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WRITING NON- DIRECTIONAL OPTION STRATEGIES ON NIFTY 50: PERFORMANCE OF STRADDLE AND STRANGLE

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ABSTRACT

To trade volatility and not the price of an underlying- options strategies are found to be the optimal and simple alternative. The present study tries to gauge low volatility option trading strategies. The study uses straddle and strangle written on NIFTY Index on one-month maturity options for a period of five financial years. To assess their performance their non-linear profiles are generated and compared. The paper is segmented in five sections- section 1 and 2 covers the introductory part and previous literature to outline the backbone of the study. Section 3 and 4 enlist the objectives of the study and the research methodology incorporated to conduct the study, respectively. Comparison of the performance of non-directional option strategies and short futures written on the Index is the primary objective. The strategies are written on NIFTY Index on one-month maturity options on strikes with different moneyness. For comparison Mean-variance framework are studied on the obtained returns. To make the study robust status of Greeks for straddle and strangle are also noticed. Section 5 and 6 are the analysis and concluding remarks of the paper. The findings of the study are consistent to previous literatures – the performance of optioned portfolio are better to unoptioned portfolio. Straddle achieves the highest sharpe ratio and is taken superior of the other two.

Keywords: *Writing Strategies, Straddle, Strangle, Greeks, NIFTY 50, Sharpe Ratio.*

Introduction

Options market has seen a splendid upsurge in past two decades, few reasons to quote such massive growth are- it provides a hedged portfolio, it requires a low capital, it provides tightest liquidity and optimal flexibility. However, availability of numerous options strategies is a datum which makes them more lucrative and rewarding for all the traders worldwide. Unlike a stock trader whose profitability is contingent to stock's rise and fall, an option traders has opportunities in all four directions- up, down, sideways and volatile. "Opportunities in option trading is not necessarily black and white- not necessarily up and down." (Dan Passarelli).

Here, now, it is imperative to understand what makes options so opportune- it is the volatility of the underlying and accessibility of various option strategies to play those volatilities. In options vernacular, these strategies are studied in two groups- Volatility buying strategies and volatility selling strategies. Again these strategies are segmented under- direction neutral, direction biased and direction indifferent strategies. Direction neutral strategies has a notion that the underlying will not move wildly, it will wander in a range. Most of the volatility selling strategies are delta neutral and works on the principle of lower implied volatility movement. Direction biased strategies either have a bullish or bearish approach towards the market and are consummated to take advantage of directional volatility. Options buying

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strategies are mostly directional biased or direction indifferent. Lastly, direction indifferent option traders believes as well desire to have a good movement in the underlying but remains indifferent to the direction of the movement. But unlike, direction neutral strategies, direction biased and direction indifferent strategies presumes higher implied volatility. Another approach to study the volatility selling strategies is of either a sideways strategies (which assumes market to be sideways- in a range-bound) or strategies to earn from higher volatilities.

Any option strategy do not work in isolation, they are affected by their parameters- Greeks. Each particular strategy has its own relation with the Greeks. To be direction neutral or direction indifferent the delta of the strategy must be brought to zero.

Option Selling Delta Neutral Strategies and Greeks

In a direction neutral strategy the delta is assumed to be zero or near zero, thus making the strategy a delta neutral strategy. It means there is no immediate gains if the underlying moves incrementally higher or lower. The strategy is thus created wherein the delta of the legs nullify themselves. For example selling an ATM straddle seeks selling an ATM call of 0.5 delta and selling an ATM put -0.5 delta cancels out each other making the strategy a delta 0 strategy. While the delta remains neutral (at least at the time the strategy is made), other greeks like gamma, theta and vega definitely play their roles. The short gamma position is associated with loss from movement of the underlying, as the underlying rallies, the position of a short trader becomes vulnerable as the option experiences a gain in its value. However, it is the theta of the strategy which holds back a short trader as an option loses its optionality with time decay. Like gamma an increased volatility (vega) also hurts a short trader.

Gamma-Theta Trade Off: Smileys and Frowns

As said above the short gamma (negative gamma) of the strategy will be adversely affected by any big movement in the underlying. Any upsurge in the underlying will change a delta neutral portfolio into a more short gamma and hence positive delta and vice versa. Then what's the point in being short. It is the motive to capture theta of the position a short trader enters the market. It is an alluring truth that an option will have no time value at the time of maturity and also that it loses fraction of its theta (time) value each passing day. A long trader may gain reward with increase in underlying's value (long/positive gamma) however, the same time he loses money on time value of options as the option becomes less valuable over time (negative theta). Conversely, a short trader may lose money with increase in the underlying's value (short/negative gamma) however, the same time he gain with theta decay as the option become less valuable over the time (positive theta). Thus, there always exists a trade-off between the two.

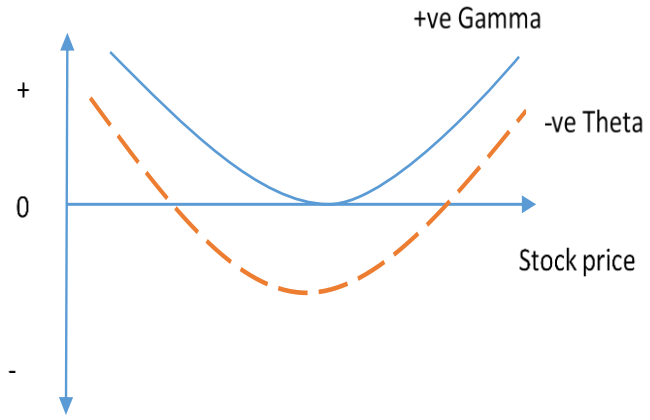

Figure 1: Effect of Time on Long-Gamma Smile

The above figure captures the effect of Theta on positive gamma – the smiley face. Where positive gamma implies that when stocks moves higher the call gains value at an increasing rate while the put loses its value at a decreasing value and vice versa. The blue line shows the position of gamma which becomes profitable when the underlying moves in either direction, it is lowest at the centre. But this is not the complete picture, when Theta (red dash line) comes into the scene the maximum loss is stretched to negative territory. This is because of the Theta risk which increases as the increases. A long gamma trader in such trade-off, strives each day to scalp gamma to cover the day's Theta loss.

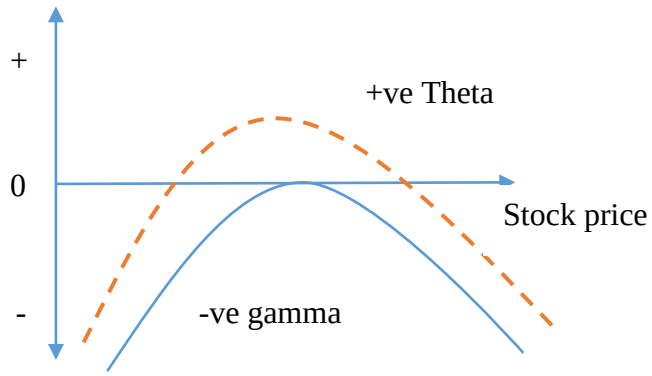

Figure 2: Effect of Time on Short-Gamma Frown

The blue line shows the gamma position of the strategy, which coincides its highest point at zero, making the p/l looks like a frown. But when theta (red dash line) is studied in parallel the profitability of the strategy comes into picture. As the time value decreases so the value of theta, causing profitability. The profitability pinnacles at the centre. However, as the volatility rises it erodes the profit and vice versa. The trade-off of the short trader targeting to capture the Theta hopes to keep the loss due to the adverse movement of underlying lower than the daily profit from Theta.

Literature Review

Keith V. Smith (1968) discussed the usability of writing options and suggested some guidelines for option writers. He suggested that calls and put should be written only in case when the trader's portfolio has adequate number of shares to close the position of call if exercised and adequate cash or liquid funds in case of put exercised. The author insisted that option small part of investment should be done in writing option allowing it to be dealt as a supplemental tactics only, although the author agreed that even a small investment in writing options could turn a mediocre investment portfolio into a handsome portfolio if the writing goes well.

J. Scott Chaput (2005) studied seven option strategies and found good evidence that traders seeks delta neutral strategy as an optimal tool for trading. Verifying a traders' choice they concluded that for a volatility trading strategy – a low transaction cost, high gamma and vega and delta neutral strategy is preferred. Quoting this they found straddle and strangles the most traded instrument while remaining five – option/asset combination guts, butterflies, iron butterflies, condors are rarely traded.

Michael L. McIntyre, and David Jackson (2007) Compared the performance of writing covered calls and buy and hold strategy, and found that covered call strategies perform better than just buying and holding strategy. The comparison was made in a synthesised economic condition to make the study more real. Transaction cost is taken for such purpose.

Dusan Isakov and Bernad Morad (2001) has studied the performance comparison of two different portfolios- hedged and unhedged on swiss market. The hedged portfolio considers a covered call strategy. The authors presumes the basic mean-variance framework to be a weak measure to analyse the portfolio performance of non-normal distribution. To overcome this weakness, a stochastic dominance and a modified treynor model is used. The study concluded that the hedged portfolio dominates the unhedged one.

Faias and Santa-Clara (2017) studying the non-normal distribution of options returns has suggested an optimal option performance strategy. They also advocated that a mean-variance comparison of options returns are not acceptable. In an out of the sample study, incorporating transaction cost, the portfolio delivered a positive skewness and a higher sharp ratio.

Kin Keung Lai (2012) has studied superiority of short trading over traditional trading. They studied the performance of strategies on Hang Sang Index and proposed the Straddle strategy to be the best selling strategy among the other chosen selling strategy. The authors concluded that the straddle has the highest positive theta. The performance of straddle is compared by taking the returns generated from straddle and the index for the same period. The study found that the compound, monthly returns and Sharpe ratio of the straddle strategy outperforms the HSI returns.

Objectives

- To write straddles on NIFTY 50 index and generate their non-linear payoff profile for the selected period.
- To write strangles on NIFTY 50 index and generate their non-linear payoff profiles for the selected period.
- To compare the performance of payoff profiles of selected delta neutral strategies on NIFTY 50 index.
- To compare the performance of non- linear payoff of delta neutral strategies with linear payoff of NIFTY futures.

Research Methodology

To work on the objectives defined, a descriptive methodology has been approached. Data from secondary sources are collected and back tested. Most of the data are collected from NSE official website www.nse.com although few data are extracted from www.investing.com also. Data filtration and tabulation and all calculations are done in Excel.

Sample period- data for a period of 5 years are considered for the study from a period starting from 1st April 2015 to 31st March 2020. This sample has a 60 months periods.

Choice of options- only near month contracts are entertained in the study. Putting simply, options contracts with one month expiry are undertaken. The contracts is supposed to be built on the next trading day of previous month expiry and is also supposed to be held till expiration of the contract i.e., nearly a month. For example- the first contract for the month of April 2015 is built on 27th March 2015 which is the next trading day of previous month expiry (26th March 2015).

Determination of Strikes- strikes are calculated with the help of the spot of NIFTY index. The spot is the close price of the index on the trading date (the day when the contract is entered). The strikes nearest to the close price is supposed to be the ATM strike (At the money). The straddle strategy are made on these ATMs. For creating strangles 2% OTMs are undertaken as 2% OTMs have good liquidity. 2% OTMs are nothing but the moneyness level of strikes chosen calculated as under-

Moneyness = strike-spot/spot*100

Premium collection- taking a short position premium are collected on the day the contracts is entered.

Closing position- as said above, the contract is held till expiry and the position is closed on the expiration date. The closing price of NIFTY index on the day of maturity/expiry of the contract is captured to tap the net position of the contract.

Net p/l- the net p/l or net payoff of strategies that are nonlinear are computed by analysing the position of trader on expiration day. If spot on the expiration experiences higher implied volatility, it will fall beyond the straddle and strangle range and may create a loss for the trader. This loss is however adjusted with the net premium received by the trader.

Sharpe ratio- for comparing the performance of strategies Sharpe ratio is computed. Sharpe ratio is a measure which compares the performance of an investment portfolio with a risk free investment portfolio. Precisely, it is excess returns earned from an investment divided by standard deviation of the invested portfolio itself. The ratio is computed as follow-

$$\mathbf{S= (r_p-r_f)/\sigma_p}$$

Where, s = Sharpe ratio,

r_p = return from the portfolio

r_f = return from risk free assets

σ_p= standard deviation of the portfolio.

Risk free rate- for the purpose of risk free rate average of daily rate of 10 Year Treasury bill issued by the government for the period of 5 years are computed.

Note: selling a strategy requires margin to be deposited before entering into the contract. In this paper margin, commission, interest rates and other transaction cost are assumed to be nil.

Data Analysis and Interpretation

In this study to assess the performance of direction neutral strategy two strategies namely- straddle and strangle are observed. Basically, the paper discusses strategies keeping option seller in mind and short positions are constructed on both the strategies chosen. Straddles and strangles are believed to the quintessential volatility strategies and are the purest way to buy and sell realized and implied volatility (Dan Pasarelli).

- **Short Straddle**

A short straddle is a position where an option trader writes (sells) a call and a put of the same option class, of same underlying with same expiration and strike. Usually this strike is an ATM strike. A straddle trader trades with a lower volatility expectation believing the stock traded to be more or less stagnant. In fact the maximum payoff a short straddle trader may extract is when the stocks does not move at all and his net payoff is the net premium received by him.

However, taking short positions in option market always comes with great risk. If the stock at expiration moves significantly the contract may result into huge loss eroding all the premiums. For example if a short seller enters into a contract of NIFTY 1 month 8000 strike straddle sold at 180-

Sell 1 1 month NIFTY 8000 strike call @ 100

Sell 1 1 month NIFTY 8000 strike put @80

The trader may assume three different risk and reward positions:

- **Up Market:** if the market moves above 8180, although the Put expires worthless but call options turns out to be a dead loss strategy. Above the breakeven 8180 the strategy is a mess as it erodes all the premium and for every further move the trader is liable to pay from his pocket. If the market is as high as 8200 the call option is exercisable by the long trader and the short trader will incur 200 non adjusted loss, for now he has to purchase stock worth 8200 from the market to close his position. However, his net position will be debit 20 adjusting for the premiums.
- **Down Market:** similar is the case with the down market, if the stocks goes beyond the ATM strike significantly, superseding its breakeven 7920 then the strategy would be a loss for any further downside move. But, if not, then the call will expire worthless and put will be adjusted by its premium.
- **Stagnant Market:** this is the best position where a short straddle could reap out its maximum profit. If the market closes at the ATM strike at expiry, both the legs (call and put) of the strategy will expire worthless and the net premium collected becomes the net payoff without any adjustments.
- **Payoff:** maximum profit- limited to net credit of two options
- **Maximum Loss:** potentially unlimited on upside; potentially limited on downside as the stock cannot fall below zero.

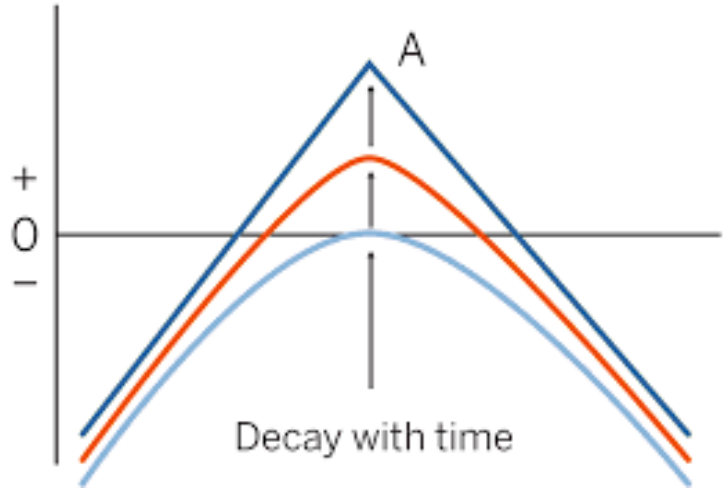

Figure 3: Straddle with Time Decay

Table 1: Nonlinear Pay Off Profile of ATM Straddle on NIFTY 50

Trading date	open	ATM strike	expiry date	Nifty on Expiry	Call prem	put prem	call on exp da	net Call p/l	put on exp date	net put p/l	net p/l
27-Mar-15	8465	8450	30-Apr-15	8181	131	144	0	131	-269	-125	6
04-May-15	8252	8250	28-May-15	8319	207	91	-69	138	0	91	229
29-May-15	8324	8300	25-Jun-15	8398	242	87	-98	144	0	87	231
26-Jun-15	8361	8350	30-Jul-15	8421	168	138	-71	97	0	138	235
31-Jul-15	8483	8500	27-Aug-15	7984	162	94	0	162	-516	-422	-260
31-Aug-15	7993	8000	24-Sep-15	7868	192	197	0	192	-132	65	257
28-Sep-15	7890	7900	29-Oct-15	8111	145	221	-211	-66	0	221	155
30-Oct-15	8142	8150	26-Nov-15	7883	111	166	0	111	-267	-101	10
27-Nov-15	7929	7950	31-Dec-15	7946	156	134	0	156	-4	130	286
01-Jan-16	7942	7950	28-Jan-16	7424	132	100	0	132	-526	-426	-294
29-Jan-16	7414	7400	25-Feb-16	6970	232	70	0	232	-430	-360	-128
26-Feb-16	7061	7050	31-Mar-16	7738	172	168	-688	-516	0	168	-348
01-Apr-16	7754	7750	28-Apr-16	7847	130	132	-97	33	0	132	165
29-Apr-16	7887	7900	26-May-16	8069	123	130	-169	-46	0	130	84
27-May-16	8091	8100	30-Jun-16	8287	178	108	-187	-9	0	108	99
01-Jul-16	8301	8300	28-Jul-16	8638	159	107	-338	-179	0	107	-72
29-Jul-16	8708	8700	25-Aug-16	8592	122	135	0	122	-108	27	149
26-Aug-16	8645	8650	29-Sep-16	8591	113	138	0	113	-59	79	192
30-Sep-16	8607	8600	27-Oct-16	8615	172	131	-15	157	0	131	288
28-Oct-16	8626	8650	24-Nov-16	7965	135	119	0	135	-685	-566	-431
25-Nov-16	8033	8050	29-Dec-16	8103	192	120	-53	139	0	120	259
30-Dec-16	8136	8150	25-Jan-17	8602	139	104	-452	-313	0	104	-209
27-Jan-17	8649	8650	23-Feb-17	8339	151	131	0	151	-311	-180	-29
27-Feb-17	8939	8950	30-Mar-17	9173	112	145	-223	-111	0	145	34
31-Mar-17	9185	9200	27-Apr-17	9342	111	114	-142	-31	0	114	83
28-Apr-17	9353	9350	25-May-17	9509	85	105	-159	-74	0	105	31
26-May-17	9490	9500	29-Jun-17	9504	149	79	-4	145	0	79	224
30-Jun-17	9493	9500	27-Jul-17	10020	115	101	-520	-405	0	101	-304
28-Jul-17	10011	10000	31-Aug-17	9917	146	106	0	146	-83	23	169
01-Sep-17	9945	9950	28-Sep-17	9768	142	88	0	142	-182	-94	48
29-Sep-17	9802	9800	26-Oct-17	10343	118	120	-543	-425	0	120	-305
27-Oct-17	10371	10350	30-Nov-17	10226	138	133	0	138	-124	9	147
01-Dec-17	10289	10300	28-Dec-17	10477	77	218	-177	-100	0	218	118
29-Dec-17	10501	10500	25-Jan-18	11069	157	108	-569	-412	0	108	-304
29-Jan-18	11141	11150	22-Feb-18	10382	191	202	0	191	-768	-566	-375
23-Feb-18	10400	10400	28-Mar-18	10113	222	121	0	222	-287	-166	56
02-Apr-18	10198	10200	26-Apr-18	10617	185	123	-417	-232	0	123	-109
27-Apr-18	10667	10650	31-May-18	10736	186	116	-86	100	0	116	216
01-Jun-18	10725	10750	28-Jun-18	10589	107	170	0	107	-161	9	116
29-Jun-18	10591	10600	26-Jul-18	11167	191	103	-567	-376	0	103	-273
27-Jul-18	11234	11250	30-Aug-18	11676	179	128	-426	-247	0	128	-119
31-Aug-18	11709	11700	27-Sep-18	10977	72	347	0	72	-723	-376	-304
28-Sep-18	11070	11050	25-Oct-18	10124	142	235	0	142	-926	-691	-549
26-Oct-18	10118	10100	29-Nov-18	10858	211	255	-758	-547	0	255	-292
30-Nov-18	10927	10950	27-Dec-18	10779	167	219	0	167	-171	48	215
28-Dec-18	10850	10850	31-Jan-19	10830	218	162	0	218	-20	142	360
01-Feb-19	10870	10850	28-Feb-19	10792	206	145	0	206	-58	87	293
01-Mar-19	10897	10900	28-Mar-19	11570	175	162	-670	-495	0	162	-333
29-Mar-19	11689	11700	25-Apr-19	11641	174	194	0	174	-59	135	309
26-Apr-19	11769	11750	30-May-19	11945	336	274	-195	141	0	274	415
31-May-19	12001	12000	27-Jun-19	11841	132	215	0	132	-159	56	188
28-Jun-19	11907	11900	25-Jul-19	11252	150	208	0	150	-648	-440	-290
26-Jul-19	11300	11300	29-Aug-19	10948	174	149	0	174	-352	-203	-29
30-Aug-19	11006	11000	26-Sep-19	11571	212	156	-571	-359	0	156	-203
27-Sep-19	11599	11600	31-Oct-19	11877	201	221	-277	-76	0	221	145
01-Nov-19	11925	11950	28-Nov-19	12151	171	194	-201	-30	0	194	164
29-Nov-19	12174	12150	26-Dec-19	12126	135	186	0	135	-24	162	297
27-Dec-19	12228	12250	30-Jan-20	12035	194	127	0	194	-215	-88	106
31-Jan-19	12103	12100	27-Feb-20	11633	165	271	0	165	-467	-196	-31
28-Feb-20	11380	11400	26-Mar-20	8641	147	395	0	147	-2759	-2364	-2217

Table 1 shows the nonlinear payoff of the straddles constructed on NIFTY 50. Net premium of call and put are calculated considering the spot on expiry. After adjusting for the particular call and put with spot position, net payoff is derived adjusting net premium of the calls with puts. The payoff column records:

Total months	Profitable months	Unprofitable months
60	35	25
59 (excluding March 2020 for COVID'19 effect)	35	24

- **Strangle**

A short strangle is a position where an option trader writes (sells) a call and put option of an option class with same underlying, same expiration but with different strikes. Usually these strikes are out of the money. Typically an OTM call and put are sold. Like straddle strangles are also volatility selling strategies but unlike straddle the strikes chosen are OTM which give a wiggle room to the stock for little movement.

As said above, taking short positions in option market always comes with great risk. If the stock at expiration moves significantly, beyond the range bound of the strategy, the contract may result into huge loss eroding all the premiums. For example if a short seller enters into a contract of NIFTY 1 month 7900-8100 strike strangle sold at 180, (assuming spot to be 8000)

Sell 1 1 month NIFTY 8100 strike call @ 100

Sell 1 1 month NIFTY 7900 strike put @80

The trader may assume three different risk and reward positions:

- **Up Market:** if the market moves above 8280, although the Put expires worthless but call options turns out to be a dead loss strategy. Above the breakeven 8280 the strategy is a mess as it erodes all the premium and for every further move the trader is liable to pay from his pocket. If the market is as high as 8300 the call option is exercisable by the long trader and the short trader will incur 200 non adjusted loss, for now he has to purchase stock worth 8300 from the market to close his position. However, his net position will be debit 20 adjusting for the premiums.
- **Down Market:** similar is the case with the down market, if the stocks goes beyond the range (7900-8100) significantly, superseding its breakeven 7720 then the strategy would be a loss for any further downside move. But, if not, then the call will expire worthless and put will be adjusted by its premium.
- **Sideways Market:** this is the best position where a short strangle could reap out its maximum profit. If the market closes at strike lying in the range at expiry, both the legs (call and put) of the strategy will expire worthless and the net premium collected becomes the net payoff of the trader without any adjustments.
- **Payoff:** maximum profit- limited to net credit of two options
- **Maximum Loss:** potentially unlimited on upside; potentially limited on downside as the stock cannot fall below zero.

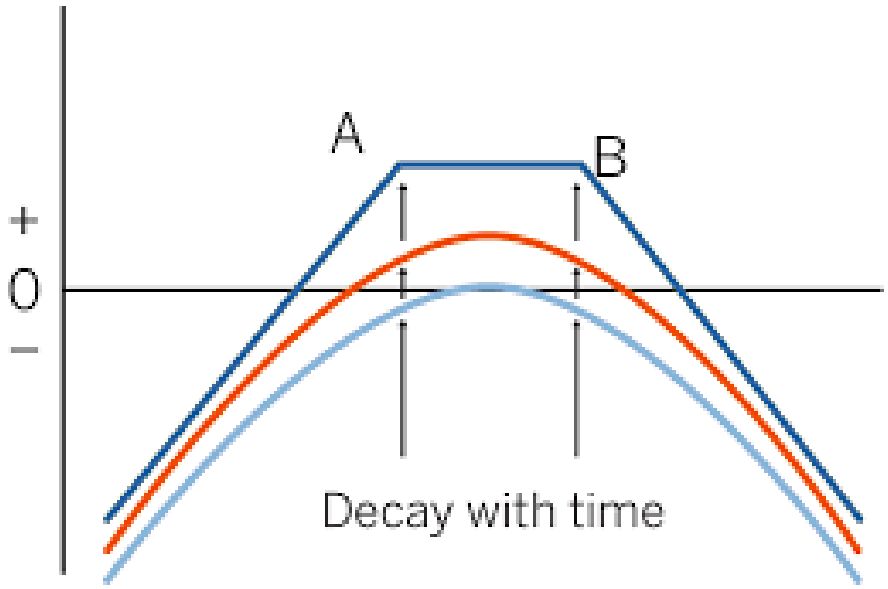

Figure 4: Strangle with Time Decay

Table 2: Nonlinear Payoff of 2% OTM Strangle on NIFTY 50

Trading date	open	ATM strike	expiry date	Nifty on Expiry	call strike	put strike	call prem	put prem	call on exp	put on exp	net call	net put	net p/l
27-Mar-15	8465	8450	30-Apr-15	8181	8650	8250	54	71	0	-69	54	2	56
04-May-15	8252	8250	28-May-15	8319	8450	8050	102	43	0	0	102	43	145
29-May-15	8324	8300	25-Jun-15	8398	8500	8100	121	44	0	0	121	44	165
26-Jun-15	8361	8350	30-Jul-15	8421	8550	8150	76	71	0	0	76	71	147
31-Jul-15	8483	8500	27-Aug-15	7984	8700	8300	64	43	0	-316	64	-273	-209
31-Aug-15	7993	8000	24-Sep-15	7868	8200	7800	98	127	0	0	98	127	225
28-Sep-15	7890	7900	29-Oct-15	8111	8100	7700	66	139	-11	0	55	139	194
30-Oct-15	8142	8150	26-Nov-15	7883	8350	7950	40	92	0	-67	40	25	65
27-Nov-15	7929	7950	31-Dec-15	7946	8150	7750	71	67	0	0	71	67	138
01-Jan-16	7942	7950	28-Jan-16	7424	8150	7750	48	41	0	-326	48	-285	-237
29-Jan-16	7414	7400	25-Feb-16	6970	7600	7200	105	34	0	-230	105	-196	-91
26-Feb-16	7061	7050	31-Mar-16	7738	7250	6850	83	98	-488	0	-405	98	-307
01-Apr-16	7754	7750	28-Apr-16	7847	7950	7550	49	65	0	0	49	65	114
29-Apr-16	7887	7900	26-May-16	8069	8100	7700	47	62	0	0	47	62	109
27-May-16	8091	8100	30-Jun-16	8287	8300	7900	78	53	0	0	78	53	131
01-Jul-16	8301	8300	28-Jul-16	8638	8500	8100	64	52	-138	0	-74	52	-22
29-Jul-16	8708	8700	25-Aug-16	8592	8900	8500	46	63	0	0	46	63	109
26-Aug-16	8645	8650	29-Sep-16	8591	8850	8450	36	69	0	0	36	69	105
30-Sep-16	8607	8600	27-Oct-16	8615	8800	8400	74	72	0	0	74	72	146
28-Oct-16	8626	8650	24-Nov-16	7965	8850	8450	47	57	0	-485	47	-428	-381
25-Nov-16	8033	8050	29-Dec-16	8103	8250	7850	86	67	0	0	86	67	153
30-Dec-16	8136	8150	25-Jan-17	8602	8350	7950	46	51	-252	0	-206	51	-155
27-Jan-17	8649	8650	23-Feb-17	8339	8850	8450	63	65	0	-111	63	-46	17
27-Feb-17	8939	8950	30-Mar-17	9173	9150	8750	40	69	-23	0	17	69	86
31-Mar-17	9185	9200	27-Apr-17	9342	9400	9000	33	50	0	0	33	50	83
28-Apr-17	9353	9350	25-May-17	9509	9550	9150	70	42	0	0	70	42	112
26-May-17	9490	9500	29-Jun-17	9504	9700	9300	48	34	0	0	48	34	82
30-Jun-17	9493	9500	27-Jul-17	10020	9700	9300	34	45	-320	0	-286	45	-241
28-Jul-17	10011	10000	31-Aug-17	9917	10200	9800	54	51	0	0	54	51	105
01-Sep-17	9945	9950	28-Sep-17	9768	10150	9750	46	39	0	0	46	39	85
29-Sep-17	9802	9800	26-Oct-17	10343	10000	9600	37	58	-343	0	-306	58	-248
27-Oct-17	10371	10350	30-Nov-17	10226	10550	10150	49	69	0	0	49	69	118
01-Dec-17	10289	10300	28-Dec-17	10477	10500	10100	25	125	0	0	25	125	150
29-Dec-17	10501	10500	25-Jan-18	11069	10700	10300	58	54	-369	0	-311	54	-257
29-Jan-18	11141	11150	22-Feb-18	10382	11350	10950	102	127	0	-568	102	-441	-339
23-Feb-18	10400	10400	28-Mar-18	10113	10600	10200	107	69	0	-87	107	-18	89
02-Apr-18	10198	10200	26-Apr-18	10617	10400	10000	80	68	-217	0	-137	68	-69
27-Apr-18	10667	10650	31-May-18	10736	10850	10450	77	63	0	0	77	63	140
01-Jun-18	10725	10750	28-Jun-18	10589	10950	10550	41	91	0	0	41	91	132
29-Jun-18	10591	10600	26-Jul-18	11167	10800	10400	81	52	-367	0	-286	52	-234
27-Jul-18	11234	11250	30-Aug-18	11676	11450	11050	79	71	-226	0	-147	71	-76
31-Aug-18	11709	11700	27-Sep-18	10977	11900	11500	62	65	0	-523	62	-458	-396
28-Sep-18	11070	11050	25-Oct-18	10124	11250	10850	67	150	0	-726	67	-576	-509
26-Oct-18	10118	10100	29-Nov-18	10858	10300	9900	122	175	-558	0	-436	175	-261
30-Nov-18	10927	10950	27-Dec-18	10779	11150	10750	78	143	0	0	78	143	221
28-Dec-18	10850	10850	31-Jan-19	10830	11050	10650	115	99	0	0	115	99	214
01-Feb-19	10870	10850	28-Feb-19	10792	11050	10650	99	85	0	0	99	85	184
01-Mar-19	10897	10900	28-Mar-19	11570	11100	10700	76	101	-470	0	-394	101	-293
29-Mar-19	11689	11700	25-Apr-19	11641	11900	11500	85	123	0	0	85	123	208
26-Apr-19	11769	11750	30-May-19	11945	11950	11550	228	208	0	0	228	208	436
31-May-19	12001	12000	27-Jun-19	11841	12200	11800	56	135	0	0	56	135	191
28-Jun-19	11907	11900	25-Jul-19	11252	12100	11700	70	125	0	-448	70	-323	-253
26-Jul-19	11300	11300	29-Aug-19	10948	11500	11100	78	81	0	-152	78	-71	7
30-Aug-19	11006	11000	26-Sep-19	11571	11200	10800	106	98	-371	0	-265	98	-167
27-Sep-19	11599	11600	31-Oct-19	11877	11800	11400	114	139	-77	0	37	139	176
01-Nov-19	11925	11950	28-Nov-19	12151	12150	11750	84	119	-1	0	83	119	202
29-Nov-19	12174	12150	26-Dec-19	12126	12350	11950	55	107	0	0	55	107	162
27-Dec-19	12228	12250	30-Jan-20	12035	12450	12050	89	69	0	-15	89	54	143
31-Jan-19	12103	12100	27-Feb-20	11633	12300	11900	91	175	0	-267	91	-92	-1
28-Feb-20	11380	11400	26-Mar-20	8641	11600	11200	86	285	0	-2559	86	-2274	-2188

Table 2 shows the nonlinear payoff of the straddles constructed on NIFTY 50. Net premium of call and put are calculated considering the spot on expiry. After adjusting for the particular call and put with spot position, net payoff is derived adjusting net premium of the calls with puts. The payoff column records:

Total months	Profitable months	Unprofitable months
60	38	22
59 (excluding March 2020 for COVID'19 effect)	38	21

- **Shorting Futures**

Futures are among the most liquid derivatives instrument of India. The NIFTY Futures is believed to be the most traded futures around the globe. Trading in futures involves two parties one taking a long position and other taking a short position. A long futures trader believes the market to be bullish and wants to hedge himself from any upsurge in the underlying's price. Conversely, a short futures trader believes the market to be bearish and wishes to make a profit from the any decline in the price of the underlying.

- **Long Futures:** purchasing a futures of an underlying means taking up a contract to buy an underlying at a predetermined future price and at predetermined future date.
- **Short Futures:** it is a position wherein a trader expecting a decline in future market enters into a contract to sell first and buy later. The trader sells an assets at currents price (higher) and then buys the asset at a future price (lower, as he believes the market to move downwards) to close his position.

Table 3: Linear Payoff of Futures (Short Selling)

Trading date	open	expiry date	Nifty on Expiry	short sellir	Trading dat	open	expiry date	Nifty on E	short sellir
27-Mar-15	8465	30-Apr-15	8181	284	29-Sep-17	9802	26-Oct-17	10343	-541
04-May-15	8252	28-May-15	8319	-67	27-Oct-17	10371	30-Nov-17	10226	145
29-May-15	8324	25-Jun-15	8398	-74	01-Dec-17	10289	28-Dec-17	10477	-188
26-Jun-15	8361	30-Jul-15	8421	-60	29-Dec-17	10501	25-Jan-18	11069	-568
31-Jul-15	8483	27-Aug-15	7984	499	29-Jan-18	11141	22-Feb-18	10382	759
31-Aug-15	7993	24-Sep-15	7868	125	23-Feb-18	10400	28-Mar-18	10113	287
28-Sep-15	7890	29-Oct-15	8111	-221	02-Apr-18	10198	26-Apr-18	10617	-419
30-Oct-15	8142	26-Nov-15	7883	259	27-Apr-18	10667	31-May-18	10736	-69
27-Nov-15	7929	31-Dec-15	7946	-17	01-Jun-18	10725	28-Jun-18	10589	136
01-Jan-16	7942	28-Jan-16	7424	518	29-Jun-18	10591	26-Jul-18	11167	-576
29-Jan-16	7414	25-Feb-16	6970	444	27-Jul-18	11234	30-Aug-18	11676	-442
26-Feb-16	7061	31-Mar-16	7738	-677	31-Aug-18	11709	27-Sep-18	10977	732
01-Apr-16	7754	28-Apr-16	7847	-93	28-Sep-18	11070	25-Oct-18	10124	946
29-Apr-16	7887	26-May-16	8069	-182	26-Oct-18	10118	29-Nov-18	10858	-740
27-May-16	8091	30-Jun-16	8287	-196	30-Nov-18	10927	27-Dec-18	10779	148
01-Jul-16	8301	28-Jul-16	8638	-337	28-Dec-18	10850	31-Jan-19	10830	20
29-Jul-16	8708	25-Aug-16	8592	116	01-Feb-19	10870	28-Feb-19	10792	78
26-Aug-16	8645	29-Sep-16	8591	54	01-Mar-19	10897	28-Mar-19	11570	-673
30-Sep-16	8607	27-Oct-16	8615	-8	29-Mar-19	11689	25-Apr-19	11641	48
28-Oct-16	8626	24-Nov-16	7965	661	26-Apr-19	11769	30-May-19	11945	-176
25-Nov-16	8033	29-Dec-16	8103	-70	31-May-19	12001	27-Jun-19	11841	160
30-Dec-16	8136	25-Jan-17	8602	-466	28-Jun-19	11907	25-Jul-19	11252	655
27-Jan-17	8649	23-Feb-17	8339	310	26-Jul-19	11300	29-Aug-19	10948	352
27-Feb-17	8939	30-Mar-17	9173	-234	30-Aug-19	11006	26-Sep-19	11571	-565
31-Mar-17	9185	27-Apr-17	9342	-157	27-Sep-19	11599	31-Oct-19	11877	-278
28-Apr-17	9353	25-May-17	9509	-156	01-Nov-19	11925	28-Nov-19	12151	-226
26-May-17	9490	29-Jun-17	9504	-14	29-Nov-19	12174	26-Dec-19	12126	48
30-Jun-17	9493	27-Jul-17	10020	-527	27-Dec-19	12228	30-Jan-20	12035	193
28-Jul-17	10011	31-Aug-17	9917	94	31-Jan-19	12103	27-Feb-20	11633	470
01-Sep-17	9945	28-Sep-17	9768	177	28-Feb-20	11380	26-Mar-20	8641	2739

Table 3 shows the payoff profile of short futures position. It is calculated believing the stocks was sold on the trading date and was bought to close the position on the expiry date. The difference between the two is the net p/l of the position. The p/l column records:

Total months	Profitable months	Unprofitable Months
60	29	31
59 (excluding March 2020 for COVID'19 effect)	28	31

Table 4: Performance of straddle, strangle and short futures on NIFTY 50

Performance Parameter	Straddle	Strangle	Futures/Short Selling
Mean (Returns)	13.35593	10.15254	-5.0678
Standard Error	30.76904	26.13912	50.18965
Median	83	89	-14
Mode	-304	109	48
Standard Deviation	236.3415	200.7784	385.514
Sample Variance	55857.3	40311.96	148621
Kurtosis	-0.86677	-0.30808	-0.20086
Skewness	-0.48505	-0.72776	0.226821
Range	964	945	1686
Minimum	-549	-509	-740
Maximum	415	436	946
Sum	788	599	-299
Count	59	59	59
Sharpe ratio	0.056	0.050	-0.143

The table 4, shows various statistical properties of the three strategies. The mean return of the straddle (13.35) stands the best among the three strategies, followed by strangle and then futures. The dispersion of the strategy, however, is more than the strangle indicating that the yields of the strategy are widely scattered. Here also, the futures do not stand at par with the options strategies. Talking about the Sharpe ratio which measures the performance of a portfolio depicts that the straddle strategy is the most effective selling strategy. It has the highest Sharpe ratio (0.056) followed by the strangle strategy (0.050) and then futures (-0.143).

Note: (the performance chart are calculated for 59 months, the last month of the sample period March 2020 is excluded from the study because it has abnormal volatility due to COVID'19)

Greeks of Straddle and Strangle

- **Delta of a Short Straddle and Strangle**

For a short position, delta of a call varies from 0 to -1 while for a put it ranges from 0 to 1. Simply putting, if the market goes bearish the put turns out to be in the money and so is the +1 delta loss to the short trader. Conversely, if the market turns bullish the call option turns in the money and short trader may experience delta loss up to -1. Both the position will adversely affect the p/l of the trader.

- **Gamma of a Short Straddle and Strangle**

Gamma of a short position is always negative whether trading a call or a put. This means that the spot-strike relation for a short position is always inverse. If the underlying rises before the expiration, (spot>strike) the negative gamma creates a negative delta which eventually erodes the trader's profit.

- **Vega of a Short Straddle and Strangle**

Implied volatility and a short straddle too shares a negative relation. As soon as the IV rises the option price also rises which is a bad sign for a short option trader. Hence, volatility has a negative impact on the p/l of the trader.

- **Theta of a Short Straddle and Strangle**

This is the only Greek which works in favour of a short option trader. As the time decays, the option loses its value and it becomes zero at the time of expiry making the option cheaper to be settled at the time of expiry. Theta works positively for a short option trader.

- **Rho of a Short Straddle and Strangle**

A higher interest rate also works negatively for a short option trader. As the interest rate rises the option price also increases and vice versa.

Greeks	Straddle	Strangle
DELTA	Lowest near the ATM strike Almost 0 (-0.5 of call + 0.5 of put)	Lowest near the average value of the two OTMs
GAMMA	Lowest near the ATM strike	Lowest near the average value of the two OTMs
THETA	Best when at ATM	Best when in the range bound.
VEGA	Lowest near the ATM strike	Lowest near the average value of the two OTMs
RHO	Lowest near the ATM strike	Lowest near the average value of the two OTMs

Conclusion

The finding of the paper thus concludes that mong the two non- directional option strategies straddle and strangle straddle performs better considering the higher sharpe ratio, which implies that it is profitable to take short straddle position on NIFTY 50 as the index is found to be closing on expiry around the ATMs strikes chosen. Apparently, the index has a low volatility and suitable for taking direction neutral strategies. Talking about strangle, although number of profitable months are greater of strangle (38) are greater than the straddle (35) but its total return is less when compared to the straddle's total return, 788 and 599 respectively. Here, it is important to mention that the option premium for an ATM options are costlier than the OTM option. Although they both have no intrinsic value and in our same extrinsic value (for a month) but at least ATM options are at par to the spot unlike the OTMs options. This may be the reason for lower total returns of strangle strategies. Considering the Futures, short selling strategy undoubtedly underperforms among the three strategies. Its sharpe ratio is the lowest.

However, when entering the market a straddle and strangle might be a delta neutral strategy but its delta may shift if the market shifts ups or down. Overall the strategy do not ensure that it will remain a delta neutral strategy till its expiration. For this an option seller must keep a track of the movement of the underlying and to hedge its position may dive into some delta hedging strategies. Taking a long position on futures is a good example of delta hedging as futures has delta of 1.

References

1. Balakrishnan, D. J. (n.d.). Hedging strategies used in selection of "Options" and "Forward" contracts in Indian Derivatives Market. *Koneru International Journal of Management Research, 1*(1).
2. Borchgrevink-Persen, D. S. (2017). Performance of Option Trading Strategies: Evidence for Individual Stocks and the OBX During 2005-2015.
3. CHAPUT, J. S. (2005). VOLATILITY TRADE DESIGN. *The Journal of Futures Markets, , Vol. 25,* (No. 3,), 243–279.
4. Hull, J, 2001, Fundamentals of futures and options markets. Prentice Hall, United States of America.
5. Lai, K. K. (2012). Generating Profit Using Option Selling Strategies.
6. McIntyre*, M. L. (2007). Great in practice, not in theory: An empirical examination of covered call writing. *Journal of Derivatives & Hedge Funds, 13*(1).
7. Michael J. Gombola", R. L. (1978). SPREADING STRATEGIES IN CBOE OPTIONS:EVIDENCE ON MARKET PERFORMANCE. *The Journal of Financial Research, 1*(1).
8. MORARD*, D. I. (2001, March,). Improving portfolio performance with option strategies: Evidence from Switzerland. *European Financial Management, Vol 7*(no 1,), pp. 73-91.
9. Osseiran, M. B. (2006). Strategies Involving Options. In *Exotic Options and Hybrids: A Guide to Structuring, Pricing and Trading .*
10. Russell, R. (2006). selling options.
11. Santa-Clara, J. A. (2017, Feb.). Optimal Option Portfolio Strategies: Deepening the Puzzle of Index Option Mispricing. *JOURNAL OF FINANCIAL AND QUANTITATIVE ANALYSIS,, Vol. 52*(No. 1), , pp. 277–303.
12. Sharma, G. (2019, January). Iron Butterfly and Iron Condor Option Strategies on Indian Banking Sector. *International Journal of Business and Management Invention, Volume 8* (Issue 1), PP 05-11.