TRADING IN EQUITY OPTIONS CONTRACTS USING BOLLINGER BAND WITH SPECIAL REFERENCE TO NSE'S NIFTY OPTIONS IN INDIA

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ABSTRACT

Trading in option contract is found to be more complex and challenging as compared with other segment of Indian Equity Market. It may be due to immense fluctuation in the option prices.Volatility in prices is one of the important factors causes this type of changes of option pricing. This volatility shall be traced by using momentum indicators of technical analysis.Bollinger Band is one of the tools of technical analysis which helps in ascertaining momentum and give hint about future volatility in prices.The present study aims to test trading system using Bollinger Band to trade in option contract by addressing to the volatility in prices. For this purpose, historical data of NSE's NIFTY index was tested on stipulated rules of Bollinger Band indicating strong momentum and accordingly creating long position in corresponding In TheMoney option contracts. The risk and return of using this trading mechanism in NIFTY option was calculated using Return, Maximum Loss Zone, Average Gain to Average Loss Ratio, Strike Rate (Success rate) and its significance. The results are found acceptable for aggressive traders with time frame of two weeks in option contracts.

Keywords: Option Trading, Technical Analysis, Technical Trading System, Bollinger Band

I.   INTRODUCTION

An investment is considered as lifeblood for any economy of the country and financial market share acting as blood-vessel for the same. In any organized economy like India, Financial Market provides different alternatives of investment. These alternatives of investment may be Risk free investment alternatives &Risky investment alternatives. The trading activities in equity market through Investment & Speculation are prominent and widely acceptable alternative by investors' fraternity. In India, stock market has witnessed marvelous growth and development of derivative segment in last decade in line with increase in market depth and volume in equity market. In Indian derivative market, derivative instruments are available in forms of future and options contracts for different indices and stocks and are available to trade mainly on platform of NSE and BSE. However, it is observed that trading in NSE NIFTY's

derivative contracts, both future and options are significantly higher in terms of volume and participants compared with other instruments.

1.1 Option Trading in Derivative Markets of India

The trading activities of option contracts i.e. either call option or put option are found comparatively difficultand complex task by owing to the fact that option prices are highly fluctuating and affected by several factors viz. time of expiry, volatility of prices, direction of the prices, types of option, interest rate and dividend decisions. Due to, amid price fluctuation in option contracts, it will to establish specific trend like share pricesof cash segment or future contracts. However, trading volume of option contracts is increasing day by day by increasing awareness and education of option trading. It is also observed that normal retail traders prefer to create long (buy) position in options (either call or put) as it gives leverage position with very small amount of investment. It also actually enables traders to earn large amount of profit with known (limited) loss and with definite exit time. However, it should be noted that option trading consists a very high risk as volatility is significantly higher. Therefore, traders have to follow the very disciplines and scientific approach of security analysis.

In real life situation, fundamental analysis and technical analysis are two popular approaches to prediction of share prices. The fundamental analysis mainly answers as to which stocks should be bought or sold for long period of time. It is based on fundamental factors related with economy, industry and company affecting share price movement. Technical analysis mainly deals with the price at which one should enter into the trade and exit the trade with stop loss based on statistical analysis of historical data of share price and its charting pattern. However, technical analysis is widely practiced tool to trade in derivative segment as it even enable traders of stock market to predict price for a very short period of time unlike the fundamental analysis.

1.2 Technical Analysis &Bollinger Band

Technical analysis, though highly criticized by academic approach based on ground of efficient market hypothesis, it remains extremely popular techniques amongst traders and research houses for predicting future prices, specifically for derivative market for last so many years. There are hundreds of indicators in technical analysis which can be used as per their risk and return expectations, their time frame and the investment amount and other trading traits of the investors. However, in this research use of Bollinger Band, one of the momentum-based indicators of technical analysis is taken into consideration for developing trading system for NSE Nifty options in India.

Bollinger Band is aupper technical indicator developed by John Bollinger in early 1980s.It is mainly indicatesmomentum in stock price with high volatility and its trend.They are volatility bands based on standard deviation placed above and below a simple moving average of the prices. The bands automatically widen when volatility increases and narrow when volatility decreases. The calculation of CCI is as follow:

Middle Band = Sum of Closing Price of Lookback Period / No. of Days in Lookback Period

Upper Band = Middle Band + (Std. Dev. in prices for Lookback Period x 2)

Lower Band = Middle Band - (Std. Dev. in prices for Lookback Period x 2)

Based on above formula, it is said that Bollinger Band consists of 3 bands (lines). The middle line is nothing but simple moving average of look back period and upper and middle bands are double of the value of plus/minus standard deviation of middle band i.e. simple moving average. It should be noted that Bollinger Band is normally calculated for20 days Look Back Period.

In case if price close above Upper Band and on next trading days if price will break high price on which it closed above Upper Band, a buying call is generated. One can exit from buying trade in case if price close below middle band. Similarly, in case if price close below Lower Band and on next trading days if price will break low price on which it closed below Lower Band, a selling call is generated. One can exit from selling trade in case if price close above middle band. The figure 1 shows way interpreting Bollinger Band on technical chart of NIFTY.

1.3 About Trading System in Options using Technical Analysis

In a very simple term the trading system is a 'set of pre-defined' rules mainly based on indicator(s) of technical analysis on the basis of which trading in either call or put option is carried out. The term 'predefined' suggests that trading will be planned for well in advance and hence will not be arbitrary or subjective. Similarly, the term 'rules' suggest that the work to be done will be done keeping strictly in mind the parameters laid down as rules. Thus, it is a set of instructions which advise entry and exit position in option contracts positions based on the results of selected indicator(s) technical analysis.

A trading system allows excluding randomness in the trading process. Strict adherence to the system permits to rule out the emotional factor in the trade. For this reason, one must follow all recommendations of the system strictly even if for all that a potentially profitable position will not be opened. Apart from it,

any trading system for option contracts includes trading in both the trend i.e. upward and downward.

II. LITERATURE REVIEW

Though Bollinger Band is one the very popular tools of the technical analysis, it is not frequently used for trading in options positions. Further, there are very less amount of literatures found which presents empirical evidences of use of technical analysis for trading in option contracts in general and use of Bollinger band for option trading in specific.

There are few studies which reported use of Bollinger Band for trading in option. A Kalkova (2016) propose a trading system to trader in currency option by using Bollinger Band to trade in Binary Option. Young Hoon Ko (2011) also presented an empirical study on developing straddles in options by use of velocity measurement index and Bollinger Band of technical analysis. His study is proposing return of around 1% per trade. Balisle et. al. (2015) and Fang J (2014) also reported the sustainably profitable trading using Bollinger Band and other technical indicators in options trading for sustainable higher returns in their research project.

However, there are couple of other studies which presents use of technical indicators for option trading. Moving Average is found very popular indicator in technical analysis for developing trading strategy in option. Baja V and Aghav J (2016) also investigates on developing trading system in options of India's NSE NIFTY by using technical indicators viz. Moving Average and Average True Range jointly and individually for the period of 2012-15. They found strike rate of 40% and AGAL with around 4.5 times. However, they have not calculated statistical significance about their system as well as consistency in their return. N M Rao (2013) for NIFTY and selected stock in India but he used Exponential Moving Average as a primary technical indicator for testing bull and bear spread strategies in in India with historical data of 3 years. Further, Chao-Hui Yeh (2012) investigates cross-sectional profitability of technical analysis with special reference to use of moving average in option market of Taiwan. His study shows almost 90% success rate in option positions. In the same line Paul Brittain and Carley Gamer (2006) came out with 8 simple option strategies in which they suggested the trading methods which are based on spreads. But they used trend line method of technical analysis identify support and resistance level for framing option strategies.Charlebois and Sapp (2007) also test Moving Average strategies on daily data on the currency pair of Dollar-Deutsche Mark to take position in either call or put option.

Lakkol S and Meghana A. (2017) investigate use of technical indicators viz. Bollinger Bands along with KAMA, Moving Average and Bollinger Band for trading in companies who are part of NSE NIFTY index. They found that strict implementation of trading rule of above technical indicators helps trader in generating over performing return from trading with technical indicators. Mahesh M. and Anju M. (2017) investigates on implementing various technical indicators and its ranking for selected companies in Steel Industries in India. Based on historical data of 1 year they found that Bollinger Band is amongst top 3 technical indicators who helps investor to gain return higher than market return. Ekarin V (2012) uses Bollinger Bands along with other technical indicators and found around 70% strike rate in selected securities in stock market of Thailand.

So, from literature it can be concluded that there are very few research papers and other literatures which actually investigates role of technical analysis, specifically Bollinger Bands, in option trading. However, literature confirms that prudent use of technical analysis definitely helps trader in enhancing their return and risk in option as well other segment of market and Bollinger Bands is also one of the best indicators of technical analysis which generate profitable trades.

III. RATIONALE OF STUDY

The present study is in area of utilizing Bollinger Bands, an indicator of technical analysis for option trading. It was found from literature that the evidences are meagre in numbers. Even there are very few published research papers with empirical study which actually describe utility of technical analysis, though technical analysis is most acceptable tool by industry professionals to practice trading in stock market. Moreover, empirical studies on option trading strategy are also very few which actually suggest profit making strategy to option traders, though it always remains point of interest by industry professionals to execute profitable strategies in option trading with minimum investment. Moreover, option trading is perceived as a bit complicated area of study due to complexities in its pricing and very high volatility. Therefore, the present study is an attempt to fulfill this gap by exploring utility of technical analysis by using Bollinger Bands for option trading, mainly in creating long position in call and put option, where option trader can generate substantial amount of profit at very calculated risk.

IV. RESEARCH METHODOLOGY

The research methodology followed for the research is described as follow:

The aim of study is to come out with technical trading system based on Bollinger Bands – An indicator of Technical Analysis for option traders willing to take long positions in NSE NIFTY's call and put options.

The objectives of the study are:

1. To find out the net return in Option trading as per pre-defined rule of trading system on Bollinger Bands
2. To access the risk zone and possibility of Loss in Option trading as per pre-defined rule of trading system on Bollinger Bands.
3. To evaluate efficiently of trading system basedBollinger Bands for option trading
4. To compare in return Option trading as per pre-defined rule of trading system on Bollinger Bands with standard return
5. To check the consistency in return as per pre-defined rule of trading system on Bollinger Bands over a period of time

The data collected are secondary in nature. The historical data from October 2008 to September 2018 (10 Years) for NSE NIFTY in the money option contracts (on the commencement of month) is collected from official website of National Stock Exchange.

The population for study is historical data of NSE NIFTY since its commencement i.e. 2001. However, judgmental sampling is used take data from January 2009 as it was a time when active volume option contract started in the market. Moreover, this time frame includes all the phases of market i.e. bullish trend, bearish trend and a phase of consolidation.

Further, option contract of NSE NIFTY is selected keeping in mind fact that more than two third of the volume in option contracts in India are reported on in this NIFTY index.

As the data collected through official website of national stock exchange, it is found to be reliable and valid for study.

Following null hypothesis were framed for the study.

H_01 = The pay-off (profit/loss from trades) of proposed trading system in NIFTY Option based in CCI is random in nature.

H_02 = There is no significant difference in average profit and average loss occurred in proposed trading system in NIFTY Option based in CCI.

H_03 = There is no significant difference between return from option trades over a period of time

The technical trading system proposed for this study is based on Bollinger Bands for creating long (Buy) position in call and put NSE NIFTY option contracts. The trading rules are as follow:

Rules of Entry in Option contract
1. An option trader long nearer In-The-Money call option at highest price (In-The-Money call option with nearest strike price) only if all the following condition satisfied
   a. Long (Buy)Call option on or between 3rd and 15th day of the respective monthwith same month expiry date
   b. The price will close above upper band.
   c. Trade will be done on the day on which the spot NIFTY price will break high of the day on which above "b" indicator generated
2. An option trader long nearer In-The-Money put option at highest price (In-The-Money put option with nearest strike price) only if all the following condition satisfied
   a. Long (Buy)Put option on or between 3rd and 15th day of the respective month with same month expiry date
   b. The price will close below lower band.
   c. Trade will be done on the day on which the spot NIFTY price will break low of the day on which above "b" indicator generated

Rules of Exit from Options contract
A long position in either Call or Put can be squared off (exit) when either of following conditions is satisfied.
   a. Option price rise by 100% i.e. when gross profit is doubled, or,
   b. Option price fall by 50% i.e. when gross loss is half, or,
   c. On closing price of second last day of expiry date of the respective option contract (if a or b is not achieved)

The assumption of research which are based on general observation during trading in NIFTY Future as follow:
1. Lot size for Option contract is 50
2. The amount of brokerage is Rs. 100 with all the taxes.
3. The slippage cost of trading is 10%

The mathematical and statistical tools used during study are as follow:

1. Simple Moving Average
2. Mean and Standard Deivation
3. Strike Rate i.e. how much out of total trading signals is profitable.
4. Average Gain to Average Loss Ratio (AGAL) i.e. how many times successful trade generate profit against a loss making trade.
5. Chi-Square Test to check significance of strike rate.
6. Two sample independent T test to check the significance of AGAL.
7. One Sample T Test for comparing return with benchmarked return.
8. Analysis of Variance for checking consistency in return over a period of time.

MS Excel 2010 and SYSTAT 12 were used for above calculation. For Bollinger Band Level, technical charts from http://economictimes.indiatimes.com/markets/technical-charts are used.

V.   DATA AND EMPIRICAL RESULTS

To develop a systematic approach for trading in option contracts of NIFTY based on Bollinger Band historical data from 1stJanuary 2009 to 31stDecember 2018 were collected as per trading rules laid down. As per stipulated rule of entry and exit for creating long position of option contracts, there are 34 trades which are generated in last 10 year time frame. Out of these 34 trades, 19 positions for long call options and 15 positions for long put options.

For every trade net profit / loss are calculated after considering lot size of 50, brokerage & taxes worth Rs. 100 and slippage cost @ 10%. Moreover, time frame for each of the trades is also calculated by taking difference between entry date and exit date into the respective trade.

The efficiency of the present option trading system is measured based on its Return, Strike Rate, Average Gain to Average Loss Ratio, Average time frame of Trade, maximum loss zone and annual return of the system. The Table – I presents the highlights of the same.

From Table – I, it was found that the system is generating profit of Rs. 73,879/- against average investment of Rs. 6698/-. Thus, it can give around 110.30% of profit annually. The strike rate is 67.35% with Average Gain to Average Loss ratio of 1.29 times. It shows that out of every 100 trades around 67 trades are profitable andthe profitable trade gives 1.69 times more return than every loss making trade. It was also found that this system will generate trades at an

interval of 105 days (3.5 Months) and 2 to 5 trades ina year and there is possibility of 4 consecutive profitable are profitable as well 2 loss making trade.

To check the statistical significance of efficiency of trading system, given hypothesis are tested. To check significance Strike Rate chi-square test is performed to check association between actual profitable trades (i.e. 23/34) &loss making trades (i.e. 11/34) against its random behavior (i.e. 17/34). The Table – II shows result of chi-square Test.

From table-II, it is observed that the test result is found statistically significant with p value of 0.040 for chi-square test statistics 4.235 for degree of freedom 1. Thus, the null hypothesis (H01) i.e. "The pay-off (profit/loss from trades) of proposed trading system in NIFTY Option based in Bollinger Band is random in nature" is rejected. Therefore, it is inferred that the strike rate of trading system is not random and hence it is significant.

Further, to check statistical significance of Average Gain to Average Loss Ratio, two sample independent T test is carried out to compare Average Net Profit/Gain (After deducting brokerage, tax and slippage cost from Gross Profit) i.e. Rs. 5183/- and Average Net Loss (After adding brokerage, tax and slippage cost in Gross Loss) i.e. Rs. 4130/-. The Table – III shows result of two sample independent T Test.

From table- III it is found that the test result is found statistically significant with p value of <0.001 for Independent T test statistics 10.856 for degree of freedom 32. Thus, the null hypothesis (H02) i.e. "There is no significant difference in average profit and average loss occurred in proposed trading system in NIFTY Option based in Bollinger Band." is rejected. Therefore, it is inferred that the AGAL (Average Gain to Average Loss) Ratio is also statistically significant.

Furthermore, to check efficiency of this trading system over a period of time, its return (net profit) is compared within time lags of one year in last 10 years.

Lag I :3 Equal Lags (Lag of 40 Months each)
Lag II :5 Equal Lags i.e. an interval of 2 years
Lag III : 10 Equal Lags i.e. an interval of a year.
The consistency in return is compared using One Way Analysis of Variance (ANOVA) for each of the lags.

The table IV suggested that the tests results are found statistically insignificant with p value of more than 0.05 for F test statistics in case of all three time lags. Thus, the null hypothesis (H04) i.e. "There is no significant difference between

return from option trades over a period of time" is failed to reject. Therefore, it is inferred that the return of proposed trading system is consistent over a period of time.

VI. FINDINGS

From the analysis and interpretation of historical data of 10 years, it was found out that the technical trading system based Bollinger Band produce consistent acceptable results in doing trading in option by creating long positions in both the trend i.e. bullish and bearish. It gives almost 110% return per annum with strike rate is found out at67.25% which is also statistically significant. The AGAL ratio is1.39 times in which average profit is significantly higher than average loss per trade. Thus, trading system is found to be very efficient and hence recommended for practice.

It should be noted that the maximum risk is around 56.5% of initial investment and there is possibility of 2 consecutive loss making trade. So, an option trader must have provision to bear loss of 113% at a time in worst situation. Thus, if investment in trade is Rs. 100, he/she must have Rs. 213 in trading account to meet worst situation of loss. Moreover, it is also found that this system is giving call almost 3 – 4 times in year with holding period of 10 days.
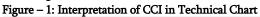
VII. CONCLUSION

Option trading is always remaining challenging task due to complexities involve in its valuations and very high volatility in its price. The technical analysis is a tool of security analysis which assists in price perdition, trend identifications and identifying momentum in price fluctuations. Bollinger Band is one of the widely used indicators to determine momentum for volatility in prices. In this research, an attempt is made to explore this highly untouched area of option trading using technical analysis by developing a trading system for Option traders with long positions based Bollinger Band. The result of this trading mechanism is found very attractive and can be implemented by traders and investment advisors to trade in option with calculated risk and return with known time frame and with comparatively small amount of investment. This research also opens up a door in doing similar type of study for other stocks and with different technical indicators.

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Figure – 1: Interpretation of CCI in Technical Chart

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Table: I Option Trading Summary based on Technical Trading System of Bollinger Band

Sr. No.	Particular	Value/Nos.
1	Time Frame	10 Years
2	Total Trades	34
3	Average Frequency of Trade	Every 3.52 Month (105 Days)
4	Range of Annual Trade	2 (Min) –5 (Max.)
5	Overall Profit (Net)	Rs. 73,879/-
6	Average Annual Profit (Net)	Rs. 7,388/-
7	Average Investment	Rs. 6,698/-
8	Range of Investment	Rs. 3575/- (Min) – Rs. 15,450 (Max)
9	Average RoI	110.30 % Per Annum
10	Total Profitable Trades	23 out of total 34 trades
11	Average Profit/Gain	Rs. 5183/-
12	Range of Profit	Rs. 62/- (Min) – Rs. 13805/- (Max)
13	Total Loss making Trades	11 out of total 34 trades
14	Average Loss	Rs. 4120/ -
15	Range of Loss	Rs. 2984/- (Min) – Rs. 6150 (Max)
16	Strike Rate	67.35%
17	Avg. Gain to Avg. Loss Ratio (AGAL)	1.29 times
18	Consecutive number of profitable trades	4 times
19	Consecutive no. of loss making trades	1 times
20	Average Holding Period	9 Days
21	Range of Holding period	1 Day (Min) – 23 Days (Max)

Table: II - Chi-Square Test

	Observed	Expected	Test Statistics	Df	p value
Profitable Trades	23 (63.25%)	17 (50%)	4.235	1	0.040
Loss Making Trades	11 (36.75%)	17 (50%)			
Total	34 (100%)	34 (100%)			

p value is significant at 0.05 (5%)

Table : III – Two Sample Independent T Test

	Mean Value	Test Statistics	Df	p value
Profit per Trade	5183	10.856	32	<0.001
Loss per Trade	4130			

p value is significant at 0.05 (5%)

Table : IV – One Way Analysis of Variance (ANOVA)

	F Test Statistics	p value
Lag – I	0.015	0.986
Lag – II	0.213	0.929
Lag – III	0.840	0.588

p value is significant at 0.05 (5%)

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Dr. Pinkal Shah is working as a Professor in the area of Healthcare Management at Department of Management, Sumandeep Vidyapeeth having diversified experience in training and research. He has certificate in statistical training using SPSS. He is also certified with Statistics in Public health from John Hopkin's University. He has earned laurels by receiving the Best PhD thesis Award at International Conference in Gujarat.