DEVELOPING A RISK MANAGEMENT MODEL FOR OPTION CONTRACT: A STUDY OF AUTO STOCK IN INDIA

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Abstract

Risk is a characteristic feature of stock market in general and option market in particular. Indian option market has grown very fast during last one decade. According to report of SMC Global Securities, in financial year 2011 the volume generated by options market is almost two times that of the volumes generated in the cash market and futures market put together. The fact is that simply selecting best of the option strategies does not help investors to minimize risk. Therefore, due care should be taken while selecting strike price, expiration date and premium rates. So, investors need to develop risk management as well as risk analysis tool which is the key to limiting option risk. There are number of risk management and analysis tools available, which help investors to take wise investment decisions. One of the popular tools which is widely used by technical analyst is Exponential Moving Average Method (EMA) which helps to predict future movement in stock price. If the option investor uses technical analysis as a means to select option strategy and strike price then it possible to minimize risk and maximize profit on option trading. In the backdrop of this a study has been conducted to find out the relevance of Exponential Moving Average Method in Indian option market as means of risk management tool. The model developed by author has helped investor to book profit on all the sample companies.

Keywords:, Bombay Stock Exchange; Call Option Premium; Exponential Moving Average; Price Option Contract; Total Payoff

1. Introduction

Derivative market is fast growing segment of Indian Financial Market. During the last one decade there was a rapid growth of derivatives market in terms of trading volume, Foreign Institutional Investors (FIIs) in derivatives and number of stock options available for trading. The retail investors are showing lot of interest in the derivatives market. However, there is lot of risk involved in trading in derivatives in general and option trading in particular. Risk involved in option trading can be minimized / return on stock option trading can be improvised through designing suitable option strategies such as bull spread, bear spread, butterfly spread, strips, strap, strangle, straddle, etc. But, the fact is that simply selecting best option strategy does not help investors to minimize risk or maximize profit. Due care should be taken while selecting strike price, expiration date and option price. So, investors need to develop risk analysis as well as risk management tool which is the key to limiting option risk/ maximizing profit. There are number of risk

analysis and risk management tools available, which help investors to take wise investment decisions. One of the popular tools widely used by technical analyst is Exponential Moving Average Method (EMAM). If the investor uses technical analysis, option strategy risk / reward, appropriate strike price and option price then it possible to minimize risk / maximize profit on stock option trading. The paper makes an attempt to enumerate how Exponential Moving Average Method and option strategy selection parameters developed by author can be used in selection of stock option strategy in order to manage risk associated with investment in stock option market and maximise profit. The study aims to develop a risk analysis as well as risk management model for selected option contract. The study also aims at comparing model outcome with market outcome and finally to offer suggestions to investors in option market.

2. Literature Review

Fahlenbrach R and S Patrik had conducted study on trading in option strategies in the FTSE-100 index market. They are of the view that order flow in volatility–sensitive option strategies contains information about future realized volatility. Option strategies are used both by traders who possess non-public information about future volatility and by uninformed speculators who appear to follow unprofitable trend chasing strategies. According to Alfredo L and Loannis P, the value of American options depends on the exercise policies followed by option holders. Market frictions, risk aversion can result in suboptimal behavior. According to them the cost of suboptimal exercise depends on option Gamma. Vanduffel S and Ahcan A had thrown a light on application of dollar cost averaging method in developing option strategy. They are of the view that when (log) returns are governed by Lévy processes then it is possible to construct a dominating strategy explicitly. N.S.Nilakantan and Aarti Srinivasan had conducted a study on "Risk Mitigation Strategy Based on Price Deviations from Strike Price". They had suggested a recovery strategy for option writer for offsetting the unlimited risk that he faces in order to minimize his losses. For the purpose of the study, only the call option contracts limited to the near month have been considered. However, an explicit model that would be preferred by investors in option market did not yet appear in the literature. This has encouraged the researcher to take up the present study.

3. Methodology

The Automobile sector was selected for the purpose of the study. Slow down in automobile market, launching of new products, increased competition, etc. have increased the magnitude of risk involved in investment in auto stock. This has encouraged the researcher to select auto sector. However, there is scope for reducing the magnitude of risk or hedging the risk through stock option. But there is no scientific risk management and risk analysis model available for selecting option strategy, strike price, expiration date and premium rates in the option market. This has encouraged the researcher to take up the present study. Two key auto players in passenger car segment i.e. Tata Motors Ltd and Maruti Suzuki India Ltd and two key auto players in two wheeler segments i.e. Hero Motors Corp. Ltd and Bajaj Auto Ltd. were selected to test the model developed by researcher. The data required for the study was collected from Bombay Stock Exchange and Business-line Newspaper. The stock prices of auto stock traded in Bombay Stock Exchange from 3rd September to 31st October 2012 (two month period) were collected as investment in option contract is considered as short term investment and not long term investment. Therefore, data for a period of two months were collected from Bombay Stock Exchange. The option price and strike price were collected from Business-line Newspaper quoted in National Stock Exchange. The data collected were analyzed by using statistical tools such as Exponential Moving Average Method and Charts. Exponential Moving method is

considered as scientific method of technical analysis by technical analysts and it is widely used tool. Hence, the researcher has selected this tool for developing a model.

4. Data Analysis

4.1. Tata Motors Ltd

Tata Motors Limited is India's largest automobile company, with consolidated revenues of INR 1,65,654 Crores in 2011-12. It is among the top three in passenger vehicles with winning products in the compact, midsize car and utility vehicle segments. Recently it has launched Tata Nano car for middle income group which constitute major portion of consumer in durable goods segment. Tata Motors is listed in the New York Stock Exchange. It has emerged as an international automobile company. UK, South Korea, Thailand, Spain and South Africa are important markets of Tata Motors Ltd. Tata Motors Ltd. is available for option trading both in National Stock Exchange (NSE) as well as Bombay Stock Exchange (BSE) with lot size of 1000 units.

Stock Price Prediction Model

Exponential Moving Average Prices of the Tata Motors Ltd. is calculated based on 10 days moving average period.

Figure1: Exponential Moving Average Price Chart of Tata Motors Ltd
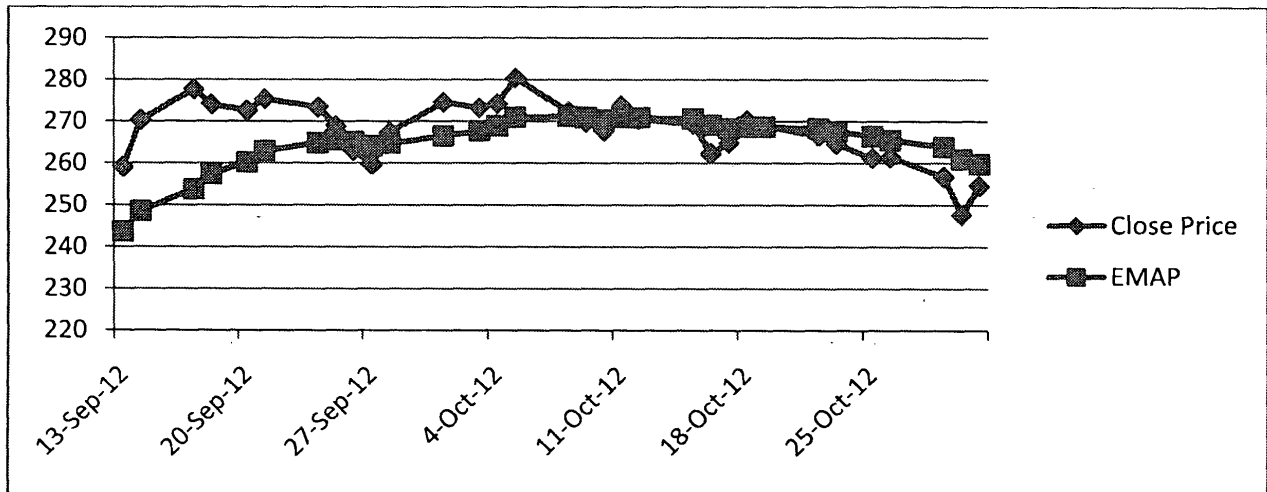
It is evident from the figure 1 that the Exponential Moving Average Price (EMAP) curve of Tata Motors Ltd has intersected with close price curve on 19th October 2012 and after intersection it started moving downward direction signalling that price of stock will move in downward direction in the near future period.

Stock Option Risk Analysis and Management Model

Stock price of Tata Motors Ltd as well as Sensex are expected to fall down in the near future period. In other words, when the market is expected to be bearish and decrease in price of the stock is expected, the investor has option of selecting any option strategy from the probable list of option strategies which is given below:

Table 1: Option Strategy Basket of Tata Motors Ltd

Option Strategy	When to Use	Reward	Risk
Short Call	Bearish Market Direction	Limited	Unlimited
Long Put	Bearish Market Direction	Limited	Unlimited
Bear Call Spread	Volatile market and moderately bearish direction	Limited	Limited

| Bear Put Spread | Bearish market as well as and modest decrease in price of the underlying stock | Limited | Limited |
| Strips | Bearish market direction and downward price movement | Unlimited | Limited |

On 1st November 2012, the stock option prices and strike prices, spot price quoted for Tata Motors Ltd (lot size: 1000 units) in National Stock Exchange (NSE) option segment are given below:

TABLE 2: Tata Motors Ltd 'S Stock Option Information

	Open	High	Low	Close
Stock Price	257	269.55	257	267.45
Option Segment				
Option Contract	Open	High	Low	Close
CE- Nov. 240	27	31.5	27	29.25
CE- Nov. 250	15.55	23.8	15.55	22.10
CE- Nov. 260	9.85	16.4	9.5	14.8
CE- Nov. 270	6.25	10.5	6.2	9.4
CE- Nov. 280	3.5	6.15	3.5	5.5
CE- Nov. 290	1.65	3.45	1.65	3.1
CE- Nov. 300	1.15	1.85	1.1	1.65
CE- Nov. 310	0.7	0.95	0.7	0.8
CE- Nov. 320	0.45	0.55	0.45	0.55
PE- Nov. 210	0.2	0.55	0.2	0.45
PE- Nov. 220	1.5	1.5	0.85	0.95
PE- Nov. 230	2.5	2.5	1.4	1.55
PE- Nov. 240	4	4	2.3	2.5
PE- Nov. 250	7.5	7.5	3.85	4.30
PE- Nov. 260	11	11.2	6.3	7.25
PE- Nov. 270	16	16	10.25	11.4
PE- Nov. 280	23	23	16.5	17.25

The researcher has used parameters such as expected direction of movement in market, expected direction of movement in stock price, strategy reward / risk, option price, spot price, strike price. The option strategy selection parameters suggest that it is better to use Strips Option Strategy for hedging and managing risk involved in investment in Tata Motors Ltd.

Option Strategy: Strips

Strips construction

Figure 2: Payoff from Strips Strategy
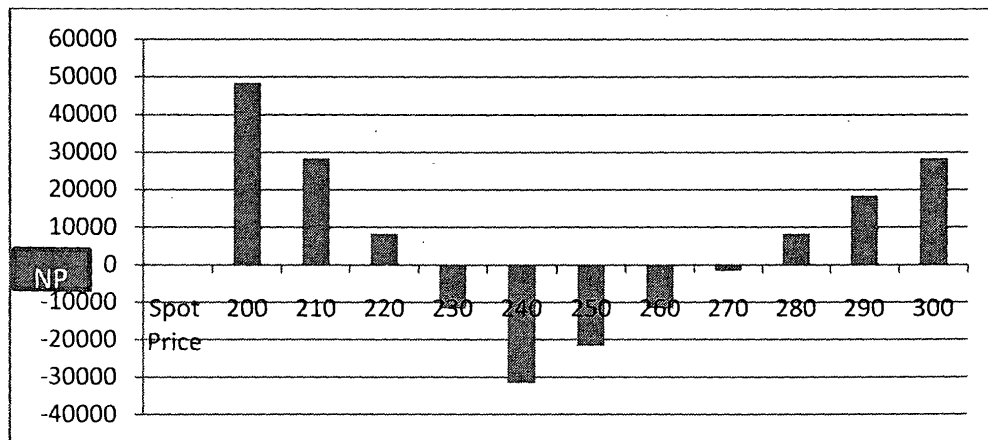
Note - NP:Net Payoff

Buy 1 Call and Buy 2 Puts with same strike price having same expiration

Buy 1 CE-Nov.240 on Tata Motors Ltd at Rs.27

Sell 2 PE-Nov.240 on Tata Motors Ltd at Rs.2.30

It is evident from figure 2 that the stock price of Tata Motors Ltd falls down by 18 percent or above on the date of contract expiration than the investor will end up with profit. If, the stock price moves up by 5 percent or above 5 percent against the prediction than also the investor will end up with profit.

Real time Option Strategy Payoff on Maturity Date (30th November 2012)

Table 3: Real Time Option Strategy Payoff on Maturity Date

| Strip strategy	1 Call	2 Put	K =240		Net Payoff
	27	2.3	Call	Put	
Actual Spot Price	Payoff	Payoff	Total Payoff	Total Payoff	
284	17	-2.3	17000	-4600	12400

It is clear from the table 3 that even though the stock price of Tata Motors Ltd has moved against the prediction of investor, the investor was able to make a profit of Rs.12400 by using strips strategy. So, strips strategy help investors to make profit either the stock price moves as per the prediction or against the prediction.

4.1.1 Maruti Suzuki India Ltd.

Maruti Suzuki India Ltd is also a leader in the passenger car segment in India. The company is producing over 150 variants ranging from Maruti 800 to latest Life Utility vehicle, Etiga. The other popular car manufactured by Maruti Suzuki India Ltd include Alto, A-star, Estilo, WagonR, Ritz, Swift, DZire, Omni, etc. The Company has registered Net Sales of Rs. 80,701 million during Q2 (Jul-Sept.2012-13), an increase of 8.5 per cent over the same period in the previous year. Maruti Suzuki India Ltd is available for option trading both in Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) with lot size of 250 units.

Stock Price Prediction Model

Figure 3: Exponential Moving Average Price Chart of Maruti Suzuki India Ltd
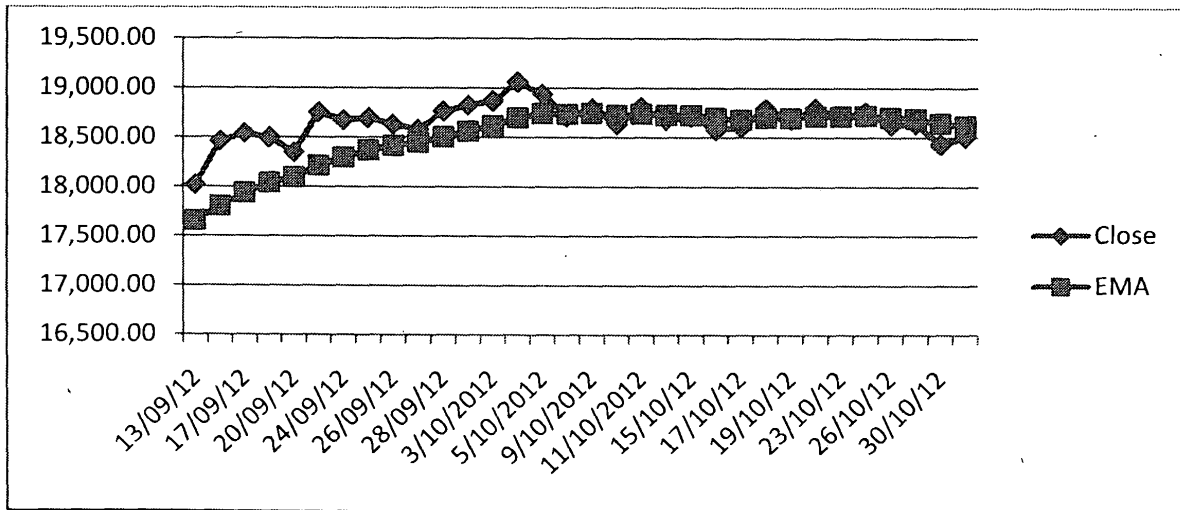
Exponential Moving Average Prices of the Maruti Suzuki Ltd is calculated based on 10 days moving average period. It is evident from the figure 3 that the Exponetial Moving Avearge Price (EMAP) curve of Maruti

Suzuki India Ltd has intersected with close price curve on 25ᵗʰ October 2012 and after intersection it started moving downward direction signalling that price of stock will move in downward direction in the near future period.

Stock Option Risk Analysis and Management Model

Stock price of Maruti Suzuki India Ltd as well as Sensex is also expected to fall down in the near future period. In other words, when the market is expected to be bearish and as well as decrease in price of the underlying stock is expected, the investor in option market has opportunity to hedge and manage the risk by using option strategy. On 1ˢᵗ November 2012, the stock option price and strike price, spot price quoted for Maruti Suzuki India Ltd (lot size: 250) in National Stock Exchange (NSE) option segment are given in table 4:

Table 4: Maruti Suzuki India Ltd 'S Stock Option Information

	Open	High	Low	Close
Stock Price	1439	1467	1438.1	1459.75
Option Segment				
Option Contract	Open	High	Low	Close
CE- Nov. 1350	106	121.6	105.5	117.45
CE- Nov. 1400	67.85	80.1	66.3	75.5
CE- Nov. 1450	38.55	47.5	37	43.7
CE- Nov. 1500	19.95	24.1	18.25	22.05
CE- Nov. 1550	10	11.25	8.20	10.1
CE- Nov. 1600	3.25	5.95	3.25	4.5
PE- Nov. 1250	1.9	2.3	1.5	1.65
PE- Nov. 1300	3.6	4	3.1	3.2
PE- Nov. 1350	10.2	10.2	6.85	7.25
PE- Nov. 1400	22	22	15	15.6
PE- Nov. 1450	38.15	42.75	30.65	32.5
PE- Nov. 1500	76	76	57	58.8

The investor has opportunity to construct option strategy by using short call, long put, bear call spread, bear put spread or strips. But the option strategy selection parameters used by researcher suggest that the investor has to use strips strategy for hedging and managing risk involved in investment in Maruti Suzuki India Ltd.

Option Strategy: Strips

Strips construction

Figure 4: Payoff From Strips Strategy
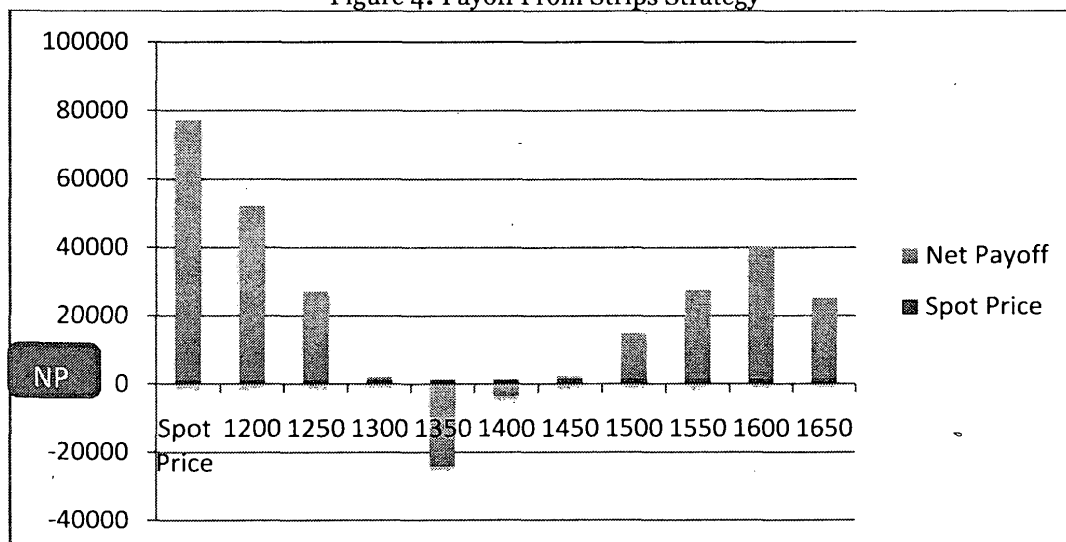
Buy 1 Call and Buy 2 Puts with same strike price having same expiration

Buy 1 CE-Nov.1400 on Maruti Suzuki India Ltd at Rs.66.30

Sell 2 PE-Nov.1400 on Maruti Suzuki India Ltd at Rs.15

It is evident from figure 4 that the stock price of Maruti Suzuki India Ltd falls down by 7.5 percent or above on the date of contract expiration than the investor will end up with profit. If, the stock price moves up by 3 percent or above 3 percent against the prediction than also the investor will end up with profit.

Real time Option Strategy Payoff on Maturity Date (30th November 2012)

Table 5: Real Time Option Strategy Payoff on Maturity Date

| Strip strategy	1 Call	2 Put	K =1400		Net Payoff
	66.3	15	Call	Put	
Actual Spot Price	Payoff	Payoff	Total Profit	Total Profit	
1499	32.7	-15	8175	-7500	675

The table 5 demonstrates that even though the stock price of Maruti Suzuki India Ltd has fallen down against the prediction of investor, the investor was able to make a minimal profit of Rs.675 by using strips strategy. This clearly indicates that strips strategy will help investors to make profit either the stock price moves as per their prediction or against their prediction.

4.1.1.1 Bajaj Auto Ltd

Bajaj Auto Ltd is one among India's top ten companies in terms of market capitalization and among the top five in terms of annual turnover. The company started producing scooters in the year 1961. Today, the company has become a market leader with annual production in excess of 1.35 million units which was about 4000 units in 1961. The popular two-wheeler manufactured by Bajaj Auto Ltd includes Plusar, Discover, Platina, Ninja and Avenger. The stock is available for option trading both in National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) with lot size of 125 units.

Stock Price Prediction Model

Figure 5: Exponential Moving Average Price Chart of Bajaj Auto Ltd
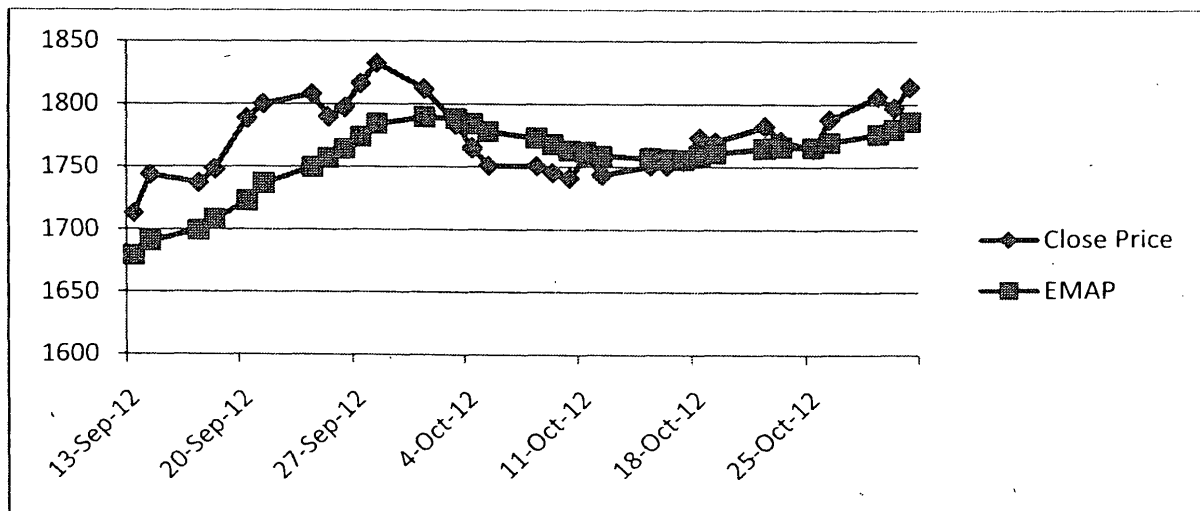
Exponential Moving Average Prices of the Bajaj Auto Ltd is calculated based on 10 days moving average period. It is evident from the figure 5 that the Exponential Moving Average Price (EMAP) of Bajaj Auto Ltd has intersected with close price on 25th October 2012 and started moving upward direction signalling that stock price of Bajaj Auto Ltd will move upward in the future period.

Stock Option Risk Analysis and Management Model

Stock price of Bajaj Auto Ltd is expected to go up whereas Sensex is also expected to fall down in the near future period. In other words, when the market is expected to be bearish and increase in price of the underlying stock is expected, the investor has option of selecting any option strategy from the probable list of option strategies which is given below:

Table 6: Option Strategy Basket of Bajaj Auto Ltd

Option Strategy	When to Use	Reward	Risk
Bull Call Spread	Bullish on Market as well as Price of Underlying Stock	Limited	Limited
Bull Put Spread	Price of Underlying Stock expected to go up moderately	Limited	Limited
Strap	High and significant upward price movement	Unlimited	Limited

On 1st November 2012, the stock option price and strike price, spot price quoted for Bajaj Auto Ltd (lot size: 125 units) in National Stock Exchange (NSE) option segment are given in table 7:

Table 7: Bajaj Auto Ltd 'S Stock Option Information

	Open	High	Low	Close
Stock Price	1818	1853	1810.70	1845.95
Option Segment				
Option Contract	Open	High	Low	Close
CE- Nov. 1800	55.2	73.75	55.2	70.1
CE- Nov. 1850	31.95	42.3	24	40.15
CE- Nov. 1900	12.4	21.9	12.05	20.4
CE- Nov. 1950	6.3	10.3	6.3	10
PE- Nov. 1750	13.15	13.45	7.9	8.45
PE- Nov. 1800	29.5	29.5	18	18.8
PE- Nov. 1850	51.25	51.25	36	38.65

The option strategy selection parameters suggest that it is better to use Strap for hedging and managing risk involved in investment in Bajaj Auto Ltd.
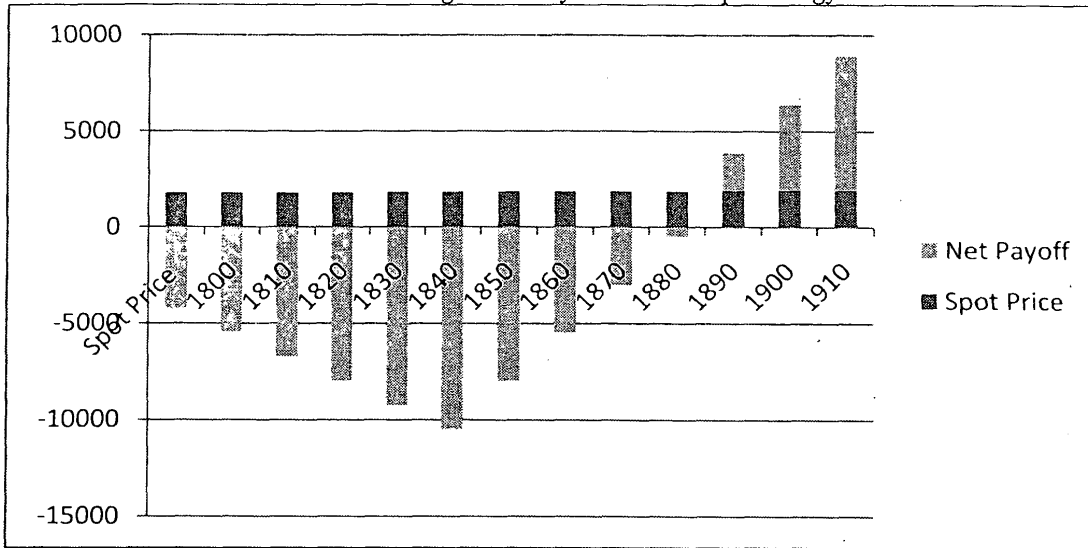
Option Strategy: Strap

Straps construction

Buy 2 Call and Buy 1 Puts with same strike price having same expiration

Buy 2 CE-Nov.1850 on Bajaj Auto Ltd at Rs.24

Sell 1 PE-Nov.1850 on Bajaj Auto Ltd at Rs.36

Figure 6: Payoff from Strap Strategy

It is evident from figure 6 that the stock price of Bajaj Auto Ltd moves up by 3 percent or above on the date of contract expiration than the investor will end up with profit. If, the stock price moves down by 2.5 percent or above 2.5 percent against the prediction than the investor will end up with loss.

Real time Option Strategy Payoff on Maturity Date (30th November 2012)

The table 8 reveals that stock price of Bajaj Auto Ltd has moved as per the prediction of investor. Hence, the investor was able to make a profit of Rs.14750 by using strap strategy. However, strap strategy will also help investors to make profit if the stock price moves against the prediction.

Table 8: Real Time Option Strategy Payoff on Maturity Date

| Strap strategy	2 Call	1 Put	K =1850		Net Payoff
	24	36	Call	Put	
Actual Spot Price	Payoff	Payoff	Total Profit	Total Profit	
1951	77	-36	19250	-4500	14750

1.1.1.1.1 Hero Motors Corp. Ltd

Hero Motors Corp Ltd is world's largest two-wheeler manufacturer. In 2011 Japan's Honda Motor had exited from partnership after 27-years of partnership with the Hero Group. The joint venture was India's largest motorcycle manufacturer with more than half the domestic market. The popular product manufactured by Hero Motors Corp Ltd includes Pleasure, Passion, Splendor, Glamour, Igniter, Impulse, Dawn, Karizma, etc. The stock is available for option trading both in NSE and BSE with lot size of 125 units.

Stock Price Prediction Model

Exponential Moving Average Prices of the Hero Motors Corp. Ltd is calculated based on 10 days moving average period. It is evident from the figure 7 that the EMAP of Hero Motors Corp. Ltd has intersected with close price on 25th October 2012 and started moving upward direction signalling that stock price of Hero Motors Corp Ltd will move upward in the future period.

Figure 7: Exponential Moving Average Price Chart of Hero Motors Corp Ltd
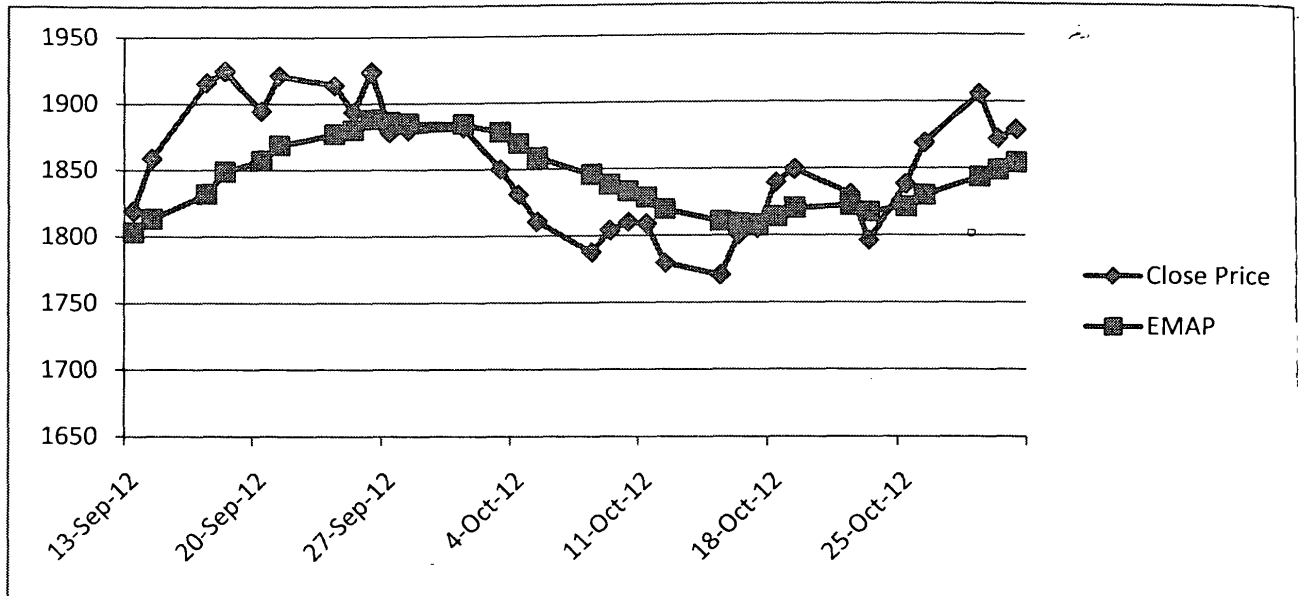
Stock Option Risk Analysis and Management Model

Stock price of Hero Motors Corp Ltd is expected to go up whereas Sensex is expected to fall down in the near future period. In other words, when the market is expected to be bearish and increase in price of the underlying stock is expected, the investor has option of selecting any option strategy from the probable list of option strategies which is given in table 9:

Table 9: Option Basket of Hero Motors Corp Ltd

Option Strategy	When to Use	Reward	Risk
Long Call	Bullish on Market	Unlimited	Limited
Short Put	Bullish on Market	Limited	Unlimited
Bull Call Spread	Bullish on Market as well as Price of Underlying Stock	Limited	Limited
Bull Put Spread	Price of Underlying Stock expected to go up moderately	Limited	Limited
Strap	High and significant upward price movement	Unlimited	Limited

On 1st November 2012, the stock option price and strike price, spot price quoted for Hero Motors Corp Ltd (lot size: 125 units) in National Stock Exchnage (NSE) option segment are given below:

Table 10: Hero Motors Corp Ltd 'S Stock Option Information

|	Open	High	Low	Close
Stock Price	1880	1917.80	1867.50	1910
Option Segment				
Option Contract	Open	High	Low	Close
CE- Nov. 1850	60.05	87.65	60.05	83.9
CE- Nov. 1900	40	57.5	35.25	53.4
CE- Nov. 1950	23	34.5	20	32.15
CE- Nov. 2000	11.35	19.4	10.7	17.65
CE- Nov. 2050	6.2	10.15	6.2	9.35
PE- Nov. 1750	8.35	8.35	6	6.4
PE- Nov. 1800	19.15	19.85	12	12.85
PE- Nov. 1850	36	37.5	22.8	24.5
PE- Nov. 1900	62.9	62.9	40.6	43.7
PE- Nov. 1950	79.6	79.6	67.2	69.1

The option strategy selection parameters such as spot price, strategy reward /risk, option price, strike price suggest that it is better to use long call strategy for hedging and managing risk involved in investment in Hero Motors Corp Ltd.

Option Strategy: Long Call

Straps construction

Buy 1 CE-Nov.2000 on Hero Motors Corp Ltd at Rs.10.7

Figure 8: Payoff From Long Call Strategy
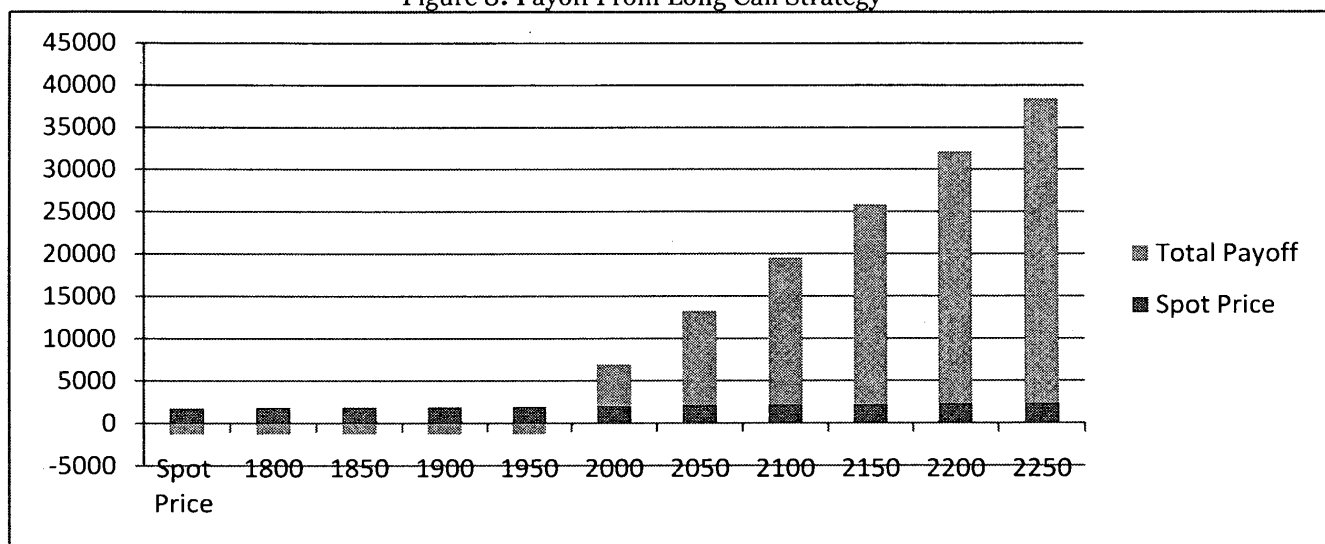
It is evident from figure 8 that the stock price of Hero Motors Corp Ltd moves up by 7 percent or above on the date of contract expiration than the investor will end up with profit. If, the stock price moves down by 5 percent or above 5 percent against the prediction than the investor will end up with loss.

Real time Option Strategy Payoff on Maturity Date (30th November 2012)

Table 11: Real Time Option Strategy Payoff On Maturity Date

Long Call	1 Call	K =2000
	10.7	
Actual Spot Price	Payoff	Total Payoff
1865.5	-10.7	-1337.5

It is evident from the table 11 that stock price of Hero Motors Corp. Ltd has fallen down to Rs. 1865.50 which was against the prediction of investor. However the investor has not incurred huge loss by constructing and using long call strategy. The quantum of loss was minimal i.e. Rs. 1337.50 even though the derivative product is considered as Surgeon's knife.

5. Conclusions

The investor can use strips strategy if he was confident that the stock price of Tata Motors Ltd and Maruti Suzuki India Ltd will fall down by 18 percent and 7.5 percent respectively on the date of expiration. If the stock price moves up against his prediction, then also the investor will end up with profit. The investor can think of using strap strategy if he was confident that the stock prices of Bajaj Auto Ltd will moves up by 3 percent on the date of expiration. If the stock price falls down against his prediction, then the investor will

end up with loss which is limited. If the stock price of Hero Motors Corp Ltd is expected to moves up by 7 percent on the date of contract expiration than the investor should use Long Call strategy. If, the stock price moves down by 5 percent then the investor will end up with loss.

6. Suggestion

The Stock Price Prediction Model and Stock Option Risk Analysis & Management Model developed by researcher may be of immense help to investors who are planning to venture into risky option market as the models will help them in hedging risk associated with investment in option market but also help in maximising profit if prices of underlying stock moves as per Stock Price Prediction Model.

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