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Effectiveness of Options Trading Strategies in India

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Abstract:

There have been significant developments in the securities market in India during the past few years particularly with the introduction of derivative products. With the derivatives market now about eight years old, it would be appropriate to study the performance of options trading strategies in India. Hence this study compares the performance of Butterfly, Straddle, Strip and Strap strategies with the simple buy & hold strategy in the Indian context for a sample of 15 stocks each over the period Feb 2007-Mar 2008. The results show that Strap strategy is not at all working in Indian options market, Straddle and Strip strategies are not working in case of one month and two months period contracts. However the result is inconclusive in case of three months period contracts. Butterfly spread is not working when the contract period is two months and three months but is neutral in case of one month period contracts. When compared to simple buy & hold strategy, the analysis reveals that buy & hold strategy, in case of highly volatile stocks, is neutral in case of one month period contracts. However the result is inconclusive in case of two months and three months period contracts. In case of least volatile stocks, buy & hold strategy is giving inconclusive results in Indian context over different time periods. On the whole, buy & hold strategy has performed better than various options trading strategies over the study period.

Keywords: Straddle strategy, Butterfly strategy, Strip strategy, Strap strategy, Buy & hold strategy
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1. Introduction

There have been significant developments in the securities market in India during the past few years particularly with the introduction of derivative products. With the derivatives market now about eight years old, it would be appropriate to study the performance of options trading strategies in India.

An *options trading strategy* is implemented by combining one or more options positions and possibly an underlying stock position that allows the trader to realize profits, in many cases, with limited risks. Some of the commonly used strategies are hedging using call and put options, hedging with writing call and put options, spreads and combinations. *Butterfly Spread* is one of the important spread strategies. Important combination strategies include *Straddle, Strip and Strap*.

The literature on evaluation of options trading strategies is limited. Lalchandani, Subramanian and Rao (2008) have made an attempt to compare the returns of the strategy which involves trading in only the stocks which are part of the index basket (Nifty), on a monthly and bi-monthly basis, with the returns of the strategy which involves, in addition to the above strategy, writing call options on the Nifty on a monthly and bi-monthly basis. The study pertains to data within the period of 4th June 2001 to 25th May 2006. The empirical results shows that the strategies involving options have lower risks as compared to corresponding strategies of not using options. The relevance of covered calls to Indian stock markets is highly dependent on the trend the market is experiencing. The most significant strategy investigated with higher returns and lesser variability for the individual investor is to cover long position in Nifty basket by shorting two month expiry call options.

Doran and Hamernik (2006) have made an attempt to examine the historical time-series performance of 12 trading strategies involving options on the S&P 100/500 indices from an individual's perspective. The analysis is conducted over two time horizons, assuming monthly investing starting in 1984 and 1996. 12 options strategies using 3 months and 6 months options on the S&P 100 and one-year options on the S&P 500 have been examined over a 22-year and 10-year holding period, and compared to a long position in the index as a benchmark. The empirical results shows that investing in options as an enhancement to a buy and hold portfolio can result in raw and abnormal returns that exceed the equivalent investment in the index. The study also provided the following conclusions for options investors. First, most option investments do not provide positive abnormal returns above the buy and hold position in the underlying index and many have significant negative returns. Second, selling short- term options can provide higher returns than the buy and hold portfolio, but does not provide significant abnormal performance. Third, certain strategies, such as combination strategies with long maturities, offer positive abnormal performance with successful market timing.

2. Research Objectives

The primary objective of this paper is to examine the profitability of four options trading strategies in Indian options market viz. Butterfly, Straddle, Strip and Strap strategies and to check whether these strategies are better than simple buy & hold strategy in the Indian context.

3. Research Hypotheses

- Butterfly, Straddle, Strip and Strap options trading strategies provide statistically significant positive net payoffs in Indian options market which are more than those provided by simple buy & hold strategy.
- H_0 : The number of options/stocks giving net positive payoffs to investors (adjusted for initial cost) in case of Straddle, Strip, Strap, Butterfly strategies, highly volatile and least volatile stocks is not significantly different from the number of options/stocks giving net negative payoffs to investors (adjusted for initial cost).
- H_a : The number of options/stocks giving net positive payoffs to investors (adjusted for initial cost) in case of Straddle, Strip, Strap, Butterfly strategies, highly volatile and least volatile stocks is substantially higher (or lower) than the number of options/stocks giving net negative payoffs to investors (adjusted for initial cost).

4. Data and their Sources

Data used in the study includes (i) closing adjusted daily prices of 226 NSE stocks for the period 1st February 2006 upto 27th March 2008 (ii) Exercise prices, put and call options premium amounts and closing adjusted prices of the sample stocks as on different dates of strategy formation and expiration dates (last Thursday of the expiration month) (iii) The closing adjusted daily price data for the period 1st February 2006 upto 31st December 2007 has been used for the calculation of daily returns on the stocks and their standard deviation.

Sources: PROWESS, the online database maintained by the Centre for Monitoring of Indian Economy (CMIE), NSE website, www.nseindia.com and The Economic Times, one of the leading financial dailies.

5. Research Methodology

For the purpose of present study, NSE stocks on which options are traded (226 in number) have been considered.

5.1. Steps 1: Forming samples for the evaluation of Butterfly, Straddle, Strip and Strap Strategies.

Twelve dates of strategy formation have been taken from 1st February 2007 upto 1st January, 2008.

5.1.1. When samples are formed on the basis of rolling volatility

For every date of strategy formation, new samples are formed as per below mentioned procedure:

- Finding daily closing adjusted prices of NSE stocks on which options are traded for one year period preceding the date of strategy formation.
- Finding daily returns for all these stocks by using the formula $(P_2 - P_1)/P_1$
Where, P_1 is the previous day's closing adjusted price, P_2 is the current day's closing adjusted price.
- Calculating standard deviation, a measure of volatility, of returns for all these stocks.
- Selecting 15 most volatile stocks (to be used for the evaluation of Straddle, Strip and Strap strategies) and 15 least volatile stocks (to be used for the evaluation of Butterfly strategy) on the basis of standard deviation of returns.
- Finding the spot price (closing adjusted price) for all the sample stocks as on different dates of strategy formation and expiration dates.

5.1.2. When samples are formed on the basis of same stocks

The above mentioned procedure holds true in this case also but the sample consisting of 15 stocks (formed as per above mentioned procedure) taken for the first date of strategy formation i.e. 1st February, 2007 is taken for the evaluation of the strategies on all other dates of strategy formation as well.

The below mentioned steps II to V hold true for both the cases i.e. when samples are formed on basis of rolling volatility and when samples are formed on the basis of same stocks.

5.2. Evaluation of Butterfly Strategy

In butterfly strategy, three different exercise prices are involved. E_1 is the exercise price at which first call option is bought. E_3 is the exercise price at which second call option is bought. E_2 is the exercise price at which these two call options are sold in such a way that $E_1 < E_2 < E_3$.

- E_2 is chosen in such a manner that it is nearest to the spot price as on a particular date of strategy formation.
- E_1 and E_3 are chosen on the basis of E_2 in such a manner that E_2 is equi-distant from E_1 and E_3 .
- Finding corresponding call premiums for the call options purchased and call options sold as on that date of strategy formation.
- Calculating the payoffs on the expiration date by comparing the exercise price with the closing adjusted stock price on that date.
- Finding net payoffs (adjusted for initial cost which is the sum of call premiums paid on two call options purchased minus the call premiums received on the two call options sold as on the date of strategy formation).

5.3. Evaluation of Straddle Strategy

In this case a call option and a put option is bought on the same stock at same exercise price (E) and expiring on same date.

- E is chosen in such a manner that it is nearest to the spot price as on a particular date of strategy formation.
- Finding corresponding call and put premiums for the call options and put options purchased on that date.
- Calculating the payoff on the expiration date by comparing the exercise price with the closing adjusted stock price on expiration date.
- Finding net payoffs (adjusted for initial cost which is the sum of call premium and put premium paid on purchase of these options on the date of strategy formation).

5.4. Evaluation of Strip Strategy

Here a long position in one call is coupled with a long position in two puts, all with the same exercise price (E) and date of expiration.

- E is chosen in such a manner that it is nearest to the spot price as on a particular date of strategy formation.
- Finding corresponding call and put premiums for the call option and put options purchased on that date.
- Calculating the payoff on the expiration date by comparing the exercise price with the closing adjusted stock price on expiration date.
- Finding net payoffs (adjusted for initial cost which is the sum of call premium and put premiums paid at the time of purchase of these options on the date of strategy formation).

5.5. Evaluation of Strap Strategy

Here a long position in two call options is coupled with a long position in a put option, all with the same exercise price (E) and date of expiration.

- E is chosen in such a manner that it is nearest to the spot price as on a particular date of strategy formation.
- Finding corresponding call and put premiums for the call options and put option purchased on that date.
- Calculating the payoff on the expiration date by comparing the exercise price with the closing adjusted stock price on expiration date.
- Finding net payoffs (adjusted for initial cost which is the sum of call premiums and put premium paid at the time of purchase of these options on the date of strategy formation).

Note: In the evaluation of all the four strategies, it has been assumed that options are European-style options.

5.6. Evaluation of Buy-Hold Strategy

- It has been done using the stocks which formed samples for the evaluation of the options trading strategies
- Different dates of strategy formation and dates of expiration are taken as the dates on which the stocks are bought and sold respectively.
- Profits on each date of sale of stock, from holding of these stocks for one month, two months and three months from the date of purchase, are calculated by comparing the adjusted closing prices on the date of purchase of stocks with the adjusted closing prices of the stocks on the last Thursday of the month in which the stocks are sold.

Note: Closing prices are not adjusted for transaction cost.

- *It is assumed that the stocks are sold on the last Thursday of a particular month in order to facilitate comparative analysis with options trading strategies.*
- **Sign test** (one of the nonparametric tests which is based on the direction of a pair of observations, not on their absolute values) has been used at 5% significance level to check whether the number of options/stocks giving net positive payoffs to investors (adjusted for initial cost) in case of Straddle strategy, Strip strategy, Strap strategy, Butterfly strategy, highly volatile and least volatile stocks is significantly different or not from the number of options/stocks giving net negative payoffs to investors (adjusted for initial cost).

Since it is a one-tail test to be tested at 5% significance level, therefore the critical value for the test is either 1.645 or -1.645 as the case may be.

- **Microsoft Excel** has been used for analysing the data.

6. Empirical Results

6.1. For Straddle Strategy

Table: A depicts that only 47, 43, 74 options and only 51, 58 and 80 options out of a total of 180 options provide net positive payoffs to investors when samples are formed on the basis of rolling volatility and same stocks under one month, two months and three months contracts respectively. However sign test shows that the number of options giving negative payoffs are substantially higher than those giving positive payoffs in all the cases except in case of three months when samples are formed using same stocks.

	Samples formed on basis of rolling volatility			Samples formed on basis of same stocks		
	One Month	Two Months	Three Months	One Month	Two Months	Three Months
Number of Options giving Net Positive Payoffs to Investors (Adjusted for Initial Cost)	47	43	74	51	58	80
Number of Options giving Net Negative Payoffs to Investors (Adjusted for Initial Cost)	133	137	106	129	122	100
Null Hypotheses	Reject	Reject	Reject	Reject	Reject	Accept

Table A

(Total Number of Options = 180) (Level of significance used is 5%)

Hence, this strategy is not working at all for one and two months period contracts under both the cases and for samples formed using rolling volatility stocks under three months contract period. It is neutral for three months period contracts when samples are formed using same stocks.

6.2. For Strip Strategy

Table: B depicts that only 49, 44, 69 options and only 51, 48 and 82 options out of a total of 180 options provide net positive payoffs to investors when samples are formed on the basis of rolling volatility and same stocks under one month, two months and three months contracts respectively. However sign test shows that the number of options giving negative payoffs are substantially higher than those giving positive payoffs in all the cases except in case of three months when samples are formed using same stocks.

	Samples formed on basis of rolling volatility			Samples formed on basis of same stocks		
	One Month	Two Months	Three Months	One Month	Two Months	Three Months
Number of Options giving Net Positive Payoffs to Investors (Adjusted for Initial Cost)	49	44	69	51	48	82
Number of Options giving Net Negative Payoffs to Investors (Adjusted for Initial Cost)	131	136	111	129	132	98
Null Hypotheses	Reject	Reject	Reject	Reject	Reject	Accept

Table B

(Total Number of Options = 180) (Level of significance used is 5%)

Hence, this strategy is not working at all for one and two months period contracts under both the cases and for samples formed using rolling volatility stocks under three months contract period. It is neutral for three months period contracts when samples are formed using same stocks.

6.3. For Strap Strategy

Table : C provides the fact that 52, 44, 60 options and 58, 57, 74 options out of a total of 180 options, give net positive payoffs to investors when samples are formed on basis of rolling volatility and same stocks under one month, two months and three months contracts respectively. Sign test shows that the number of options giving negative payoffs are substantially higher than those giving positive payoffs in all the cases.

	Samples formed on basis of rolling volatility			Samples formed on basis of same stocks		
	One Month	Two Months	Three Months	One Month	Two Months	Three Months
Number of Options giving Net Positive Payoffs to Investors (Adjusted for Initial Cost)	52	44	60	58	57	74
Number of Options giving Net Negative Payoffs to Investors (Adjusted for Initial Cost)	128	136	120	122	123	106
Null Hypotheses	Reject	Reject	Reject	Reject	Reject	Reject

Table C

(Total Number of Options = 180) (Level of significance used is 5%)

Hence Strap Strategy fails to satisfy expectations of the investors over different time periods.

6.4. Comparison of Straddle, Strip and Strap strategies with Buy & Hold Strategy

In case of buy & hold strategy, sign test shows that the number of highly volatile stocks giving positive payoffs to investors is not statistically significantly different from the number of stocks giving negative payoffs in case of rolling volatility stocks as is evident from Table: D that 87, 90 and 93 stocks out of a total of 180 stocks give positive payoffs when stocks are held for one month, two months and three months respectively. However in case of same sample stocks, 90, 102 and 106 stocks out of a total of 180 stocks give positive payoffs when stocks are held for one month, two months and three months respectively. In this case, sign test shows that the number of stocks giving positive payoffs are substantially higher than those giving negative payoffs in case of two months and three months contract period. In case of one month period contracts, the result is not statistically significantly different.

	Samples formed on basis of rolling volatility			Samples formed on basis of same stocks		
	One Month	Two Months	Three Months	One Month	Two Months	Three Months
Number of Stocks giving Net Positive Payoffs to Investors (Adjusted for Initial Cost)	87	90	93	90	102	106
Number of Stocks giving Net Negative Payoffs to Investors (Adjusted for Initial Cost)	93	90	87	90	78	74
Null Hypotheses	Accept	Accept	Accept	Accept	Reject	Reject

Table D: For Highly Volatile Stocks

(Total Number of Stocks = 180) (Level of significance used is 5%)

Hence buy & hold strategy is working successfully only when the highly volatile stocks are held for two months and three months from the date of purchase in case of same sample stocks. This strategy is neutral in rest all other cases. However it has performed better than options trading strategies.

6.5. For Butterfly Strategy

Table : E provides the fact that 88, 59, 39 options and 96, 62, 45 options out of a total of 180 options give net positive payoffs to investors when samples are formed on basis of rolling volatility and same stocks under one month, two months and three months contracts respectively. Sign test shows that the number of options giving negative payoffs are substantially higher than those giving positive payoffs in case of two months and three months period contracts. In case of one month period contracts, the result is not statistically significantly different.

	Samples formed on basis of rolling volatility			Samples formed on basis of same stocks		
	One Month	Two Months	Three Months	One Month	Two Months	Three Months
Number of Options giving Net Positive Payoffs to Investors (Adjusted for Initial Cost)	88	59	39	96	62	45
Number of Options giving Net Negative Payoffs to Investors (Adjusted for Initial Cost)	92	121	141	84	118	135
Null Hypotheses	Accept	Reject	Reject	Accept	Reject	Reject

Table E

(Total Number of Options = 180) (Level of significance used is 5%)

Butterfly spread is not working at all when the options contract is for two months and three months period. It is neutral in case of one month period contracts.

6.6. Comparison with Buy & Hold Strategy

Table: F shows that 97, 93 and 94 least volatile stocks (when stocks are selected on basis of rolling volatility) and 105, 107 and 115 least volatile stocks out of 180 stocks (when stocks are selected using same sample stocks) provide positive payoffs when the stocks are held for one month, two months and three months respectively. Sign test shows that the number of stocks giving positive payoffs are substantially higher than those giving negative payoffs only in case of same sample stocks. The result is not statistically significantly different in case of rolling volatility stocks.

	Samples formed on basis of rolling volatility			Samples formed on basis of same stocks		
	One Month	Two Months	Three Months	One Month	Two Months	Three Months
Number of Stocks giving Net Positive Payoffs to Investors (Adjusted for Initial Cost)	97	93	94	105	107	115
Number of Stocks giving Net Negative Payoffs to Investors (Adjusted for Initial Cost)	83	87	86	75	73	65
Null Hypotheses	Accept	Accept	Accept	Reject	Reject	Reject

Table F: For Least Volatile Stocks

(Total Number of Stocks = 180) (Level of significance used is 5%)

Hence buy & hold strategy is working successfully in case of same sample stocks and is neutral in case of rolling volatility stocks. Also, it has performed better than butterfly spread.

- **In nutshell**, Strap strategy is not at all working in Indian options market. Straddle and Strip strategies are not working in case of one month and two months period contracts. However, these strategies are not working at all for rolling volatility stocks but are neutral for same sample stocks when the contract period is for three months. Butterfly spread is not working when the contract period is two months and three months but is neutral in case of one month period contracts. When compared to simple buy & hold strategy, the analysis reveals that buy & hold strategy, in case of highly volatile stocks, is working successfully only for two months and three months period contracts in case of same sample stocks and is neutral in rest all other cases. In case of least volatile stocks, buy & hold strategy is working successfully in Indian context over different time periods in case of same sample stocks and is neutral in case of rolling volatility stocks. On the whole, buy & hold strategy has performed better than various options trading strategies over the study period.

However the evaluation ignores the impact on payoffs given by options trading strategies when options are exercised before the expiration date, in case it is profitable to do so. It might have an impact on the payoffs provided by the options trading strategies.

7. Limitations of the Study

The Present study conducts an evaluation of only four strategies (Butterfly, Straddle, Strip and Strap) using only those NSE stocks on which options are traded (226 in number). Hence the study takes into account only a limited number of stocks.

We have assumed that the options contracts are of European style. The results may change if we take options as American style options which can be exercised anytime till expiry.

Required data in respect of all 226 stocks was not available. Also, we couldn't restrict ourselves to the original samples that should have been taken into account, due to non-availability of data. The Present study is restricted to only twelve dates of strategy formation i.e. from 1st February 2007 upto 1st January 2008. Evaluation of Straddle, Strip and Strap strategies has been

done by considering only long positions in call and put options. Evaluation of various strategies has been done on the basis of secondary data only. Primary data as regards usefulness of the strategies has not been collected.

8. Directions for Further Research

- Evaluation of Straddle, Strip, Strap and Butterfly Strategies can be done by taking into account larger number of stocks.
- Evaluation of other commonly used strategies like box spread, condors, bull spreads, bear spreads etc. can be done.
- More number of dates of strategy formation can be taken for the purpose of evaluation.
- Evaluation of Straddle, Strip and Strap strategies can be done by considering short positions in call and put options.
- Primary data regarding usage and utility of various options trading strategies can be collected, for evaluating these strategies, from those who use them.

9. References

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