for index investors.

This section aims at building strategic combination of head and shoulders top pattern with various stock indices to maximize returns for index investors. The idea involves selling the index or stocks comprising the index at the neckline breakdown level of head and shoulders top pattern and later, buying back at a lesser price level. Once sold, it is assumed that the investor will keep the proceeds with him and not invest in any other asset. The index or its constituent stocks are bought at the later date, when either initial stop loss or trailing stop loss is triggered or the target price level is reached. A comparative analysis is done using Carhart alpha obtained from Carhart four factor model, which considers additional risk factors like size, value and momentum. The findings are summarized as follows:

- Earlier the Carhart alpha was significantly positive for CNX IT and CNX NI15 but later, on considering the head and shoulders top pattern, significant profits are generated in case of CNX 100, CNX Auto, CNX Consumption, CNX 10 Equal Weight and CNX Low Volatility too.

- Although, Carhart alpha is negative for Nifty Midcap 50, CNX Realty, CNX Commodities, CNX PSE, CNX Alpha and CNX High Beta, but it is statistically
insignificant. Considering the economic significance, there is improvement in the value of Carhart alpha of all the indices (except CNX NV 20).

Thus, it can be comprehended that the head and shoulders top pattern enhances the profitability of the passive investors. The sell signals arising from the price patterns provide an opportunity to the investors to maximize their returns from the long term investments. Similarly, other profitable technical tools can also be combined with different investing styles to generate higher alphas.

7.5 CONCLUSION

The present study makes an attempt to explore one of the oldest market theories i.e. technical analysis. As evidenced from the results of this research work that technical analysis actually works, few patterns successfully generated profits. It proves that patterns keep repeating over time and provide profitable opportunities. However, it does not imply that all patterns are profitable. Some of them indeed fail. It suggests that one should use profitable patterns and avoid losers. It builds the confidence of investor community in the theory and helps them in adopting it in their investment/trading strategy. Building strategic combination of head and shoulders top pattern with stock indices is one example of combining technical tools with passive investing.

The application of technical analysis has given birth to quantitative trading, which further extends to algorithmic trading. The algorithmic trading involves programming a computer with the set of instructions for buying and selling a security in order to generate profits at a lightning speed. This study will feed the industry of algorithmic trading. The profitable patterns and their strategic combinations can be developed in an algorithm and used by investing/trading community to their advantage. Their profitability can be tested on varied financial products like commodities, currencies, fixed income instruments etc.

The market theories are same but the dynamics of trading have changed and will keep changing with the change in technology. The need is to change with the change. Hence, one needs to incorporate a change in traditional investment style to have better profitability. If combining head and shoulders top pattern with passive investment style can improve its profitability, other strategic combinations may do wonders. The need is to hunt them.
7.6 RECOMMENDATIONS OF THE STUDY

On the basis of above discussion, the study offers following recommendations.

- The profitability in trading depends upon right entry and exit rules. Entering a new trade at the right time enhances the probability of larger profits and lesser losses. Exiting the trade at the right time is more important than the entering, as it finally decides the amount of profit or loss that the trade generates. The right exit helps in booking profit and prevents the profitable trade from turning into loss.

- Traders should make use of the stop loss rules in trading. This can be comprehended from the results of first and second objective, when the use of stop loss rules improved the profitability of the patterns. Trading without stop loss rules leads to loss as supported by the findings of previous research, when exogenous exit rules are used.

- All the technical tools are not profitable. This can be concluded from the performance of candlestick reversal patterns. Some patterns are profitable and can be used for trading while unprofitable patterns should be avoided. Firstly, a pattern’s profitability should be rigorously tested using objective entry and exit rules on the historical data and then, after obtaining profitable results, it should be incorporated in trading.

- Rather than concentrating on only one technical tool, traders can use combination of multiple tools to enhance their profitability. For example, combining valid trendline rule and fibonacci ratios with head and shoulders top pattern improved the profitability in comparison to traditional head and shoulders top pattern.

- CNX Nifty, the flagship index of NSE, is found successful in generating superior return over risk free rate, proving that Indian equity markets tend to generate better returns as compared to 91-day treasury bills of Government of India. With falling interest rates and rising inflation, it is advised that Indians should invest their money in stock market to maximize their earnings.
• If an investor can’t find a good mutual fund or portfolio manager to manage his capital, then he can make passive investment using any index. But like patterns, all indices are not suitable for investment. Hence, he must analyze them before investing in them. The present study suggests that CNX NI 15 (growth stocks) and CNX Low volatility are good indices to invest as they generate higher risk adjusted returns.

• A passive investor should not block his investment in only one index. He must diversify by investing in other indices. The study finds that CNX IT has low association with CNX Nifty. As a result, an investor can diversify by investing in IT stocks. This shall reduce his risk and improve profitability.

• An investor should avoid investing in only one sectoral sector and keep shifting among the sectors with the change in the market conditions as it is doubtful that a specific sector will always outperform in all the market conditions. To quote, IT sector outperformed in the bull market that ended in 2000 while banking, realty and capital goods stocks generated exorbitant returns in the bull market from 2003 till 2008.

• A passive investor can enhance his profitability by using technical analysis. The study shows that the use of head and shoulders top pattern can help him in increasing his returns by selling the index or stocks comprising the index at the neckline breakdown level and later, buy them back at a lesser price level.

7.6.1 Scope for Further Research

The research in the area of technical analysis can be extended in the following ways:

• The present study focuses on few patterns i.e. head and shoulders pattern and candlestick reversal patterns. The profitability of other patterns like harmonic patterns, Elliott wave patterns and other geometric patterns can also be analyzed.

• The patterns studied here can be combined with other technical tools to build numerous trading rules. For example: candlestick patterns can be combined with moving averages, volume and fibonacci ratios.
• The present study analyzes few entry and exit rules. Other entry and exit can also be made and analyzed to improve profitability. For example: It is found that endogenous exit rule II helped in generating superior profits for head and shoulders top pattern. It involves using initial stop loss, trailing stop loss and target price levels. Other price levels based on moving average crossovers and fibonacci projections can be used as exit rules to enhance profitability.

• The profitability of same trading rules can be tested on other markets like commodity and currency markets.

• The profitability of trading rules based on technical analysis can be compared with fundamental analysis and quantitative analysis.

• The impact of corporate announcements and events on the profitability of technical analysis can be studied.

• The profitability of the patterns can also be studied using option prices i.e. the buy and sell signals given by the patterns can be used to buy call and put options.