
**BOLLINGER BANDS OPTIMAL ALGORITHMIC
STRATEGY IN STOCK TRADING****Thangjam Ravichandra*****Mohsin Hanif****

ABSTRACT

This paper endeavors to evaluate the effectiveness of the usage of Bollinger Bands. Bollinger Bands can capture the volatility of stock and can be treated and factored in as the support and resistance in the course of analyzing a particular stock. The purpose of this study is to identify and substantiate its relation to profitability. The methodology is carried out by testing the bands and their success along with the importance of moving averages in the study. After due testing a singular trading rule has been established in respect of the bands. It is founded that during the course of trading in a particular stock with respect to Bollinger Bands.

Keywords

Bollinger Bands, technical analysis, RSI, Stop Loss.

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INTRODUCTION

The purpose of this paper is to evaluate the successful implementation of Bollinger Bands. The study is carried out where the main weightage is placed on profitability. The industry standard for the bands is 20 day simple moving averages and all calculations are based on the data provided by such simple moving averages. A simple trading rule can be implemented to determine when trading should be carried out on the basis of the bands along with the rule's success rate. The trading rule is applied on 144 scripts totally present in the futures and options segments of the Indian market. The rule is tested for a period of one year i.e. from 1st January 2014 to 1st January 2015. The objective behind this research project was to enlighten the readers about a system of algorithmic trading and the financial success that can be achieved through it.

OBJECTIVE OF STUDY

The objective behind this research project is

1. To prove the trading rule of success of Bollinger Bands
2. To enlighten the readers about a system of algorithmic trading and the financial success that can be achieved through it.

Data For Study

The data used for study is primary data of all the 144 scripts present in the Indian F & O segment. Everyday information of all the stocks were gathered for a period of a year ranging from 01/01/2014 to 01/01/2015. The gathered information was combined according to study requirements.

Methodology

The data taken up for study was analyzed using the strategy labs as an algorithm and the results were arrived.

Measurement of Risk

The first problem encountered here is how to properly implement and use technical tools, patterns, trends, support, resistance, etc. Secondly consideration must be given in regard to the amount of money to be staked in this practice along with the accompanying risk.

In analyzing and determining the success of any strategy, prime factor(s) should first be identified and measured. When it comes to risk control it is imperative to establish the means to measure the very risk itself. The factor of volatility must be duly

examined since price movements depend on the volatility of stock. The manner of calculating the volatility of stock is as follows:

1. Find the difference between the return of stock and the averages over a period of time (here, the difference is taken for a period of 20 Days, the average chosen is 20 since the industry standard for Bollinger Bands is 20 day simple moving averages)
2. Square the periods which serve as deviation of returns
3. Add them together.
4. Divide the sum by the number of the period to arrive at the variance
5. Take the square root.

The formula of the calculation is below:

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (R_i - \mu)^2}{n - 1}}$$

The performance of traders is gauged by factoring in the returns generated with respect to their benchmarks placed. Another factor that could be considered is ex-post risk, which is also known as the historical risk. Ex-post risk cannot be said to be the best way to gauge returns but it can be said to be one of the more effective ways to gauge returns in technical analysis since the very definition of the latter implies the study of historical data as well as predicting trends and making informed and educated decisions in the future through such study and research where the prime basis is that of historical data. Ergo Ex-post analysis can be considered as one of the best ways to frame a strategy for trading.

Technical Analysis

Technical analysis is the study of historical data and can be effectively directed in predicting movements of stock unlike fundamental analysis where such analysis is made based on the actual performance of the company. Technical analysis is all facts & figures and is more concerned upon the analysis of various trends, patterns, indicators, etc.

RSI- Relative Strength Index

A technical momentum indicator that compares the magnitude of recent gains to recent losses in an attempt to determine overbought and oversold conditions of an asset.

Stop Loss

It is a point set in order to mitigate risk by selling a particular position when the price of security reaches below a certain point

Bollinger Bands

The technique involving Bollinger bands was developed by John Bollinger. They are essentially alpha beta bands positioned at a quantum of two standard deviations from a 20 day moving average. They were developed in an attempt to further augment the concept of fixed width trading bands. Bollinger bands are drawn parallel at a fixed distance to a moving average. John Bollinger selected standard deviations since the calculation involves squaring from the average which in turn makes the system responsive to short term price changes. The primary purpose of Bollinger bands is to indicate whether the prices are relatively too high or too low.

Prime Rule

Since Bollinger Bands do not indicate buying and selling signals on its own; other factors have to be considered - such as relative strength index (RSI) or chart patterns. When the price touches one of the bands it can indicate a continuation of a trend or it might indicate a reversal. In essence, buying and selling signals are required from other sources.

When combined with an indicator such as RSI. Bollinger bands can become quite indispensable. RSI is among the best indicators in regard to trend reversals. When the price level touches the upper Bollinger band and consequently falls below 70, it is an indication that the trend will continue. Conversely when the price level touches its lower band and RSI is above 30 it indicates that the trend should continue.

If the price level touches the upper Bollinger band and RSI is above 70 (possibly approaching 80) the trend may reverse and decline. On the other hand, if the price level touches the lower Bollinger band and RSI is below 30 (possibly approaching 20) it indicates the trend may reverse and move upward.

Since there is risk factor involved the risk management can be to square off the trades when RSI reaches 80 and a stop loss of 20% is maintained.

Research Analysis

The above strategy has been implemented in the total 144 scripts included in the F & O segment, duly back tested from 1st January 2014 to 1st January 2015 and the results present a cumulative gain of 3224%. In addition, the above strategy can be strictly

followed in any of the 144 scripts (being the sample set) and even any other stock.

Further trade information are given below:

Cumulative % Gain/Loss	3224.8
Payoff Ratio	1.99
Profit Factor	1.51

Out of the 144 scripts present in the F & O segment, 5 scripts have been randomly selected for the purpose of validating the study.

The table signifies the entry and exit points of the traded stock as well as the profit and loss derived from the strategy.

Refer the 'Prime Rule' as elaborated earlier for a general understanding of the entry and exit points.

'*' indicates the risk management strategy- the exit point when RSI reaches 80

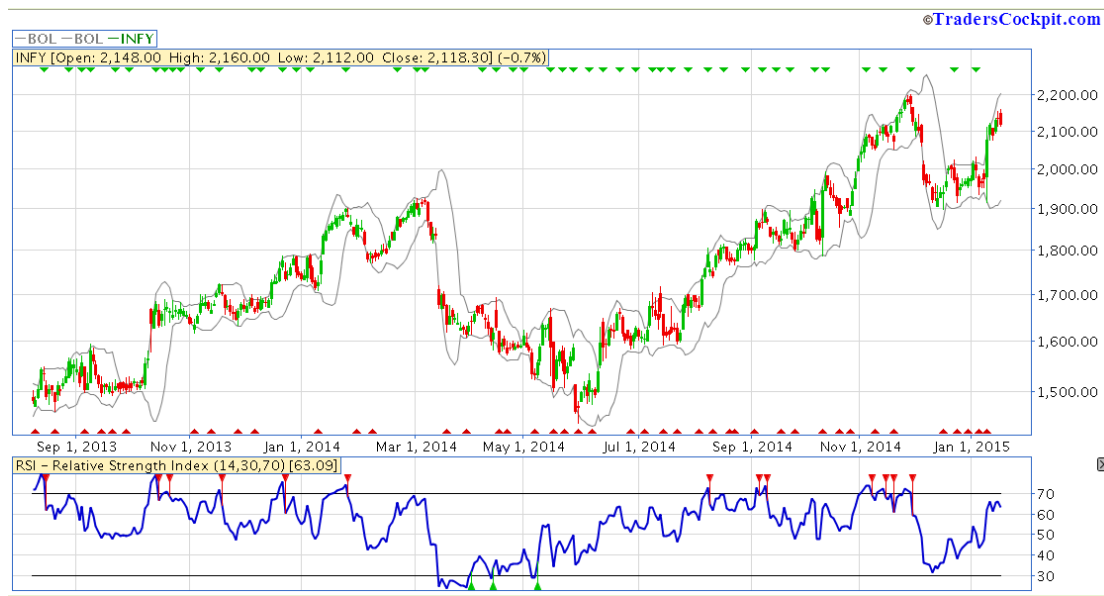
ASIAN PAINTS

Entry Point	Price	RSI	Exit Point	Price	RSI	Profit
18/03/2014	496	70	20/03/2014	519	Potential fall to 70	23
24/06/2014	574	70	01/07/2014	598	Potential fall to 70	24
24/07/2014	602	70	31/07/2014	632	Potential fall to 70	30
05/09/2014	634	70	09/09/2014	674	Potential fall to 70	40
27/11/2014	709	70	01/12/2014*	753	80*	44



Infosys

Entry Point	Price	RSI	Exit Point	Price	RSI	Profit
15/01/2014	1847	70	23/01/2014	1882	Potential fall to 70	35
05/08/2014	1738	70	06/08/2014	1762	Potential fall to 70	24
03/09/2014	1805	73	08/09/2014*	1866	80*	61
03/11/2014	2038	72	11/11/2014	2087	Potential fall to 70	49
14/11/2014	2097	70	18/11/2014	2112	Potential fall to 70	15



ITC

Entry Point	Price	RSI	Exit Point	Price	RSI	Profit
12/03/2014	341	70	19/03/2014*	360	80*	19
23/07/2014	353	70	30/07/2014	360	Potential fall to 70	7
22/09/2014	359	70	25/09/2014	377	Potential fall to 70	18



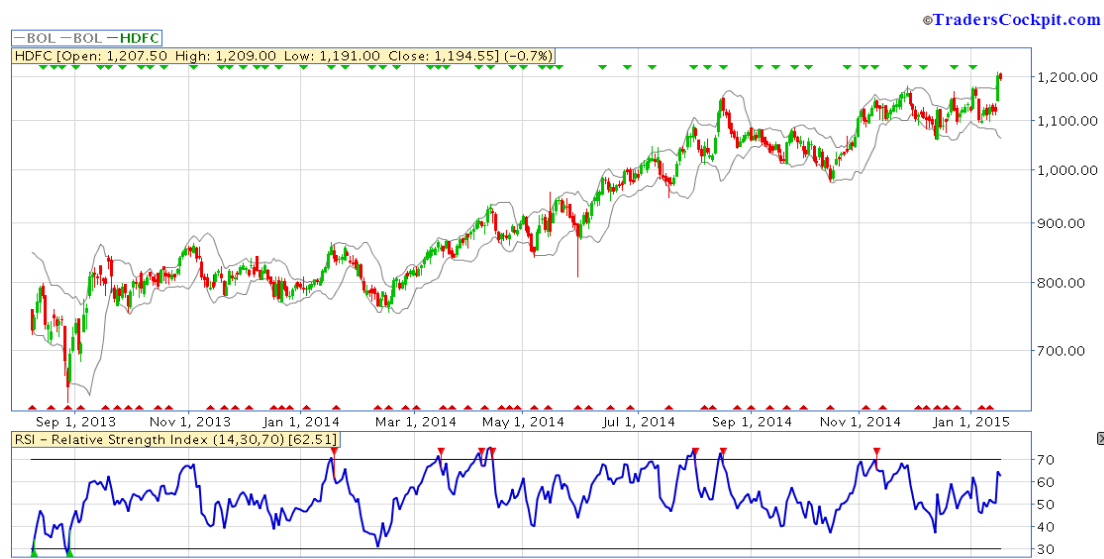
BHEL

Entry Point	Price	RSI	Exit Point	Price	RSI	Profit
07/03/2014	173	70	12/03/2014	188	Potential fall to 70	15
24/03/2014	187	70	28/03/2014*	201	80*	14
13/03/2014	199	70	21/03/2014*	277	80*	78
28/10/2014	252	70	30/10/2014	256	Potential fall to 70	4
26/11/2014	265	70	28/11/2014*	285	80*	20



HDFC

Entry Point	Price	RSI	Exit Point	Price	RSI	Profit
16/01/2014	846	70	17/01/2014	852	Potential below 70	6
13/03/2014	858	70	14/03/2014	855	Potential below 70	(3)
01/04/2014	885	70	04/04/2014	902	Potential fall to 70	17
07/04/2014	895	70	11/04/2014	920	Potential fall to 70	25
24.07/2014	1033	70	30/07/2014	1066	Potential fall to 70	33



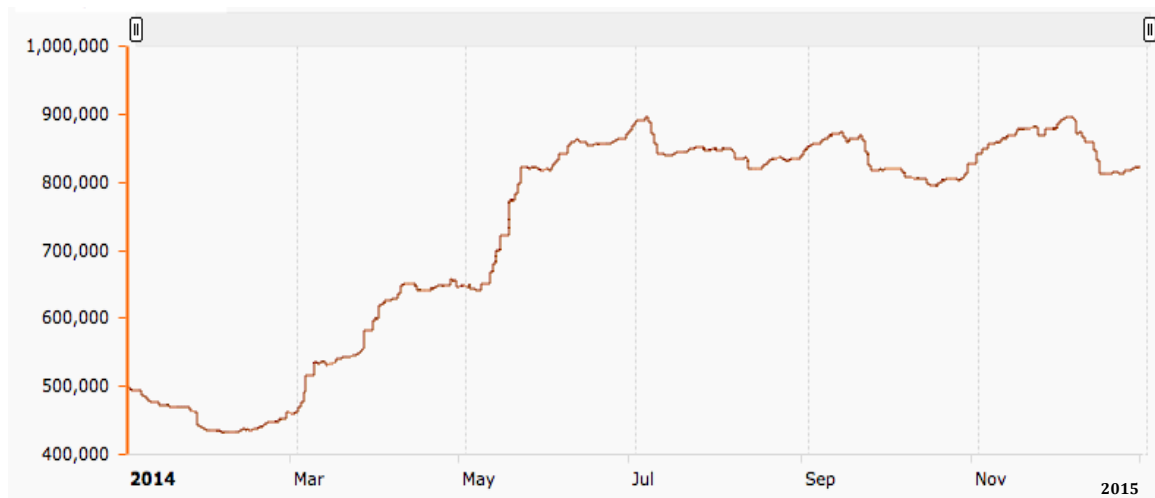
Findings

Whenever the stock price level touches the upper Bollinger band and the RSI crosses a level of 70 then we find bull-oriented investors surging into the markets and subsequently raising the stock prices. Bollinger Bands can thus be used as a strategy for algorithmic trading.

CONCLUSION

Bollinger Bands serve as an algorithmic strategy. When the same strategy is tested out in a list of 144 stocks a high accuracy rate is achieved and a cumulative return of 3224% is earned when an algorithm based on this strategy is run on these 144 stocks. It is highly reliable as it involves taking into account past figures and data together with a technical bridge that leads to an informed and technical conclusion. In light of diligent back testing, the strategy carried out over a year has been validated with highly positive results and findings. The following is the graph showing the results when a corpus of 5 Lac has been invested and the strategy is run as an algorithm over a period of 1 year the amount of profit gained is 3 Lac, which is 57% of the capital

invested, and 3224% as cumulative Gain. This can happen when a strict risk management strategy is followed. (Mentioned in the prime Rule).



REFERENCES

1. Data was taken up from www.traderscockpit.com
2. Book of "Technical analysis of stock trends" by Robert D Edwards, John Magee