



A COMPARATIVE STUDY ON THE EARNING POTENTIAL OF BUTTERFLY AND COLLAR STRATEGY

Dr. (CA.) Anshul Kothari CFP^{CM}

PhD, CFP, ACA, MBA, NCMP

Guest Faculty at Faculty of Management
Studies

Mohanlal Sukhadia University Udaipur

Ms Nidhi Inani

MBA

Faculty of Management Studies

Mohanlal Sukhadia University Udaipur

ABSTRACT

Option based investment strategies are gaining popularity in investment and portfolio management. This paper has analyzed the earning potential of 2 derivatives option spreads namely Butterfly strategy (long and short) and Collar strategy in the Indian Derivatives Market. The analysis has been done using the historical data from the futures and options segment of National Stock Exchange's primary index, CNX Nifty 50 and 4 other major traded stocks namely Hindustan Aluminum Industries, ICICI Bank, Infosys and Reliance Industries Limited for a period of 5 years to incorporate all the market characteristics. So the period of the study ranges from 26th April 2012 to 30th March 2017. The study reveals that Collar Strategy turn out to be the best as it has given positive results in all the samples.

Keywords

- Derivative, Commodities, Spot Price, Strike Price, Premium

List of Abbreviations

- OTC- Over-the-counter
- ITM- In-the-money

- ATM- At-the-money
- OTM- Out-of-the-money

List of Symbols

- > Greater than
- = Equal to
- < Less than

1. Introduction

1.1 Derivatives Defined-

A derivative can be defined as the contract which derives its value from an underlying asset. The underlying asset can be anything such as commodities, currencies, stocks, bonds, interest rates and also from the market indices. Derivatives are generally traded either on an exchange or (OTC).

1.2 Derivatives Products

1.2.1 Stock Option-

A stock option is a contract between two parties in which the buyer gets the right to buy or sell a stock at an agreed price within a specified period of time. The party that sells is known as the *Writer* of the option and party that buys is known as the option *Holder*.

Types of Options-

1. On the basis of Expiry :-

- **American Option-** These are the options which can be exercised **any** time before the expiration date.
- **European Option-** European Options can be exercised only at the expiration date.

2. On the basis of Right of buyer/holder:-

- **Call Option-** A call option gives the *buyer* of the option, a *Right to Buy* an underlying asset from the seller of the option at a particular price known as the strike price on or before the expiry date.

- **Put Option-** A put option gives the *buyer* of the option, a *Right to Sell* an underlying asset to the buyer of the option at the strike price on or before the expiry date.
3. On the basis of **Cash Flows** :-
- **In-the-money option (ITM)** - This option would lead to positive cash flows to the holder if it is exercised immediately. A call option stands ITM when current spot price is more than the strike price (spot price > strike price).
 - **At-the-money option (ATM)** –This option would lead to zero cash flow if it is exercised immediately. This occurs when the spot price is equal to strike price (i.e. Spot price = Strike price).
 - **Out-of-the-money option (OTM)** - This option when exercised immediately would lead to negative cash flows. A call option stands OTM when the spot price is less than the strike price (i.e. Spot price < Strike price).

1.2.2 Features of stock options contract-

- The buyer is also called the *Holder* of the option.
- The *buyer/holder* of the option has the *Right* to buy or sell the underlying asset.
- In order to acquire the right of the option, the *holder* of the option pays the price to the *writer* of the option which is known as the option price or option *Premium*.
- The price at which the *holder* of the call or put option can buy or sell the underlying asset is known as the *Strike Price* and this is determined at the beginning of the contract.
- The final date at which the call or put option is exercised by the option *holder* is known as the *Expiration Date*.

1.2.3 Option Strategies

1. **Butterfly Strategy**– A butterfly strategy can be created by using either the call or put options. It is a type of spread strategy which is neutral and is formed by a combination of a bull spread and a bear spread. The profit and the risk involved are limited. The construction of the butterfly spread involves 3 strike prices and the calls or puts options.

It is of two types:

- **Long Butterfly-** Long Butterfly can be constructed by purchasing one ITM call, writing two ATM calls and further buying one OTM call. This is generally entered

when the investors assumes that the underlying stock will not rise or fall much by the expiration. The debit so occurred is taken to enter the trade.

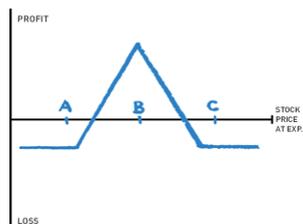


Figure 1- payoff diagram of Long Butterfly Strategy (source: www.optionsplaybook.com)

- *Short Butterfly*-Short Butterfly can be constructed by writing one ITM call, purchasing two ATM calls and further writing OTM call. This will result into the credit which is taken to enter the trade by the investor.

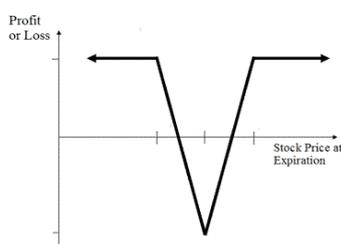


Figure 2- Payoff diagram of Short Butterfly Strategy (source: www.optionsplaybook.com)

2. **Collar Strategy** –The Collar strategy is created by the ATM put and OTM call with possess the same expiration date with the equal number of shares. It is a limited risk strategy as the stock is bought and in order to prevent the downside risk a put is bought the cost is reduced (partly) by selling a call. This strategy is most suitable for the investors who are conservatively bullish as no unlimited gains are expected in this strategy as the call prevents the same.

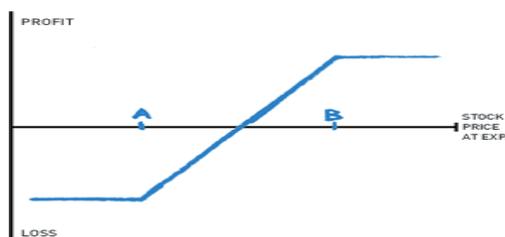


Figure 3- Payoff diagram of Collar Strategy (source: www.optionsplaybook.com)

2. Review of Literature

Scholes (1972) (Scholes, (1972))revealed that the option trading has been highly

active. The reason being that the markets were very well functioned which was actually determined a value based criteria. It was further utilized by the diversified range of investors to facilitate both the risk seeking and the risk aversion investment strategies.

Merton (1978)(Merton, (1978)) wrote one of the first papers about the option strategies. The writers concluded that in the situation of stable markets, the Covered call strategy works the best. In the situation of the volatile markets, buying the strategy works the best.

Chaput(2002) suggested that the combination strategies are better than the straight purchases and sales of the individual options. (Whaley, (2002))The reasons for the popularity of the combinations strategy as these positions often focuses on the exposure of specific risk factors, especially volatility, while minimizing exposure to others, which is not possible with single options.

Whaley (2002) study has been an important paper in the BWS Literature which was followed after the introduction of the BXM Index.(Chaput, Option spread and combination trading, (2003))The study concluded that the BWS strategy provided an equivalent return with the lower volatility from that of S&P 500 index.

Sandagdorj (2005) presentedthe study on the metals which depicted that metals price risk management is a key issue related to financial risk in metal markets because of uncertainty of commodity price fluctuation. (Chaput, Volatility trade design, (2005))Hence the basic option strategies and also the combination strategy such as bull spreads bear spreads and butterfly spreads which are created by using both call & put options are evaluated.

Santa-Clara (2009) carried out the study on the risk-return on the option strategies.(Santa-Clara, (2009))As per the outcomes of the study, naked calls generated positive average returns but with that it has high volatilities. Covered call also provided the same average returns but with comparatively less volatility than the stocks.

Leggio and Lien (2010) made use of the covered call strategy of S&P 500 index but the same was carried out in the Loss Aversion Framework.(Chang, (2010))The results of the comparison resulted into the fact that the covered call Strategy turned out to be better strategy for investment irrespective of the time frames especially in the loss aversion utility function.

Mugwagwa et al (2011) examined various financial products such as the buy-write strategy and other portfolio trading strategies. (Mugwagwa, (2011))It was further observed that for the low levels of the out-of-the-money situations the risk-return levels were superior but for the higher levels the situation stood contrary.

Hoffmann and Fischer (2012) study mainly focuses on the Covered Call Writing and also represented the behavioral aspects of the option strategies. (Hoffmann, (2012)) Another thing was that the inclination towards the out-of-the-money calls was more than that of the in-the-money calls.

Simon David P. (2013) presented the study on the covered call strategies for the period ranging from January 2002 to January 2012 of the QQQ stocks. (Simon, (2013))The results of the proposed study displayed that the downside risk-adjusted returns are suitable for both the absolute and the relative basis of the long QQQ position.

Sonmezer (2016) questioned the way prominent option strategies are priced and exotic options and applied and addressed behavioral approaches for the same. (Sönmezer, (2013))He also discussed the speculative nature of exotic options and financial instability relationship between them.

Zhuo Chen and Andrea Lu (2017) investigated the source of price momentum in the stock market using information from options markets. (Chen, (2017))Their empirical strategy generates a risk-adjusted alpha of 1.8% per month over the 1996–2011 period, during which the simple momentum strategy fails to perform.

Jimmy and Jitka (2017) tested the favor provided in financial economics to models derived from no-arbitrage assumptions by theoreticians and practitioners. They developed a model of option prices where arbitrage is short lived. (Hilliard, (2017)) They used data from five large capitalization firms to test implications of the model.

3.1 Scope of the Research

As per the aforementioned studies, this paper aims at presenting a comparative analysis of the Butterfly Strategy and Collar Strategy and further it extends to evaluating their performance against the investment in index and the other major traded stocks of the Indian derivatives market. The index which is taken as CNX Nifty 50 and the major traded stocks has been taken as Hindustan Aluminum Industries, ICICI Bank, Infosys Limited and Reliance Industries Limited.

3.2 Sampling Method Used

As per the study, one top traded index CNX Nifty 50 and 4 other most traded stocks have been selected using **Convenience Sampling Method**.

3.3 Nature of Research

Exploratory research has been conducted for this purpose. The index has been selected to be CNX Nifty 50 and the stocks are that of Hindustan Aluminum Industries, ICICI

Bank, Infosys and Reliance Industries Limited. The entire study comprises of the secondary data.

3.4 Data Collection

The entire data beginning from the Spot Prices, Strike prices, Future prices and the Option prices has been collected from the historical data section of the NSE's official website www.nseindia.com.

3.5 Period of study

For the current study, the period of the study is taken to be 5 years i.e. beginning from 26th April 2012 to 30th March 2017.

3.6 Methodology

- ***Butterfly Strategy***

- 1) On the first day when the contract is entered, one ITM Call option and one OTM Call option are purchased and further two ATM Call options are sold. The resultant figure created a net outflow of funds resulting in the debit value.
- 2) At the Expiry of the contracts, the ITM Call options are exercised and the resultant payoffs are settled in cash. At the time of the expiry, all the call options except ITM will result in no value.
- 3) The butterfly strategy is applicable for all the contracts i.e. 60 contracts for the period specified above.

- ***Collar Strategy***

- 1) On 26th April 2012, stocks/baskets as relevant to the sample are purchased, OTM Call option with a spread of 100 points is written and ATM/ITM Put options are purchased. 26th April 2012 is the first working day in the study period and the lot size of any of the Nifty Futures and Options contract was 50.
- 2) Further, at the end of each expiry-
 - a. If the index rises above the call option strike price, then option is settled in cash and the stock is sold in the market and the put option expires worthless.
 - b. If the index falls below the put strike price, the put option is exercised and settled in cash, the basket is sold and the call option expires worthless
 - c. If the index remains between the two strike prices then the stock is sold and both the options are allowed to expire worthless.

- d. The net premium paid and the capital gain or losses on the baskets along with settlement on any of the options (if exercised) have been recorded.

- **For the Investment in the Stocks/Baskets-**

- 1) In the beginning of each contract, the stocks/baskets are purchased at the opening price from the Futures & Options Market as per the relevant lot size.
- 2) At the expiry of each option contract, the stocks/baskets are sold and the profit/loss thereof is realized.
- 3) All the above methodologies have been applied to all the 60 contracts covered in the period respectively.

3.7 Assumptions of the study

The following things has been assumed for better understanding –

- 1) The initial margin which is assumed to be 10% of the Contract value of the option has been reduced by the premium amount received in case of the options which are sold.
- 2) The next working day to the expiry of the last contract marks the beginning of the new contract.
- 3) Brokerage has been taken as 0.01% for both the options as well as that of the index. Further, in case of the options it is taken as 0.01% of the Contract value and for the index is 0.01% of the purchase price.

3.8 Drawbacks of the Study

- 1) The option contracts having the expiry of one month are sold.
- 2) The non-availability of the American options for the Nifty F&O segment and the other stocks makes the study restricted to the European options.
- 3) When options prices would have no opening strike price on certain dates, then in that case the Settlement price has been used in the place of the opening price.
- 4) The non-availability of the quotes makes the entire study restricted to the options with the expiry of one month.
- 5) As we know, Collar can be constructed using the deep out-of-the-money calls. Therefore only the nearest out-of-the-money calls are written
- 6) For the purpose of the above study, Securities Transaction Tax (STT) has been ignored which is otherwise applicable to the Indian derivatives markets.

4. Data Analysis

4.1 Risk-Return Analysis

Table 1- Risk-Return Analysis

		CNX Nifty 50	Hindustan Aluminum	ICICI Bank	Infosys	Reliance
Equity Investment	CAGR	9%	5%	6%	11%	9%
	Annual Standard Deviation	15%	43%	32%	26%	23%
Long Butterfly	CAGR	-1.75%	-16.82%	5.24%	-8.49%	-9.97%
	Annual Standard Deviation	7%	30%	18%	16%	23%
	Sharpe Ratio	-1.30	-0.34	-0.25	-0.79	-0.49
Short Butterfly	CAGR	-0.69%	16.77%	-8.58%	-22.06%	23.60%
	Annual Standard Deviation	7.18%	32.92%	19.11%	20.29%	104.69%
	Sharpe Ratio	-1.26	0.02	-0.37	-0.76	0.15
Collar	CAGR	4%	7%	2%	9%	9%
	Annual Standard Deviation	1.85%	10.28%	5.28%	9.19%	6.64%
	Sharpe Ratio	-4.82	-0.42	-1.02	-1.11	-1.27

In order to determine the Risk-adjusted return **Sharpe Ratio** is used for the purpose. It is the most widely used tool. From the above, one can say that HINDUSTAN ALUMINUM has the highest Sharpe ratio and the lowest is that of CNX Nifty 50. Further, the sample which has best performed is RELIANCE INDUSTRIES LIMITED in comparison to other samples. Thus, in the Long Butterfly strategy, the Highest CAGR, volatility and Sharpe ratio was that of ICICI Bank, Hindustan Aluminum Industries and ICICI Bank respectively. In the Short Butterfly, Reliance Industries has the highest CAGR and is also the most volatile sample. In the Collar Strategy, Infosys & Reliance has the highest CAGR of 9%, Hindustan Aluminum is the most risky stock and has the highest Sharpe Ratio.

5. Findings& Suggestions

5.1 Findings

- 1) From the above analysis, the sample which has performed outstandingly from all the other samples is RELIANCE INDUSTRIES LIMITED as it has the highest CAGR in terms of others.
- 2) The overall best performing strategy is the COLLAR STRATEGY which has given positive return in all the samples. This is not true in any of the above strategy except Collar Strategy.
- 3) The stock which comes out to be least volatile is the CNX Nifty 50. The reason behind being the least volatile is the fact that it is an index in comparison to all the most traded stocks.
- 4) The strategy with least volatility is COLLAR STRATEGY. All the other strategy has very high volatility.
- 5) As we know highest Sharpe is preferred, thus Hindustan Aluminum has the highest Sharpe as compared to the other samples.
- 6) When talking about the strategy, SHORT BUTTERFLY has the highest Sharpe in comparison to the other strategies.

5.2 Recommendations

- 1) From the above analysis and findings, it can be said that option Strategies are not very successful in the Indian derivative market.
- 2) As we know, the above analysis is based on Mechanical approach. Thus if Human element is included in the analysis i.e. Human knowledge and presence of mind can lead to the generation of better profits.
- 3) Further, the investor opting for the option trading should evaluate Risk and Return and must also consider Securities Transaction Tax (STT) as this affects the performance of the option Strategies.

5.3 Conclusion

From the above analysis following things have been revealed-

By doing the comprehensive Risk-Return Analysis, in the Indian derivatives market the performance of the Butterfly and Collar strategies is *Underwhelming*. Whereas the literature highlights that the option strategies are more successful than the traditional investment. But as we know that the same is not true as per the results of the study.

There are many reasons which account for the underperformance of option strategies. These are mispricing among options, High option premiums, lack of ready market quotes and mechanical approach which is applied to the study. Thus if these limitations are looked upon then the strategies may generate better returns. In a nutshell, one can conclude that the Indian derivatives market is not suitable for Systematic Speculation.

Table 2- Long Butterfly Strategy Data Table

Opening Date	Opening Price	Lot Size	OTM	Price	ATM	Price	ITM	Price	Investment	Closing Date	Closing Price
3/30/2012	5206.6	50	5300	104.7	5200	158.95	5100	220	₹ 5,478.95	4/26/2012	5189
4/27/2012	5189	50	5300	74.3	5200	131	5100	175.7	₹ 5,406.70	5/31/2012	4924.25
6/1/2012	4910.98	50	5000	60.35	4900	132.92	4800	189.95	₹ 5,122.87	6/28/2012	5149.15
6/29/2012	5191.25	50	5300	67.15	5200	92	5100	154	₹ 5,346.00	7/26/2012	5043
7/27/2012	5124.3	50	5300	31	5200	66.3	5000	181	₹ 5,247.30	8/30/2012	5315.05

Table 3- Short Butterfly Strategy data table

Opening Date	Opening Price	Lot Size	OTM	Price	ATM	Price	ITM	Price	Investment	Closing Date	Closing Price
3/30/2012	5206.6	50	5300	104.7	5200	158.95	5100	220	₹ 5,478.95	4/26/2012	5189
4/27/2012	5189	50	5300	74.3	5200	131	5100	175.7	₹ 5,406.70	5/31/2012	4924.25
6/1/2012	4910.98	50	5000	60.35	4900	132.92	4800	189.95	₹ 5,122.87	6/28/2012	5149.15
6/29/2012	5191.25	50	5300	67.15	5200	92	5100	154	₹ 5,346.00	7/26/2012	5043
7/27/2012	5124.3	50	5300	31	5200	66.3	5000	181	₹ 5,247.30	8/30/2012	5315.05

Table 4-Collar Strategy data table

Entering the Contract	Opening Price	Lot Size	OTM Call	Price	ATM Put	Price	Initial Investment	Date of Expiry of Contract	Closing Price	Pu Opt Pay
3/30/2012	5206.6	50	5300	104.7	5200	114	- ₹15,765.90	4/26/2012	5189	₹550
4/27/2012	5189	50	5300	74.3	5200	112.65	- ₹15,777.35	5/31/2012	4924.25	₹13,78
6/1/2012	4910.98	50	5000	60.35	4900	124.8	- ₹14,925.43	6/28/2012	5149.15	₹0.
6/29/2012	5191.25	50	5300	67.15	5200	102	- ₹15,776.10	7/26/2012	5043	₹7,85
7/27/2012	5124.3	50	5300	31	5200	147.4	- ₹15,790.70	8/30/2012	5315.05	₹0.

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