Option Strategies

An Option Strategy is nothing but a suggested combination of derivative purchases (mostly options, rarely involving futures) which provide better profits in case of successful market turn (note that this is not necessarily based on the underlying price, strategies can be made benefitting from volatility, arbitrage), insulate better against losses and overall, provide a better risk to return ratio compared to the naked option.

The various strategies discussed are as follows:

Bullish Strategies

1. Bull Call Spread
2. Bull Put Spread
3. Call Ratio Back Spread
4. Bear Call Ladder
5. Synthetic Call

Bearish Strategies

1. Bear Call Spread
2. Bear Put Spread
3. Bull Put Ladder
4. Put Ratio Back spread

Neutral Strategies

1. Long & Short Straddles
2. Long & Short Strangles
3. Long & Short Iron Condor
4. Call Butterfly
5. Max Pain

Bullish Strategies

A bullish strategy is a strategy implemented when the view on the market is bullish, that is, when we expect the price of the underlying to increase. These strategies have a positive delta. However, the strategy is not only dependent on delta but also on volatility (Vega), time till expiration (Theta), etc. Here, we state the various bearish strategies, compute the results of the strategy for an example, and analyze the strategies and effects of the Option Greeks on the strategies.

Bull Call Spread:

The bull call spread is a strategy applied when the view on the market is moderately bullish. It is a two-leg spread strategy traditionally executed using ITM and OTM options.

Strategy:

- Buy 1 ATM option (Leg 1)
- Sell 1 OTM option (Leg 2)

Example of bull call spread	
Buy 1 XYZ 100 call at	-3.30
Sell 1 XYZ 105 call at	1.50
Net cost =	-1.80

Note that both the options belong to the same underlying, have same expiration date and are in the same ratio (1:1). This is a net debit strategy as initially we need to put money into the strategy (ATM option is costlier than OTM option). Both the maximum loss and gain are capped as can be seen from the below calculations.

The calculations are as follows:

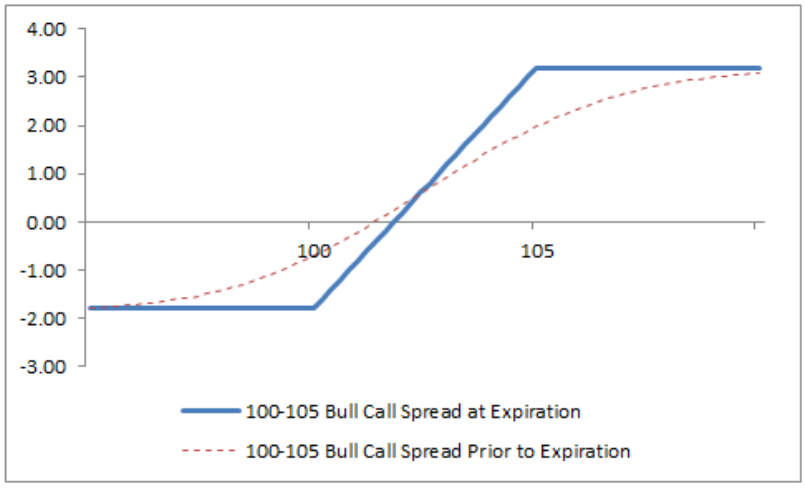
$$
\begin{aligned}
Spread &= Strike Price of Short Call - Strike\ Price\ of\ Long\ Call \\
Net\ Debit &= Maximum\ Loss \\
&= Premium\ of\ Long\ Call - Premium\ of\ Short\ Call \\
Maximum\ Profit &= Spread - Net\ Debit \\
Break-even point\ (Point\ of\ zero\ payoff) &= Strike\ Price\ of\ Long\ Call + Net\ Debit
\end{aligned}
$$

For our Example,

$$
\begin{aligned}
Spread &= 105 - 100 = 5 \\
Net\ Debit &= Maximum\ Loss \\
&= 3.30 - 1.50 = 1.80 \\
Maximum\ Profit &= 5 - 1.80 = 3.20 \\
Break-even\ point\ (Point\ of\ zero\ payoff) &= 100 + 1.80 = 101.80
\end{aligned}
$$

Stock Price at Expiration	Long 100 Call Profit/(Loss) at Expiration	Short 105 Call Profit/(Loss) at Expiration	Bull Call Spread Profit/(Loss) at Expiration
108	+4.70	-1.50	+3.20
107	+3.70	-0.50	+3.20
106	+2.70	+0.50	+3.20
105	+1.70	+1.50	+3.20
104	+0.70	+1.50	+2.20
103	-3.30	+1.50	+1.20
102	-3.30	+1.50	+0.20
101	-3.30	+1.50	-0.80
100	-3.30	+1.50	-1.80
99	-3.30	+1.50	1.80
98	-3.30	+1.50	1.80
97	-3.30	+1.50	1.80
96	-3.30	+1.50	1.80

The graph of the strategy looks as follows:



Option Greeks:

The effect of the various Option Greeks on the strategy is as follows:

Delta and Gamma:

The Bull Call Spread is a bullish strategy which makes money when the price of the underlying increases. Thus, it has a positive delta. As it consists of one long and one short call, the change in delta when the underlying changes is less. Thus, it has a near-zero gamma.

Vega:

As the bull call spread has a long call and a short call, the rise in premiums due to increased volatility is balanced out, and thus it has a near zero Vega.

Theta:

The option premium values decrease as time passes because of theta. However, the decrease in premiums is not the same for all strikes and depends on the price of the underlying. If the underlying is close to the long call option, then the price of the bull call spread value decreases (loses money). This is because the long call is closest to the money, and thus the decrease in price of the long option is more than that of the short option. However, if the underlying is closer

to the short option, the bull call spread value increases (makes money). This is because the decrease in premium of the short option is more than that of the long option.

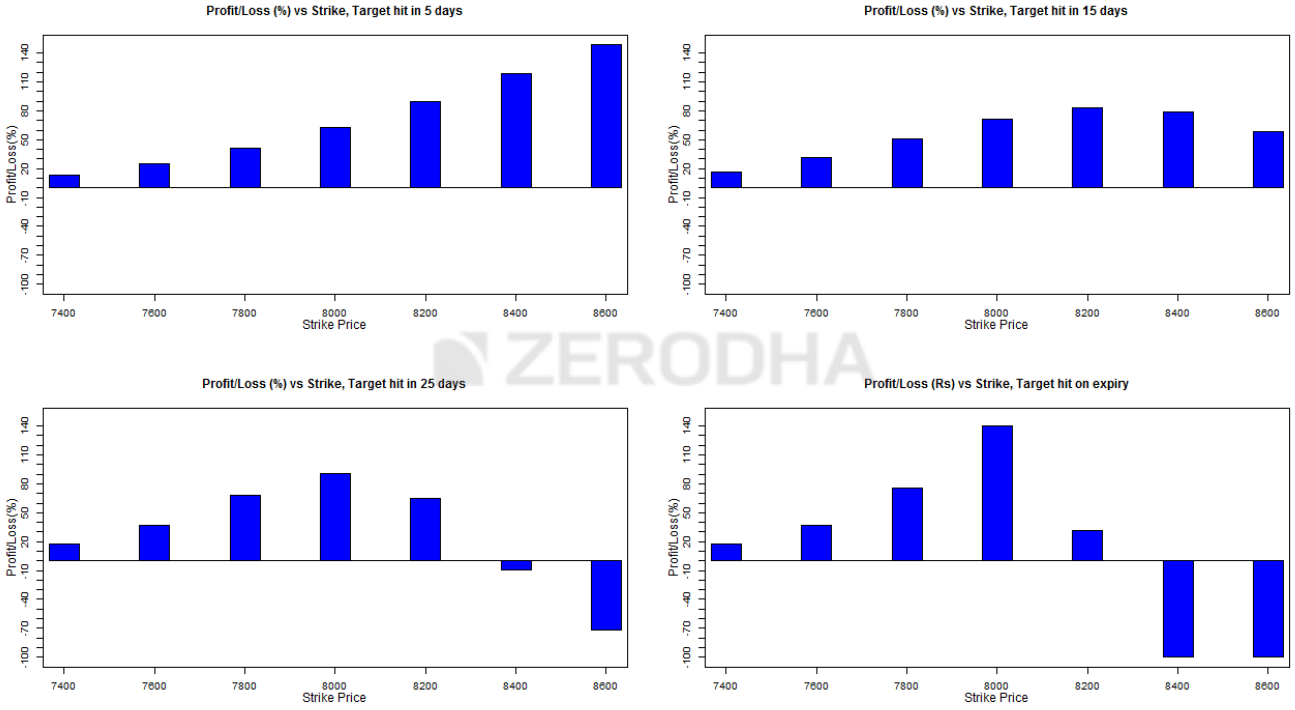
Strike Selection:

The best strike to be selected (one which gives maximum profit) depends on the time in which the target is expected to be reached as well as in which half of the month the trade is being executed on. The effect of theta (time) and the best strike for various scenarios is as follows:

First Half:

Expectancy	***Strikes to choose***
5 days (Top Left)	Far OTMs
15 days (Top Right)	Slightly OTM
25 days (Bottom Left)	ATM
Expiry (Bottom Right)	ATM

Graph is as follows:



Second Half:

Expectancy	***Strikes to choose***
1/2days	Far OTMs
5 days	Far OTM
10 days	slightly OTM
Expiry	ATM

Graph is as follows:

ZERODHA

Advantages:

- Cost of strategy is less compared to the naked call option. Low cost also implies lower risk.
- The strategy has a lower breakeven point, which means that to become profitable, the underlying price will not have to rise as much as it would have to in case of a naked long call.

Drawbacks:

- Limited profit potential as maximum profit is fixed.

Bull Put Spread:

The bull put spread strategy is a bullish strategy, very similar to the bull call spread except that it is executed using put options rather than call options.

Strategy:

- Buy 1 OTM Put option (Leg 1)
- Sell 1 ITM Put option (Leg 2)

Example of bull put spread	
Sell 1 XYZ 100 put at	3.20
Buy 1 XYZ 95 put at	-1.30

Note that both the options belong to the same underlying, have same expiration date and are in the same ratio (1:1). This is a net credit strategy as initially, the cost of buying OTM Put option is less than the premium received by selling an ITM option. Like bull call spread, both the profit and loss are capped.

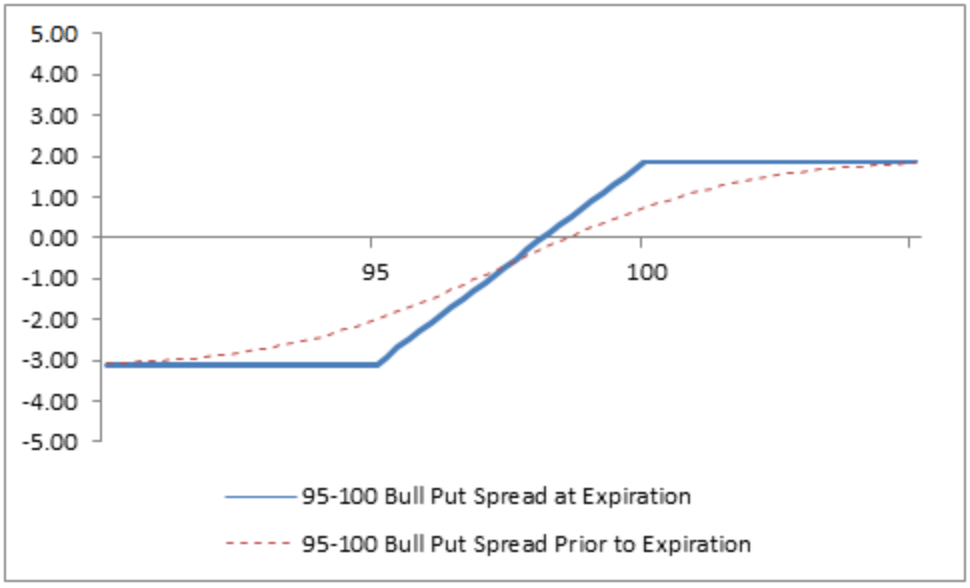
The calculations are as follows:

$$\begin{aligned}
Spread &= Strike\ Price\ of\ Short\ Call \\
&\quad - Strike\ Price\ of\ Long\ Call \\
Net\ Credit &= Maximum\ Profit. \\
&= Premium\ of\ Short\ Call - Premium\ of\ Long\ Call \\
Maximum\ Loss &= Spread - Initial\ Profit \\
Break-even\ point &= Strike\ Price\ of\ Long\ Call - Initial\ Profit
\end{aligned}$$

For our Example,

$$\begin{aligned}
Spread &= 100 - 95 = 5 \\
Net\ Debit &= Maximum\ Loss \\
&= 3.20 - 1.30 = 1.90 \\
Maximum\ Profit &= 5 - 1.90 = 3.10 \\
Break-even\ point &= 100 - 1.90 = 98.10
\end{aligned}$$

Stock Price at Expiration	Short 100 Put Profit/(Loss) at Expiration	Long 95 Put Profit/(Loss) at Expiration	Bull Put Spread Profit/(Loss) at Expiration
104	+3.20	-1.30	+1.90
103	+3.20	-1.30	+1.90
102	+3.20	-1.30	+1.90
101	+3.20	-1.30	+1.90
100	+3.20	-1.30	+1.90
99	+2.20	-1.30	+0.90
98	+1.20	-1.30	-0.10
97	+0.20	-1.30	-1.10
96	-0.80	-1.30	-2.10
95	-1.80	-1.30	-3.10
94	-2.80	-1.30	-3.10
93	-3.80	+0.70	-3.10
92	-4.80	+1.70	-3.10



The Option Greeks and Strike selection for this strategy is similar to Bull Call Spread.

Benefits of the Strategy

- Maximum loss is limited to the extent of net premium paid
- Shorting an OTM Put reduces the overall cost of the strategy
- The breakeven point of this strategy is smaller as compared to that of a naked long Put.

Drawbacks of the Strategy

- Put that is sold at the lower strike limits the maximum profit that can be earned
- Because this is a net debit strategy, the trader will lose money even if the underlying consolidates
- If the underlying price is above the breakeven price as expiration approaches, Theta would work against the trader.

Call Ratio Back Spread

The Call Ratio Back Spread is a 3-leg strategy, applied when the view on the market is outrightly bullish. It involves buying 2 OTM call option and selling 1 OTM call option. Unlike the previous strategies, the profit is not capped. Also, even if the market moves against the trend, if the market moves, the strategy will still make money. The strategy loses money if the market remains stagnant.

Strategy:

- Sell one lot of ITM options.
- Buy two lots of OTM options.

Example of Call Ratio Back Spread

Sell 1 XYZ 100 call at 3.30

Buy 2 XYZ 105 calls at 1.50 each

Note that both the options belong to the same underlying, have same expiration date and are in the ratio 2: 1 (OTM: ITM).
This is a net credit strategy as the cost of the ITM options finances the buying of the OTM options.

The calculations for the strategy are as follows:

$$Spread = Strike\ of\ the\ OTM\ option - Strike\ of\ the\ ITM\ option$$
$$Net\ Credit = Premium\ of\ short\ option - 2 * Premium\ of\ long\ option$$
$$Maximum\ Profit = Unlimited$$
$$Maximum\ Loss = Spread - Net\ Credit$$
$$Lower\ Breakeven = Lower\ Strike + Net\ Credit$$
$$Upper\ Breakeven = Upper\ Strike + Maximum\ Loss$$

Stock Price at Expiration	Short 1 100 Call Profit/(Loss) at Expiration	Long 2 105 Calls Profit/(Loss) at Expiration	Net Profit/(Loss) at Expiration
113	-9.70	+13.00	3.30
112	-8.70	+11.00	2.30
111	-7.70	+9.00	1.30
110	-6.70	+7.00	0.30
109	-5.70	+5.00	-0.70
108	-4.70	+3.00	-1.70
107	-3.70	+1.00	-2.70
106	-2.70	-3.00	-3.70
105	-1.70	-3.00	-4.70
104	-0.70	-3.00	-3.70
103	+0.30	-3.00	-2.70
102	+1.30	-3.00	-1.70
101	+2.30	-3.00	-0.70
100	+3.30	-3.00	+0.30
99	+3.30	-3.00	+0.30
98	+3.30	-3.00	+0.30
97	+3.30	-3.00	+0.30

For our calculation:

$Spread = 105 - 100 = 5$

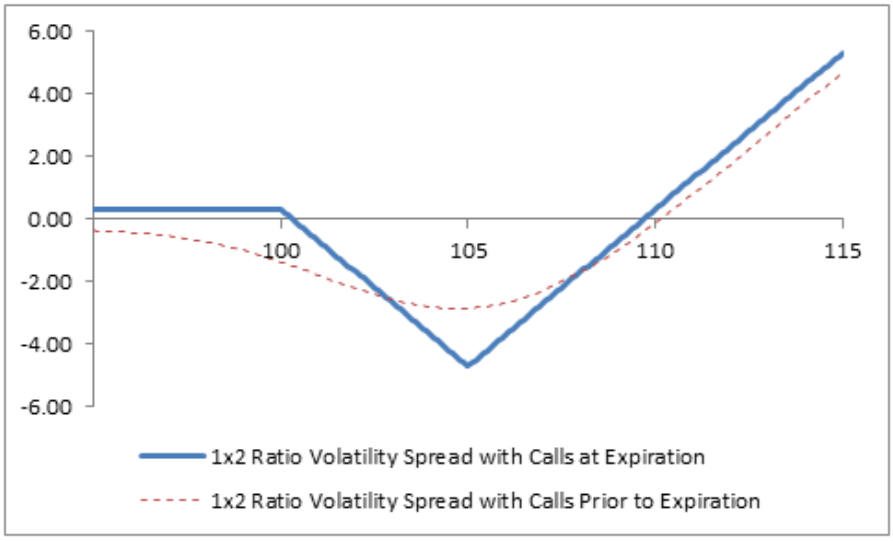
$Net\ Credit = 3.30 - 2 * 1.50 = 0.30$

$Maximum\ Profit = Unlimited$

$Maximum\ Loss = 5 - 0.30 = 4.70$

$Lower\ Breakeven = 100 + 0.30 = 100.30$

$Upper\ Breakeven = 105 + 4.70 = 109.70$



Option Greeks:

Delta:

The initial delta of bull call spread is positive. Delta increases as the stock price increases; thus, the strategy position has a positive gamma. As expiration approaches, the position delta approaches −1.00 if the short call is in the money and the long calls are out of the money. In this case, the delta of the short call approaches −1.00, and the deltas of the long calls approach zero. When the stock price is above the strike price of the long calls as expiration approaches, the position delta approaches +1.00. In this case, the delta of the short call approaches −1.00 and the deltas of the two long calls approach +1.00 each. The

position delta approaches zero as the stock price falls below the strike price of the short call, because the deltas of all calls approach zero.

Gamma:

Gamma is initially negligible or slightly negative when the underlying price is at or near the lower strike. It starts rising as the underlying price rises and moves away from the lower strike. This causes the Delta to turn positive and move higher. Gamma peaks out near the higher strike and starts tapering after that. As a result, once the underlying moves above the higher strike, Delta continues rising but at a slower rate as it approaches its upper extreme.

Vega:

Volatility is a measure of the fluctuation of the stock price. As volatility rises, option premiums tend to swell if all other factors remain constant. Long options, therefore, rise in price and make money when volatility rises, and short options rise in price and lose money when volatility rises. The opposite is observed when volatility falls. Long options lose money and short options make money.

The call back ratio spread has a net positive Vega, as it has two long calls and one short call. However, the impact of changing volatility (Vega) varies depending on the time to expiration and the relationship of the stock price to the strike prices.

The increase in volatility when there is ample time for the expiry increases the payoff of Call Ratio back spread. However, when there is less time to expiry, increase in volatility has a negative impact on the strategy. This is because as the volatility increases with few days left to expiry, the chances of the option to expire OTM increases, and hence premium decreases.

Theta:

The value of an option decreases as the expiration approaches, all other factors remaining constant. This is called time erosion. Theta measures how much time erosion affects the net price of the position. Long options have a negative theta, and short options have a positive theta. The Call Ratio Back Spread has a negative theta, because of the two long calls and one short call. However, the impact of time erosion varies depending on the relationship of the stock price.

When first established, assuming the stock price is at or above the strike price of the short call and there are 14 days or more to expiration, the net theta is negative, because the total negative theta of the two long calls is greater than the positive theta of the one short call. As a result, the position loses money from time decay. As expiration approaches, if the stock price is close to or above the strike price of the long calls (higher strike), then the net theta is negative. If the stock price is close to the strike price of the short call (lower strike), then the net theta tends to be positive. The net theta approaches zero if the stock price falls below the lower strike.

The main advantage of this strategy is that it makes a limited profit even if the market goes against you (moves down) and an unlimited profit if the market moves up. However, the strategy loses money if the price does not move in any direction. Thus, if the move of the underlying is expected in either direction, most probably in the upward direction, this strategy would be a perfect fit. However, the volatility must also be factored in. If the volatility is expected to decrease, this strategy might lose money and hence, might not be a good fit.

Advantages of the Strategy

- More often than not, this is a net credit strategy that requires no upfront payment
- This strategy can profit from a down move in price as well
- This strategy has an unlimited profit potential in case the underlying rallies sharply
- This strategy is subject to limited risk

Drawbacks of the Strategy

- Because this is a volatility-based strategy, stagnating underlying price can lead to losses
- Because this strategy involves selling an option, it will require a greater margin in your trading account

Bear Call Ladder:

Contrary to the name, the bear call ladder is actually a bullish strategy. This is an improvisation of the aforementioned Call Ratio Back Spread and can be implemented when the view on the market is out rightly bullish.

Strategy:

- Sell 1 ITM call option
- Buy 1 ATM call option
- Buy 1 OTM call option

Example of Bear Call Ladder

Sell 1 XYZ 7600 call at 247
Buy 1 XYZ 7800 call at 117
Buy 1 XYZ 7900 call at 70

Note that both the options belong to the same underlying, have same expiration date and are in the ratio 1: 1: 1 ($ITM\ (Sell)$: $ATM\ (Buy)$: $OTM(Buy)$).
This is a net credit strategy as writing an ITM option should finance the buying of ATM and OTM options

The calculations of the strategy are as follows:

$$Net\ Credit\ =\ Premium\ of\ ITM\ short\ -\ (Premium\ of\ ATM\ long + Premium\ of\ OTM\ long)$$

$$Maximum\ Loss = (Difference\ between\ ITM\ and\ ATM) - Net\ Credit$$

$$Lower\ Breakeven\ =\ Lower\ Strike\ +\ Net\ Credit$$

$$Upper\ Breakeven\ =\ Strike\ of\ ATM\ +\ Strike\ of\ OTM - Strike\ of\ ITM - Net\ Credit$$

Calculations

Market Expiry	LS_IV (ITM)	PR	Payoff	HS_IV (ATM)	PP	Payoff	HS_IV (OTM)	PP	Payoff	Net Payoff
7000	0	247	247	0	-117	-117	0	-70	-70	60
7100	0	247	247	0	-117	-117	0	-70	-70	60
7200	0	247	247	0	-117	-117	0	-70	-70	60
7300	0	247	247	0	-117	-117	0	-70	-70	60
7400	0	247	247	0	-117	-117	0	-70	-70	60
7500	0	247	247	0	-117	-117	0	-70	-70	60
7600	0	247	247	0	-117	-117	0	-70	-70	60
7700	100	247	147	0	-117	-117	0	-70	-70	-40
7800	200	247	47	0	-117	-117	0	-70	-70	-140
7900	300	247	-53	100	-117	-17	0	-70	-70	-140
8000	400	247	-153	200	-117	83	100	-70	30	-40
8100	500	247	-253	300	-117	183	200	-70	130	60
8200	600	247	-353	400	-117	283	300	-70	230	160
8300	700	247	-453	500	-117	383	400	-70	330	260
8400	800	247	-553	600	-117	483	500	-70	430	360
8500	900	247	-653	700	-117	583	600	-70	530	460
8600	1000	247	-753	800	-117	683	700	-70	630	560
8700	1100	247	-853	900	-117	783	800	-70	730	660

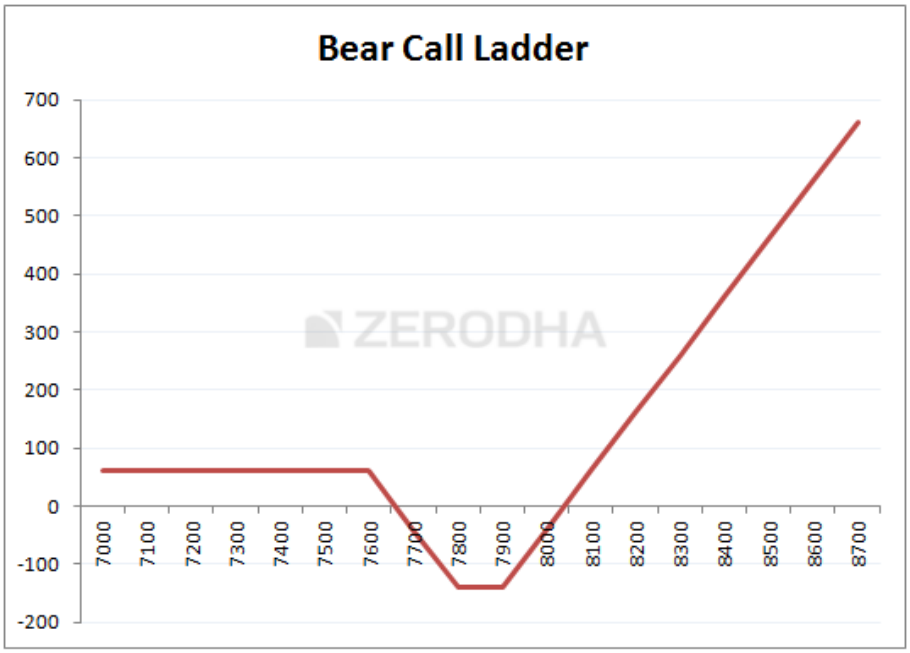
The calculation for this example is as follows:

$Net\ Credit \quad = 247 - (117 + 70) = 60$

$Maximum\ Loss = 200 - 60 = 140$

$Lower\ Breakeven \ = \ 7600 + \ 60 = 7660$

$Upper\ Breakeven \ = \ 7800 + 7900 - \ 7600 - 60 = \ 8040$



This strategy makes money (limited) when the price of the underlying decreases and makes unlimited profit when the price of the underlying increases. However, it loses money (risk is limited) when the underlying does not move in either direction.

Option Greeks:

Delta:

Because this is a bullish strategy at initiation, Delta is initially positive and thereby benefits the position when the underlying price rises, and vice versa. However, Delta turns negative as the underlying price continues rising and inches towards the strikes of the short Calls. As a result, rising underlying price eventually starts hurting the option position, and vice versa.

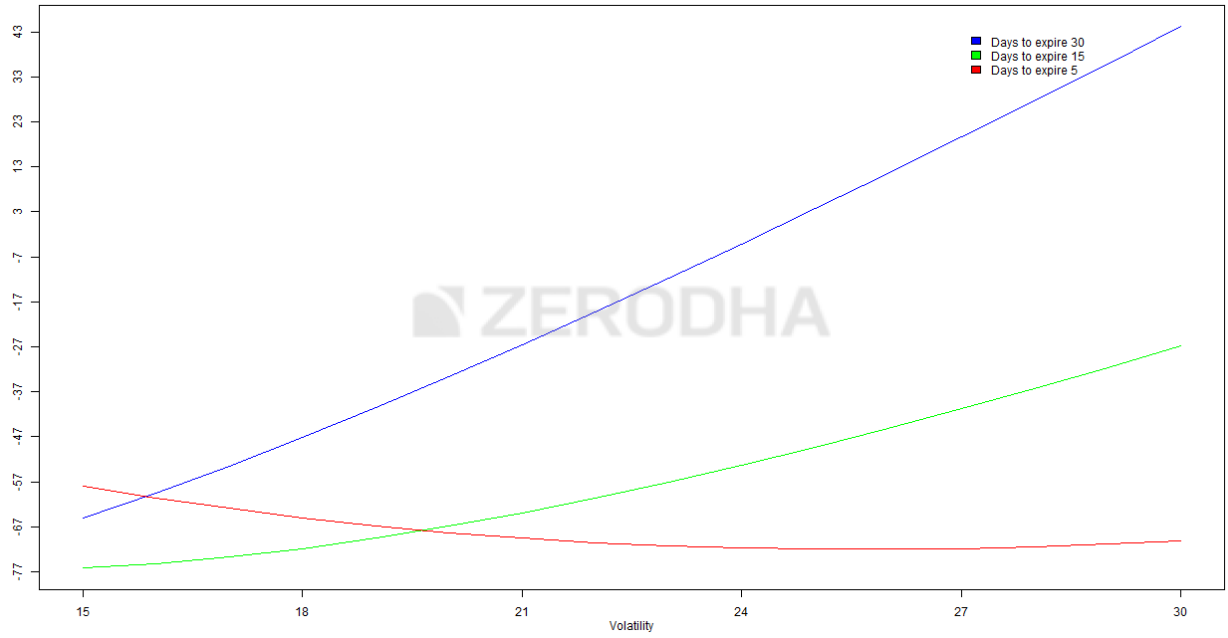
Gamma:

Gamma peaks out at the lower strike, lifting the Delta as the underlying price rises, and vice versa. It eventually turns negative as the underlying moves towards the middle strike, by which time rising prices start dragging the Delta into negative zone. Gamma bottoms out at the higher strike, dragging the Delta further into negative if the underlying price continues rises.

Vega:

The effect of Vega on this strategy is dependent on the time left till expiration of the option.

If the option has ample time to expiry (> 5-6 days) then the increase in Vega benefits the option strategy with the maximum increase seen when there is the most amount of time to expiry. However, when the time period is less (fewer days to expire) increase in Vega negatively affects the strategy as increased Vega increases the chances of the option to expiry OTM.



Theta:

When the underlying price is below the lower breakeven point or above the upper breakeven point, Theta is positive, because of which time decay benefits the position. On the other hand, when the underlying price is in between the two breakeven points, Theta is negative, because of which time decay hurts the position.

Advantages of the Strategy:

- Highly lucrative risk reward ratio as the risk is limited while the profit is unlimited
- The strategy makes money even when the market moves in the opposite direction

Disadvantage:

- Loss when the market remains constant
- Sometimes, even though the market moves in the expected direction, the strategy might not make money as the move might not be enough to cross the breakeven.

Synthetic Call:

This strategy employs synthetic call, arbitrage and Put Call Parity which are defined below, followed by the actual strategy.

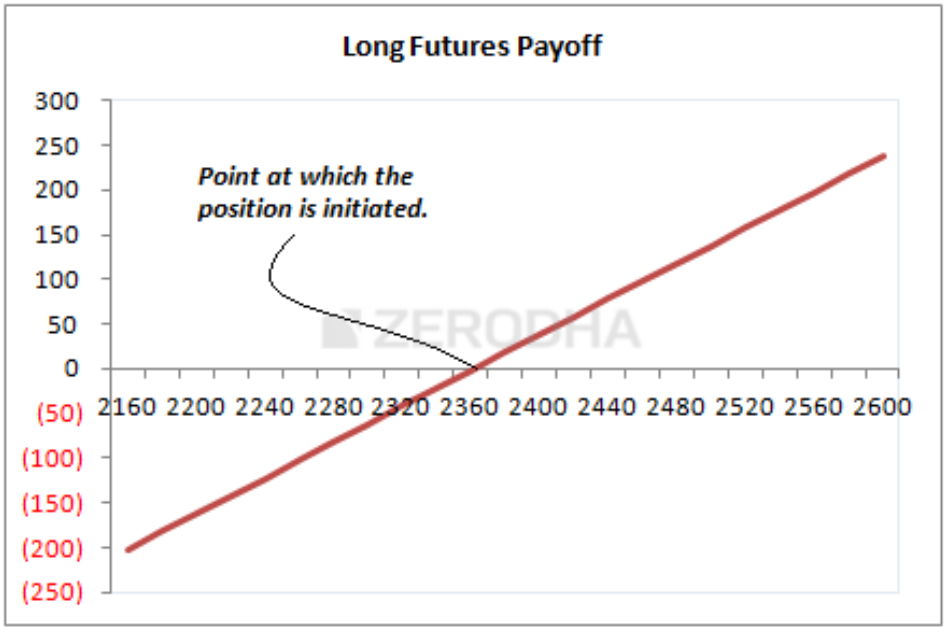
Synthetic Long:

A Synthetic Long is used to build a position whose payoff is similar to that of going long on futures. This can be executed as follows:

- Buy the ATM call option
- Sell the ATM put option.

(Make sure that the options belong to the same underlying and belongs to the same expiry)

When we plot the net payoff, we realize that the payoff structure is similar to long call futures.



Arbitrage:

Arbitrage is an opportunity to buy goods/asset in a cheaper market and sell the same in expensive markets and pocket the difference in prices. Such opportunities also occur in the stock market and the Put Call Parity allows us to identify them.

Put Call Parity:

Put-call parity states that simultaneously holding a short European put and long European call of the same class will deliver the same return as holding one forward contract on the same underlying asset, with the same expiration, and a forward price equal to the option's strike price.
This can be represented as:

$$P - C + S = exp\big(-r(T-t)\big)K$$

Proof of put and call parity: Arbitrage reasoning
Let us explain the formula for put & call parity using the arbitrage arguments. Whatever the put and call options prices (with the same expiry dates and the same strike prices) are, if we are buying a put now (at time t), suppose we decide also to sell a call and buy a share of stock. It costs $P_t - C_t + S_t$ which turns out to be positive, - remember that S is much greater than C and P. To finance this operation, we borrow the amount $P_t - C_t + S_t$ in the bank. Since both options are **European**, we wait till July (expiry date) keeping the share of stock as well: this is our **portfolio = the set of all financial securities** which we have at the moment. Let us look at the P&L plot for this portfolio **at expiry**. Our P&L is positive and *constant*, it is equal to K:

$$P_T - C_T + S_T = K$$

We can check it using the definitions of payoff functions:

$$P_T - C_T + S_T = (K - S_T)_+ - (S_T - K)_+ + S_T \equiv K$$

Indeed, if $S_T > K$ then the value$(K - S_T)_+ - (S_T - K)_+ + S_T$ equals to

$$0 - (S_T - K) + S_T = K$$

If $S_T \leq K$ then it equals to

$$(K - S_T) - 0 + S_T = K$$

So, our profit is **deterministic, not random**. Hence, it must be exactly the same as if it were invested into a bank account with the interest rate r, that is,

$$K = ex\,p\big(r(T-t)\big)\,(P_t - C_t + S_t)$$

Otherwise, an **arbitrage opportunity** would arise. So, we come to the **put and call parity formula:**

$$P - C + S = exp\big(-r(T-t)\big)K$$

Arbitrage Opportunity in the Stock Market:

Based on the Put Call Parity we can say that:

$Long\ ATM\ Call\ +\ Short\ ATM\ Put\ +\ Short\ Futures\ =\ 0$

$Short\ ATM\ Call\ +\ Long\ ATM\ Put\ +\ Long\ Futures\ =\ 0$

This means that any given time, the profit and loss calculated on the above combination of options should amount to 0. If it does not amount to 0, then it is an arbitrage opportunity.

Example of Arbitrage

Buy XYZ 7300 CE at 79.5

Sell XYZ 7300 PE at 73.85

Sell XYZ futures at 7316

For this example, we calculate the payoff at different prices of expiry as follows:

Market Expiry	CE_IV (ATM)	PP	Payoff	PE_IV (OTM)	PP	Payoff	Fut Payoff	Net Payoff
6700	0	79.5	-79.5	600	73.85	-526.15	616	10.35
6800	0	79.5	-79.5	500	73.85	-426.15	516	10.35
6900	0	79.5	-79.5	400	73.85	-326.15	416	10.35
7000	0	79.5	-79.5	300	73.85	-226.15	316	10.35
7100	0	79.5	-79.5	200	73.85	-126.15	216	10.35
7200	0	79.5	-79.5	100	73.85	-26.15	116	10.35
7300	0	79.5	-79.5	0	73.85	73.85	16	10.35
7400	100	79.5	20.5	0	73.85	73.85	-84	10.35
7500	200	79.5	120.5	0	73.85	73.85	-184	10.35
7600	300	79.5	220.5	0	73.85	73.85	-284	10.35
7700	400	79.5	320.5	0	73.85	73.85	-384	10.35
7800	500	79.5	420.5	0	73.85	73.85	-484	10.35
7900	600	79.5	520.5	0	73.85	73.85	-584	10.35
8000	700	79.5	620.5	0	73.85	73.85	-684	10.35
8100	800	79.5	720.5	0	73.85	73.85	-784	10.35
8200	900	79.5	820.5	0	73.85	73.85	-884	10.35
8300	1000	79.5	920.5	0	73.85	73.85	-984	10.35
8400	1100	79.5	1020.5	0	73.85	73.85	-1084	10.35

ZERODHA

We observe that the value is same for all prices of expiry and thus, if we find a stock market arbitrage opportunity, it will always yield profit. Ensure that the profit is good enough to cover the brokerage and taxes.

Bearish Strategies

A bearish strategy is a strategy implemented when the view on the market is bearish, that is, when we expect the price of the underlying to increase. These strategies have a positive delta. However, the strategy is not only dependent on delta but also on volatility (Vega), time till expiration (Theta), etc. Here, we state the various bearish strategies, compute the results of the strategy for an example, and analyse the strategies and effects of the Option Greeks on the strategies.

Bear Put Spread:

The Bear Put Spread is a two-leg spread strategy traditionally involving ITM and OTM Put options invoked when the view on the market is 'moderately bearish'.

Strategy:

- Buy an ITM Put Option
- Sell an OTM Put Option

Example of bear put spread	
Buy 1 XYZ 100 put at	-3.20
Sell 1 XYZ 95 put at	1.30

Note that both the options belong to the same underlying, have same expiration date and are in the same ratio (1:1).

This is a net debit strategy as initially we need to put money into the strategy (ATM option is costlier than OTM option). Both the maximum loss and gain are capped as can be seen from the below calculations.

The calculations are as follows:

$$Spread = Strike\ Price\ of\ Long\ Put - Strike\ Price\ of\ Short\ Put$$

$$Net\ Debit = Maximum\ Loss$$

$$= Premium\ of\ Long\ Put - Premium\ of\ Short\ Put$$

$$Maximum\ Profit = Spread - Net\ Debit$$

$$Break - even\ point = Strike\ Price\ of\ Long\ Call + Net\ Debit$$

$$(Point\ of\ zero\ payoff)$$

Stock Price at Expiration	Long 100 Put Profit/(Loss) at Expiration	Short 95 Put Profit/(Loss) at Expiration	Bear Put Spread Profit/(Loss) at Expiration
104	(3.20)	+1.30	(1.90)
103	(3.20)	+1.30	(1.90)
102	(3.20)	+1.30	(1.90)
101	(3.20)	+1.30	(1.90)
100	(3.20)	+1.30	(1.90)
99	(2.20)	+1.30	(0.90)
98	(1.20)	+1.30	+0.10
97	(0.20)	+1.30	+1.10
96	+0.80	+1.30	+2.10
95	+1.80	+1.30	+3.10
94	+2.80	+0.30	+3.10
93	+3.80	(0.70)	+3.10
92	+4.80	(1.70)	+3.10

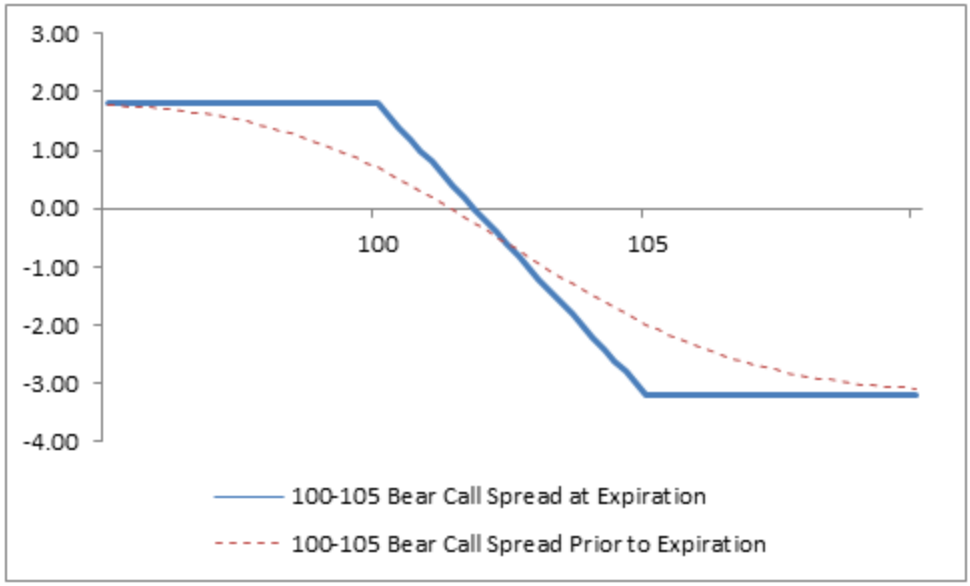
The calculations for the example are as follows:

$Spread = 105 - 100 = 5$

$Net\ Debit = 3.30 - 1.50 = 1.80$

$Maximum\ Profit = 5 - 1.80 = 3.2$

$Break - even\ point = 100 + 1.80 = 101.80$

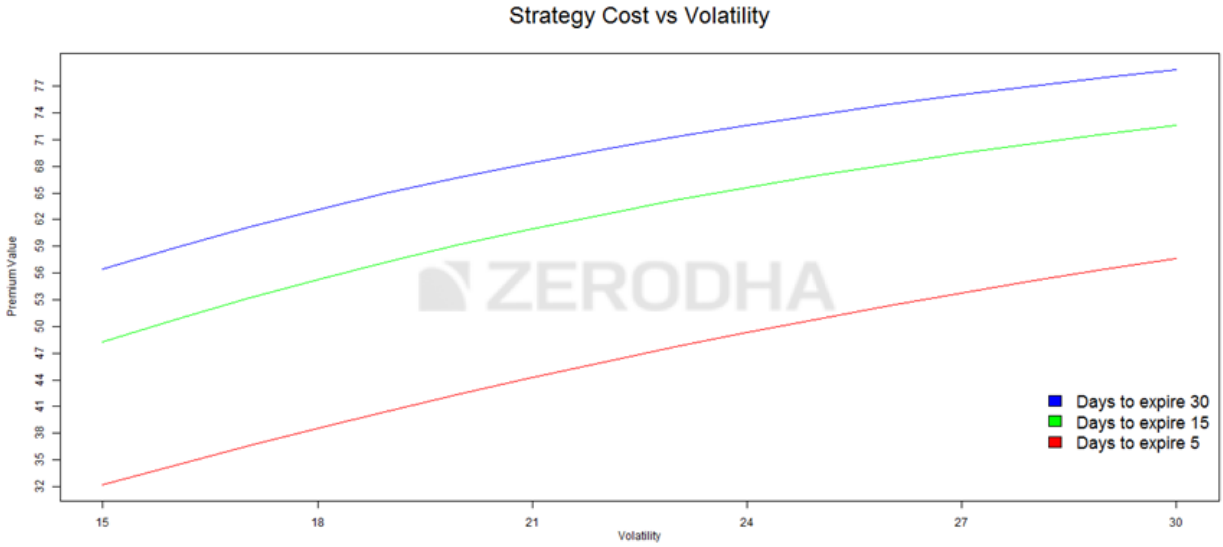


Option Greeks:

Delta and Gamma:
A bear put spread benefits when the underlying price falls and is hurt when it rises. This means that the position has a "net negative delta." Also, because a bear call spread consists of one short call and one long call, the net delta changes very little as the stock price changes and time to expiration is unchanged. In the language of options, this is a "near-zero gamma."

Vega:
Since a bear put spread consists of one short put and one long put, the price of a bear put spread changes very little when volatility changes and other factors remain constant. In the language of options, this is a "near-zero Vega."
Thus, when there is ample time to expiry, the bear call spread cost doesn't vary much with volatility. If around 15 days is left the effect of volatility is a bit more noticeable. However, the increase in Vega when there are only a few days left till expiry benefits the Bull Put Spread as it increases the chances the stock

expires OTM.



Theta:

The time value portion of an option's total price decreases as expiration approaches. This is known as time erosion, or time decay. Since a bear put spread consists of one long put and one short put, the sensitivity to time erosion depends on the relationship of the stock price to the strike prices of the spread. If the stock price is "close to" or above the strike price of the long put (higher strike price), then the price of the bear put spread decreases with passing of time (and loses money). This happens because the long put is closest to the money and decreases in value faster than the short put. However, if the stock price is "close to" or below the strike price of the short put (lower strike price), then the price of the bear put spread increases with passing time (and makes money). This happens because the short put is now closer to the money and decreases in value faster than the long put. If the stock price is half-way between the strike prices, then time erosion has little effect on the price of a bear put spread, because both the long put and the short put decay at approximately the same rate.

Strike selection is very similar to that of bull call spread

Advantages of the Strategy:

- Cost of strategy is less compared to the naked put option. Low cost also implies lower risk.
- The strategy has a lower breakeven point, which means that to become profitable, the underlying price will not have to fall as much as it would have to in case of a naked long call.

Drawbacks:

- Limited profit potential as maximum profit is fixed.

Bear Call Spread:

The Bear Call Spread is a two-leg spread strategy traditionally involving ITM and OTM Call options invoked when the view on the market is 'moderately bearish'.

Strategy:

- Buy an OTM Call Option
- Sell an ITM Call Option

Example of bear call spread	
Sell 1 XYZ 100 call at	3.30
Buy 1 XYZ 105 call at	-1.50
Net credit =	1.80

Note that both the options belong to the same underlying, have same expiration date and are in the same ratio (1:1).

This is a net credit strategy as initially, the cost of buying OTM Put option is less than the premium received by selling an ITM option. Like bear put spread, both the profit and loss are capped.

The calculations are as follows:

$$Spread = Strike\ Price\ of\ Long\ Call - Strike\ Price\ of\ Short\ Call$$

$$Net\ Credit = Maximum\ Profit$$

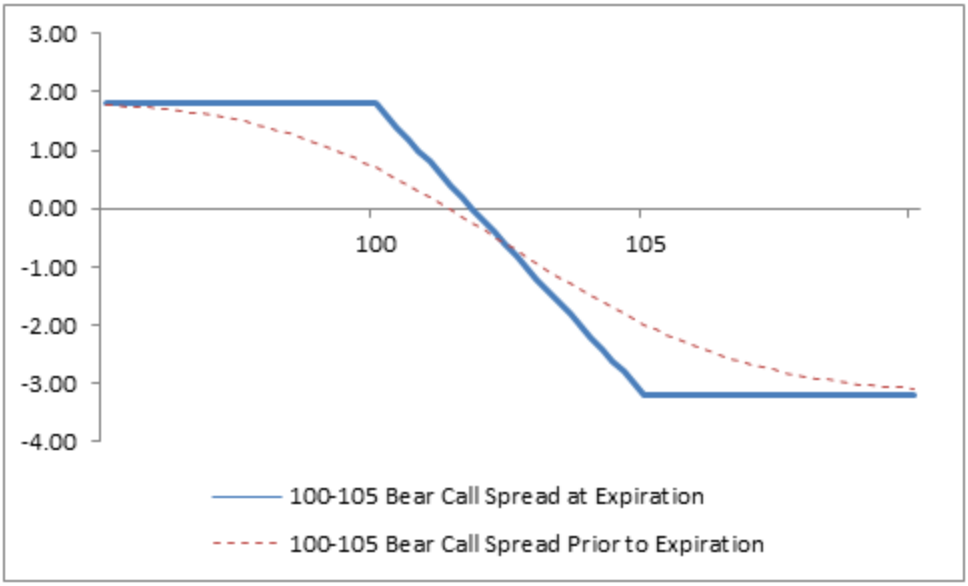
$$= Premium\ of\ Short\ Call - Premium\ of\ Long\ Call$$

$$Maximum\ Loss = Spread - Initial\ Profit$$

$$Break-even\ point\ (Point\ of\ zero\ payoff)$$

$$= Strike\ Price\ of\ Short\ Call + Net\ Credit$$

Stock Price at Expiration	Short 100 Call Profit/(Loss) at Expiration	Long 105 Call Profit/(Loss) at Expiration	Bear Call Spread Profit/(Loss) at Expiration
108	(4.70)	+1.50	(3.20)
107	(3.70)	+0.50	(3.20)
106	(2.70)	(0.50)	(3.20)
105	(1.70)	(1.50)	(3.20)
104	(0.70)	(1.50)	(2.20)
103	+0.30	(1.50)	(1.20)
102	+1.30	(1.50)	(0.20)
101	+2.30	(1.50)	+0.80
100	+3.30	(1.50)	+1.80
99	+3.30	(1.50)	+1.80
98	+3.30	(1.50)	+1.80
97	+3.30	(1.50)	+1.80
96	+3.30	(1.50)	+1.80



Option Greeks:

Delta and Gamma:
A bear call spread benefits when the underlying price falls and is hurt when it rises. This means that the position has a "net negative delta." Because a bear call spread consists of one short call and one long call, the net delta changes very little as the stock price changes and time to expiration is unchanged. In the language of options, this is a "near-zero gamma."

Vega:
Since a bear call spread consists of one short call and one long call, the price of a bear call spread changes very little when volatility changes and other factors remain constant. In the language of options, this is a "near-zero Vega."
Thus, when there is ample time to expiry, the bear call spread cost doesn't vary much with volatility. If around 15 days is left the effect of volatility is a bit more noticeable. However, the increase in Vega when there are only a few days left till expiry benefits the Bull Put Spread as it increases the chances the stock expires OTM.

Theta:

The time value portion of an option's total price decreases as expiration approaches. This is known as time erosion. Since a bear call spread consists of one short call and one long call, the sensitivity to time erosion depends on the relationship of the stock price to the strike prices of the spread. If the stock price is "close to" or below the strike price of the short call (lower strike price), then the price of the bear call spread decreases (and makes money) with passing of time. This happens because the short call is closest to the money and erodes faster than the long call. However, if the stock price is "close to" or above the strike price of the long call (higher strike price), then the price of the bear call spread increases (and loses money) with passing time. This happens because the long call is now closer to the money and erodes faster than the short call. If the stock price is half-way between the strike prices, then time erosion has little effect on the price of a bear call spread, because both the short call and the long call erode at approximately the same rate.

Strike selection is very similar to that of bull call spread

Benefits compared to naked call option:

- Cost of strategy is less compared to the naked call option. Low cost also implies lower risk.
- The strategy has a lower breakeven point, which means that to become profitable, the underlying price will not have to fall as much as it would have to in case of a naked long call.

Drawbacks:

- Limited profit potential as maximum profit is fixed.

Bull Put Ladder:

The bull put ladder is a bearish strategy very similar to the bear call ladder. It is an extension of Bull Put Spread but has 3 legs rather than 2.

Strategy:

- Sell ATM put option
- Buy OTM middle strike option
- Buy OTM lower strike option

Note that the options belong to the same underlying, have same expiration date and are in the same ratio (1:1:1).

This might be a net credit strategy (mostly, might vary depending on the strikes chosen.).

The calculations are as follows:

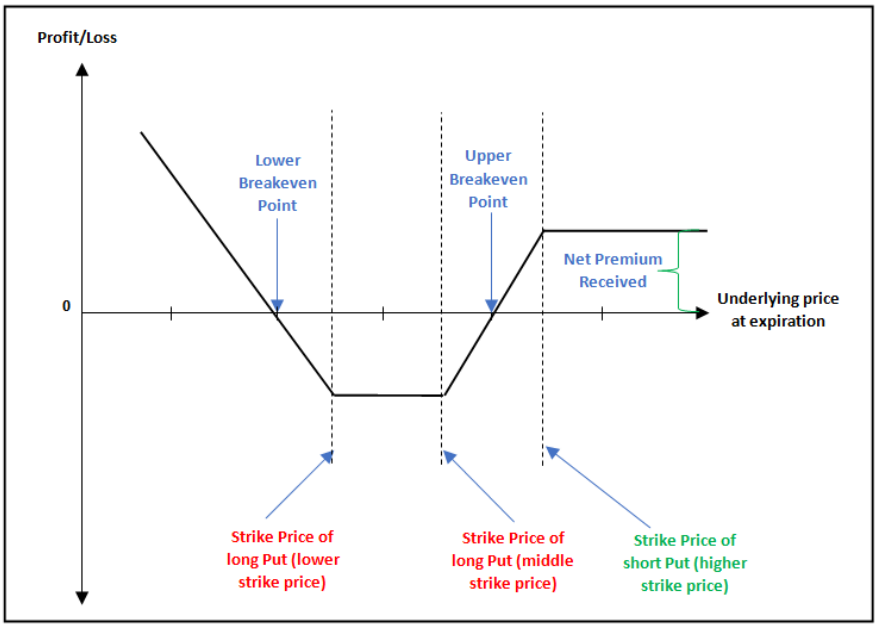
Net Credit = Premium of ATM put option - (Premium of middle OTM strike + Premium of Lower OTM strike)

Upper Breakeven Point = Strike of ATM Put – Net Credit

Lower Breakeven Point = Strike of Lower OTM Put + Strike of Middle OTM Put – Strike of ATM Put + Net Credit

Maximum Profit = Unlimited

Maximum Loss = Strike of ATM – Strike of middle OTM – Net Credit



Example of Bull Put Ladder:

- Strike price of Short Put = 20000
- Strike price of Middle Long Put = 19000
- Strike price of Lower Long Put = 18500
- Short Put premium (higher strike) = ₹1,500
- Long Put premium (middle strike) = ₹700
- Long Put premium (lower strike) = ₹600
- Net Credit = ₹200 (1500 - 700 - 600)
- Net Credit (in value terms) = ₹4,000 (200 * 20)
- Upper breakeven point = 19800 (20000 - 200)
- Lower breakeven point = 17700 (18500 + 19000 - 20000 + 200)
- Maximum upside reward = ₹4,000
- Maximum downside reward = unlimited
- Maximum risk = ₹16,000 ((20000 - 19000 - 200) * 20)

Underlying price at Expiration	**Net Profit/Loss**	**Notes**
25000	**Profit of ₹4,000**	Payoff = [1500-maximum of (20000-25000,0)]+[maximum of (19000-25000,0)-700] + [maximum of (18500-25000,0)-600]. As the underlying price at expiration is above the upper breakeven price, the trader will make a profit
22000	**Profit of ₹4,000**	Payoff = [1500-maximum of (20000-22000,0)]+[maximum of (19000-22000,0)-700] + [maximum of (18500-22000,0)-600]. As the underlying price at expiration is above the upper breakeven price, the trader will make a profit
20000	**Profit of ₹4,000**	Payoff = [1500-maximum of (20000-20000,0)]+[maximum of (19000-20000,0)-700] + [maximum of (18500-20000,0)-600]. As the

		underlying price at expiration is above the upper breakeven price, the trader will make a profit
19900	**Profit of ₹2,000**	Payoff = [1500-maximum of (20000-19900,0)]+[maximum of (19000-19900,0)-700] + [maximum of (18500-19900,0)-600]. As the underlying price at expiration is above the upper breakeven price, the trader will make a profit
19800	**No profit, No loss**	Payoff = [1500-maximum of (20000-19800,0)]+[maximum of (19000-19800,0)-700] + [maximum of (18500-19800,0)-600]. As the underlying price at expiration is equal to the upper breakeven price, the trader will neither make a profit nor incur a loss
19500	**Loss of ₹6,000**	Payoff = [1500-maximum of (20000-19500,0)]+[maximum of (19000-19500,0)-700] + [maximum of (18500-19500,0)-600]. As the underlying price at expiration is below the upper breakeven price, the trader will incur a loss
19000	**Loss of ₹16,000**	Payoff = [1500-maximum of (20000-19000,0)]+[maximum of (19000-19000,0)-700] + [maximum of (18500-19000,0)-600]. As the underlying price at expiration is below the upper breakeven price, the trader will incur a loss
18500	**Loss of ₹16,000**	Payoff = [1500-maximum of (20000-18500,0)]+[maximum of (19000-18500,0)-700] + [maximum of (18500-18500,0)-600]. As the underlying price at expiration is below the upper breakeven price, the trader will incur a loss
18000	**Loss of ₹6,000**	Payoff = [1500-maximum of (20000-18000,0)]+[maximum of (19000-18000,0)-700] + [maximum of (18500-18000,0)-600]. As the underlying price at expiration is below the upper breakeven price, the trader will incur a loss
17700	**No profit, No loss**	Payoff = [1500-maximum of (20000-17700,0)]+[maximum of (19000-17700,0)-700] +

		[maximum of (18500-17700,0)-600]. As the underlying price at expiration is equal to the lower breakeven price, the trader will neither make a profit nor incur a loss
17000	**Profit of ₹14,000**	Payoff = [1500-maximum of (20000-17000,0)]+[maximum of (19000-17000,0)-700] + [maximum of (18500-17000,0)-600]. As the underlying price at expiration is below the lower breakeven price, the trader will make a profit
16000	**Profit of ₹34,000**	Payoff = [1500-maximum of (20000-16000,0)]+[maximum of (19000-16000,0)-700] + [maximum of (18500-16000,0)-600]. As the underlying price at expiration is below the lower breakeven price, the trader will make a profit
15000	**Profit of ₹54,000**	Payoff = [1500-maximum of (20000-15000,0)]+[maximum of (19000-15000,0)-700] + [maximum of (18500-15000,0)-600]. As the underlying price at expiration is below the lower breakeven price, the trader will make a profit

Option Greeks:

Delta:

Because this strategy is neutral to bullish at initiation, Delta initially is positive and hence benefits the position when the underlying price rises, and vice versa. However, Delta turns negative when the underlying price drops and inches towards the strikes of the long Puts. When this happens, falling prices start benefiting the option position.

Gamma:

Gamma is slightly negative at initiation but bottoms out at the higher strike, causing the Delta to become more positive when the underlying price falls. However, if the price fall continues, Gamma turns positive, causing the Delta to eventually move into the negative zone. Gamma peaks out at the lower strike,

causing the Delta to become more negative if the underlying price continues dropping.

Vega:
When the underlying price is below the lower breakeven point or above the upper breakeven point, Vega is positive and hence, rising volatility is helpful to the position, and vice versa. On the other hand, when the underlying price is between the two breakeven points, Vega is negative and hence, rising volatility hurts the position, and vice versa.

Theta:
When the underlying price is below the lower breakeven point or above the upper breakeven point, Theta is negative because of which time decay hurts the position. On the other hand, when the underlying price is between the two breakeven points, Theta is positive because of which time decay benefits the position.

Benefits of the Strategy

- Potential for unlimited profit if the underlying price rises sharply
- Potential to retain the net premium received if the underlying price stays below the lower strike

Drawbacks of the Strategy

- If the underlying price stays between the two breakeven points, the trader will suffer a loss
- Sometimes, the strategy could be a net debit strategy

Put Ratio Back spread

The Pull ratio back spread is very similar to call ratio back spread except that the strategy is executed when the view on the market is bearish. The Put Ratio Back Spread is a 3-leg option strategy as it involves **buying two OTM** Put options and **selling one ITM** Put option. This is the classic 2:1 combo.

Strategy:

- Sell one ITM put option
- But two OTM put options

Example of Put Ratio Back spread

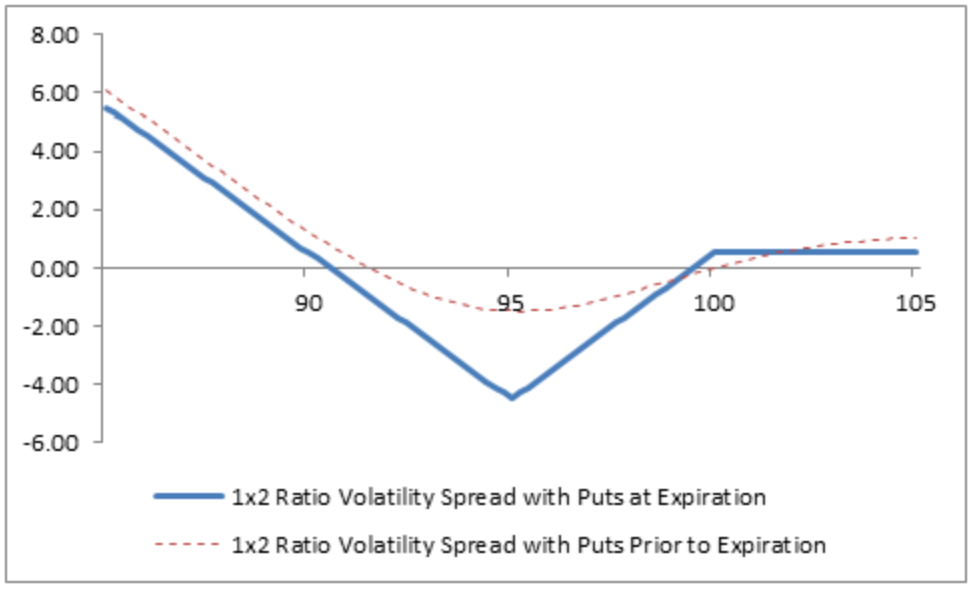
Sell 1 XYZ 100 put at 3.50

Buy 2 XYZ 95 puts at 1.50 each

Note that the options belong to the same underlying, have same expiration date and are in the same ratio (1:2).

Usually this is a net credit strategy, where the selling of the ITM put option finances the buying of the two OTM put options.

The graph of the strategy looks as follows:



Stock Price at Expiration	Short 1 100 Put Profit/(Loss) at Expiration	Long 2 95 Puts Profit/(Loss) at Expiration	Net Profit/(Loss) at Expiration
103	+3.50	(3.00)	+0.50
102	+3.50	(3.00)	+0.50
101	+3.50	(3.00)	+0.50
100	+3.50	(3.00)	+0.50
99	+2.50	(3.00)	(0.50)
98	+1.50	(3.00)	(1.50)
97	+0.50	(3.00)	(2.50)
96	(0.50)	(3.00)	(3.50)
95	(1.50)	(3.00)	(4.50)
94	(2.50)	(1.00)	(3.50)
93	(3.50)	+1.00	(2.50)
92	(4.50)	+3.00	(1.50)
91	(5.50)	+5.00	(0.50)
90	(6.50)	+7.00	+0.50
89	(7.50)	+9.00	+1.50
88	(8.50)	+11.00	+2.50
87	(9.50)	+13.00	+3.50

The calculations are as follows:

$$Spread = Higher\ Strike - Lower\ Strike$$
$$Credit = Premium\ of\ ITM\ option - 2 * Premium\ of\ ATM\ option$$
$$Maximum\ Loss = Spread - Net\ Credit$$
$$Maximum\ Profit = Unlimited$$
$$Lower\ Breakeven\ Point = Lower\ Strike - Maximum\ Loss$$
$$Upper\ Breakeven\ Point = Lower\ Strike + Maximum\ Loss$$

A Pull Ratio Back Spread with puts is the same as selling a bull put spread and simultaneously buying a put with the same strike price as the long put in the bull put spread. The net premium received from the bull put spread is used to at least partially pay for the long put. The position profits if the underlying stock falls sharply beyond the strike price of the long puts.

Option Greeks:

Delta:

Long puts have negative deltas, and short puts have positive deltas. The net delta of a pull ratio back spread varies from −1.00 to +1.00, depending on the relationship of the stock price to the strike prices of the options. When established, the initial delta of a pull ratio back spread is negative. Furthermore, the delta falls (gets more negative) as the stock price falls and rises (gets less negative) as the stock price rises. In the language of options, this is known as a "positive gamma."

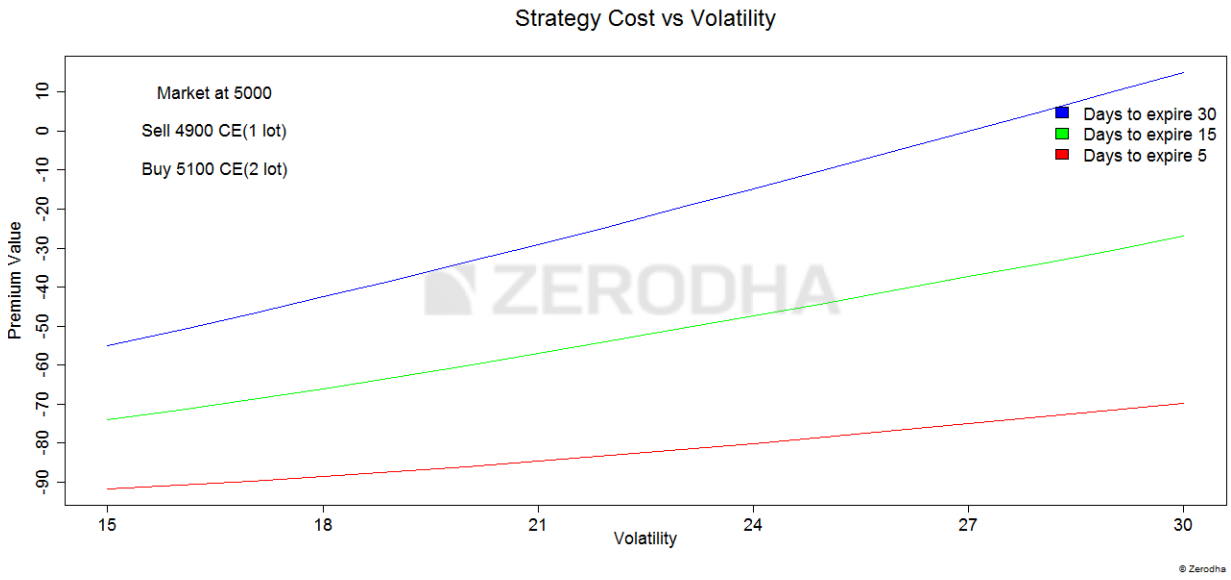
As expiration approaches, the position delta approaches +1.00 if the short put is in the money and the long puts are out of the money. In this case, the delta of the short put approaches +1.00, and the deltas of the long puts approach zero. When the stock price is below the strike price of the long puts as expiration approaches, the position delta approaches −1.00, because the delta of the short put approaches +1.00 and the deltas of the two long puts approach −1.00 each. The position delta approaches zero as the stock price rises above the strike price of the short put, because the deltas of all puts approach zero.

Gamma:

Gamma is initially negligible or slightly negative when the underlying price is at or near the lower strike. It starts rising as the underlying price rises and moves away from the lower strike. This causes the Delta to turn positive and move higher. Gamma peaks out near the higher strike and starts tapering after that. As a result, once the underlying moves above the higher strike, Delta continues rising but at a slower rate as it approaches its upper extreme.

Vega:

In general a pull ratio back spread has a net positive Vega, because the position has two long puts and one short put. However, the impact of changing volatility, i.e., the net Vega, varies depending on the relationship of the stock price to the strike prices and on the time to expiration. When first established, assuming the stock price is close to the strike price of the short put and there are 28 days or more to expiration, the net Vega is positive, because the total positive Vega of the two long puts is greater than the negative Vega of the one short put. As expiration approaches, if the stock price is close to or below the strike price of the long puts (lower strike), then the net Vega is positive. If the stock price is close to the strike price of the short put (higher strike), then the net Vega tends to be negative. The net Vega approaches zero if the stock price rises above the higher strike.



Theta:

In general pull ratio back spread has a net negative theta, because the position has two long puts and one short put. However, the impact of time erosion varies depending on the relationship of the stock price to the strike prices and on the time to expiration. When first established, assuming the stock price is close to the strike price of the short put and there are 14 days or more to expiration, the net theta is negative, because the total negative theta of the two long puts is greater than the positive theta of the one short put. As a result, the position loses money from time decay. As expiration approaches, if the stock price is close to or below the strike price of the long puts (lower strike), then the net theta is negative. If the stock price is close to the strike price of the short put (higher strike), then the net theta tends to be positive. The net theta approaches zero if the stock price rises above the higher strike.

Benefits of the Strategy

- More often than not, this is a net credit strategy that requires no upfront payment
- This strategy can profit from a down move in price as well
- This strategy has an unlimited profit potential in case the underlying rallies sharply
- This strategy is subject to limited risk

Drawbacks of the Strategy

- Because this is a volatility-based strategy, stagnating underlying price can lead to losses
- Because this strategy involves selling an option, it will require a greater margin in your trading account

Neutral Strategies:

Neutral Strategies are the strategies which make money irrespective of whether the market goes up or down, that is, these strategies make money based on the movement of the market rather than the direction. These strategies make money based on the various factors such as volatility, time decay, great moves in prices of underlying etc.

Long Straddle:

A long straddle is a neutral strategy to profit from a big price change, either up or down in the underlying stock.

Strategy:

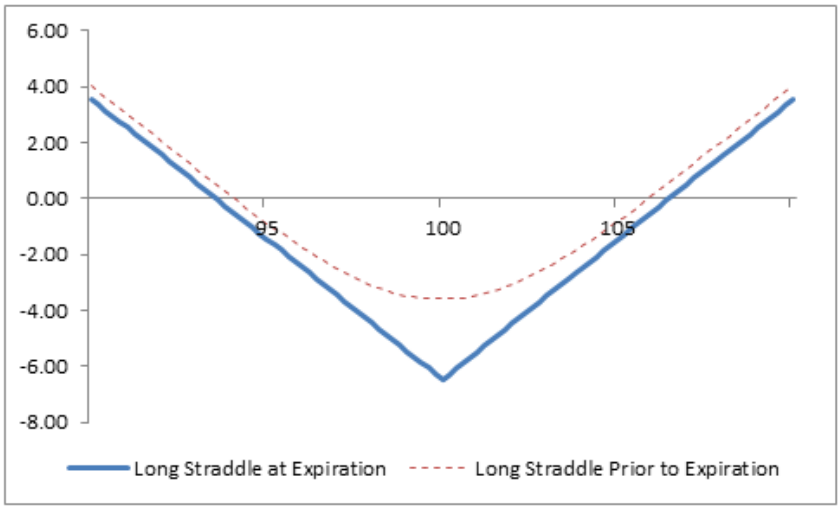
- Buy an ATM call option
- Buy an ATM put option

Example of long straddle	
Buy 1 XYZ 100 call at	-3.30
Buy 1 XYZ 100 put at	-3.20

Note that the options belong to the same underlying, have same expiration date, have the same strike price and are in the same ratio (1:1).

The calculations are as follows:

$$Net\ Premium = Net\ Debit$$
$$= Premium\ of\ Call\ Option + Premium\ of\ Put\ Option$$
$$Maximum\ Loss = Net\ Premium\ Paid$$
$$Maximum\ Profit = Unlimited$$
$$Upper\ Breakeven = Strike\ Price + Net\ Premium$$
$$Lower\ Breakeven = Strike\ Price - Net\ Premium$$



Stock Price at Expiration	Long 100 Call Profit/(Loss) at Expiration	Long 100 Put Profit/(Loss) at Expiration	Long Straddle Profit / (Loss) at Expiration
110	+6.70	(3.20)	+3.50
109	+5.70	(3.20)	+2.50
108	+4.70	(3.20)	+1.50
107	+3.70	(3.20)	+0.50
106	+2.70	(3.20)	(0.50)
105	+1.70	(3.20)	(1.50)
104	+0.70	(3.20)	(2.50)
103	(0.30)	(3.20)	(3.50)
102	(1.30)	(3.20)	(4.50)
101	(2.30)	(3.20)	(5.50)
100	(3.30)	(3.20)	(6.50)
99	(3.30)	(2.20)	(5.50)
98	(3.30)	(1.20)	(4.50)
97	(3.30)	(0.20)	(3.50)
96	(3.30)	+0.80	(2.50)
95	(3.30)	+1.80	(1.50)
94	(3.30)	+2.80	(0.50)
93	(3.30)	+3.80	+0.50

92	(3.30)	+4.80	+1.50
91	(3.30)	+5.80	+2.50
90	(3.30)	+6.80	+3.50

A long straddle is established for a net debit (or net cost) and profits if the underlying stock rises above the upper break-even point or falls below the lower break-even point. Profit potential is unlimited on the upside and substantial on the downside. Potential loss is limited to the total cost of the straddle.

Option Greeks:

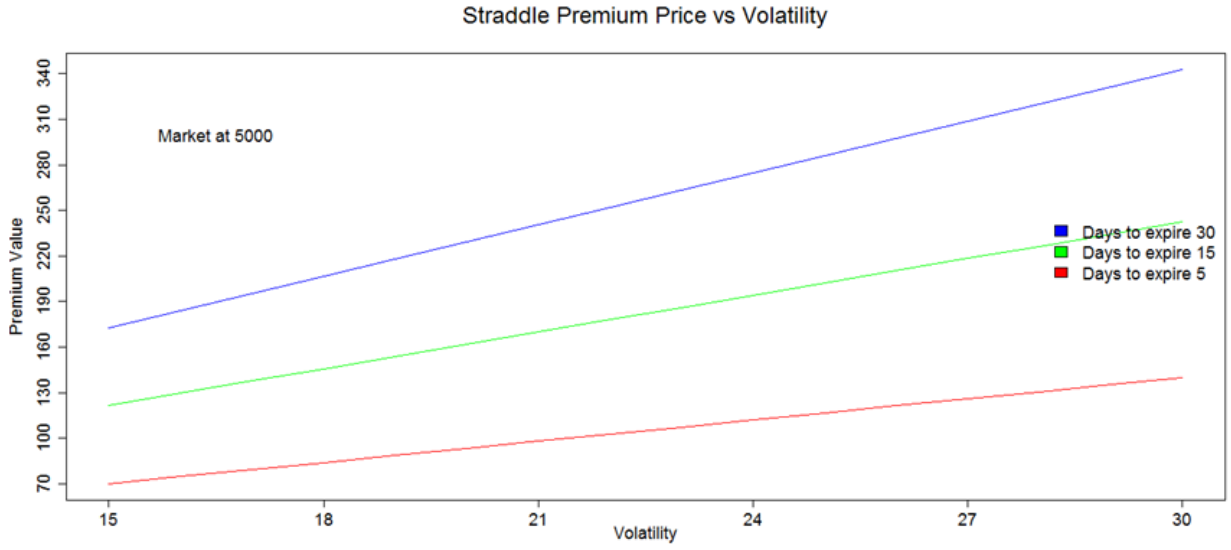
Delta and Gamma:

When the stock price is at or near the strike price of the straddle, the positive delta of the call and negative delta of the put very nearly offset each other. Thus, for small changes in stock price near the strike price, the price of a straddle does not change very much. This means that a straddle has a "near-zero delta". *Delta* estimates how much an option price will change as the stock price changes.

However, if the stock price "rises fast enough" or "falls fast enough," then the straddle rises in price. This happens because, as the stock price rises, the call rises in price more than the put falls in price. Also, as the stock price falls, the put rises in price more than the call falls. In the language of options, this is known as "positive gamma." *Gamma* estimates how much the delta of a position changes as the stock price changes. *Positive gamma* means that the delta of a position changes in the same direction as the change in price of the underlying stock. As the stock price rises, the net delta of a straddle becomes more and more positive, because the delta of the long call becomes more and more positive and the delta of the put goes to zero. Similarly, as the stock price falls, the net delta of a straddle becomes more and more negative, because the delta of the long put becomes more and more negative and the delta of the call goes to zero.

Vega:

As volatility rises, option prices – and straddle prices – tend to rise if other factors such as stock price and time to expiration remain constant. Therefore, when volatility increases, long straddles increase in price and make money. When volatility falls, long straddles decrease in price and lose money. In the language of options, this is known as "positive Vega." The time left to expiry determines the effect of Vega on the position. More the time left to expiry, more the strategy profits due to increased volatility.



Theta:

The time value portion of an option's total price decreases as expiration approaches. This is known as time erosion, or time decay. Since long straddles consist of two long options, the sensitivity to time erosion is higher than for single-option positions. Long straddles tend to lose money rapidly as time passes and the stock price does not change.

Benefits of the Strategy

- This strategy has risk that is limited to the extent of net premium paid
- This strategy has a potential for unlimited reward
- This strategy can profit from either side move in the price of the underlying instrument, provided the move is substantial

Drawbacks of the Strategy

- Because the trader would buy two ATM options, this strategy can be quite expensive
- There is a possibility that the trader could lose 100% of his/her investment if the underlying price is exactly at the strike price on expiration
- Because both the options bought are ATM, they will be subject to highest time decay if the underlying price does not move much
- If volatility does not pick up or if the underlying price stays range bound, time decay would erode the values of both the options

Short Straddle:

A short straddle is a neutral strategy which aims to profit from little to no price movement in the underlying stock and is opposite to the long straddle.

Strategy:

Sell one ATM call option
Sell one ATM put option

Example of short straddle	
Sell 1 XYZ 100 call at	3.30
Sell 1 XYZ 100 put at	3.20

Note that the options belong to the same underlying, have same expiration date, have the same strike price and are in the same ratio (1:1).

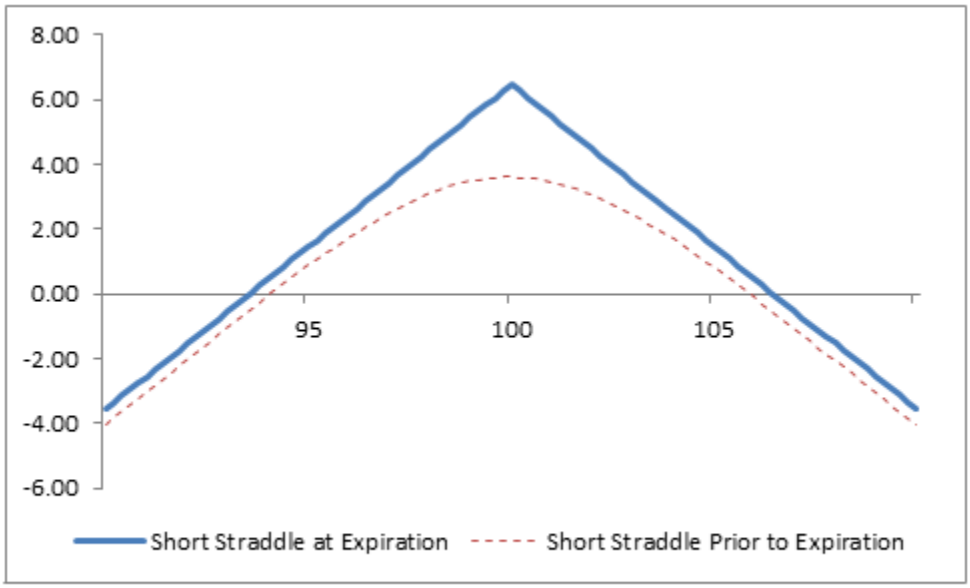
The calculations are as follows:

$$
\begin{aligned}
Net\ Premium &= Net\ Credit \\
&= Premium\ of\ ATM\ call\ option \\
&+ Premium\ of\ ATM\ Put\ option \\
Maximum\ Gain &= Net\ Credit \\
Maximum\ Loss &= Unlimited \\
Lower\ Breakeven &= Strike\ Price - Net\ Premium \\
Upper\ Breakeven &= Strike\ Price + Net\ Premium
\end{aligned}
$$

Stock Price at Expiration	Short 100 Call Profit/(Loss) at Expiration	Short 100 Put Profit/(Loss) at Expiration	Short Straddle Profit / (Loss) at Expiration
110	(6.70)	+3.20	(3.50)
109	(5.70)	+3.20	(2.50)
108	(4.70)	+3.20	(1.50)
107	(3.70)	+3.20	(0.50)
106	(2.70)	+3.20	+0.50)
105	(1.70)	+3.20	+1.50
104	(0.70)	+3.20	+2.50
103	+0.30	+3.20	+3.50
102	+1.30	+3.20	+4.50
101	+2.30	+3.20	+5.50
100	+3.30	+3.20	+6.50
99	+3.30	+2.20	+5.50
98	+3.30	+1.20	+4.50
97	+3.30	+0.20	+3.50
96	+3.30	(0.80)	+2.50
95	+3.30	(1.80)	+1.50
94	+3.30	(2.80)	+0.50
93	+3.30	(3.80)	(0.50)

92	+3.30	(4.80)	(1.50)
91	+3.30	(5.80)	(2.50)
90	+3.30	(6.80)	(3.50)

The graph of the strategy is as follows:



A short straddle is established for a net credit (or net receipt) and profits if the underlying stock trades in a narrow range between the break-even points. Profit potential is limited to the total premiums received. Potential loss is unlimited if the stock price rises and substantial if the stock price falls.

Option Greeks:

Delta and Gamma:

When the stock price is at or near the strike price of the straddle, the positive delta of the call and negative delta of the put very nearly offset each other. Thus, for small changes in stock price near the strike price, the price of a straddle does

not change very much. This means that a straddle has a "near-zero delta." *Delta* estimates how much an option price will change as the stock price changes.

However, if the stock price "rises fast enough" or "falls fast enough," then the straddle rises in price, and a short straddle loses money. This happens because, as the stock price rises, the short call rises in price more and loses more than the short put makes by falling in price. Also, as the stock price falls, the short put rises in price more and loses more than the call makes by falling in price. In the language of options, this is known as "negative gamma." *Gamma* estimates how much the delta of a position changes as the stock price changes. *Negative gamma* means that the delta of a position changes in the opposite direction as the change in price of the underlying stock. As the stock price rises, the net delta of a straddle becomes more and more negative, because the delta of the short call becomes more and more negative and the delta of the short put goes to zero. Similarly, as the stock price falls, the net delta of a straddle becomes more and more positive, because the delta of the short put becomes more and more positive and the delta of the short call goes to zero.

Vega:

Volatility is a measure of how much a stock price fluctuates in percentage terms, and volatility is a factor in option prices. As volatility rises, option prices – and straddle prices – tend to rise if other factors such as stock price and time to expiration remain constant. Therefore, when volatility increases, short straddles increase in price and lose money. When volatility falls, short straddles decrease in price and make money. In the language of options, this is known as "negative Vega."

Theta:

The time value portion of an option's total price decreases as expiration approaches. This is known as time erosion, or time decay. Since short straddles consist of two short options, the sensitivity to time erosion is higher than for single-option positions. Short straddles tend to make money rapidly as time passes and the stock price does not change.

Benefits of the Strategy

- This strategy is a net credit strategy
- This strategy can be a good source of income if used under right market conditions
- For this strategy, time decay is immensely beneficial

Drawbacks of the Strategy

- This strategy has an unlimited risk profile
- This strategy has a limited reward profile
- An unexpected rise in volatility would be detrimental to the success of the strategy
- Any unexpected price-sensitive news or event could spell big trouble to the trader
- A sharp gap up or gap down opening can be detrimental

Long Strangle:

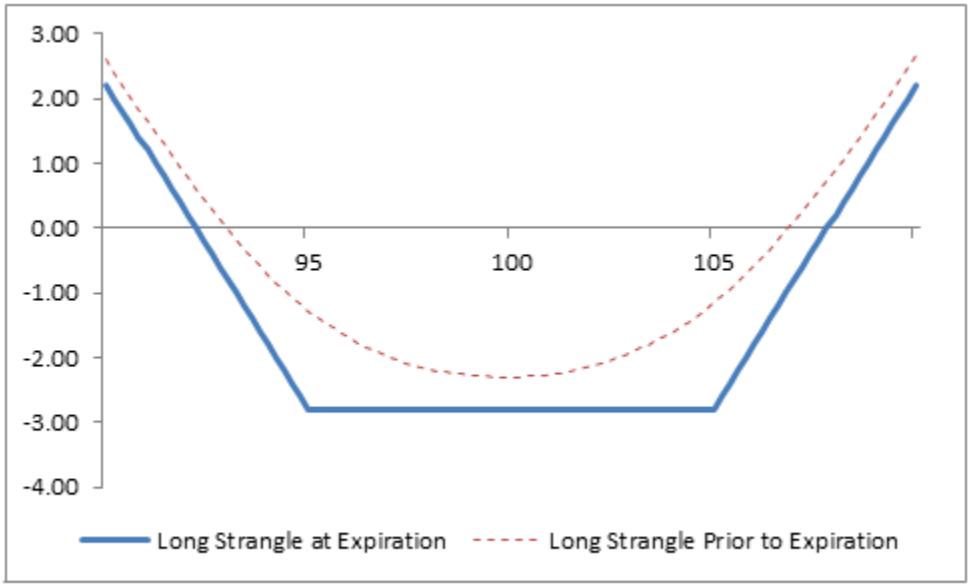
A long strangle is a neutral strategy to profit from a big price change – either up or down – in the underlying stock. The strangle is an improvisation over the straddle. The improvisation mainly helps in terms of reduction of the strategy cost, however as a trade-off the points required to breakeven increases.

Strategy:

- Buy an OTM call option
- Buy an OTM put option

Example of long strangle	
Buy 1 XYZ 105 call at	-1.50
Buy 1 XYZ 95 put at	-1.30

Note that the options belong to the same underlying, have same expiration date, have the same strike price and are in the same ratio (1:1).
The OTM options are cheaper than the ATM options and hence, the strategy cost is less compared to that of a straddle.



Stock Price at Expiration	Long 105 Call Profit/(Loss) at Expiration	Long 95 Put Profit/(Loss) at Expiration	Long Strangle Profit / (Loss) at Expiration
110	+3.50	(1.30)	+2.20
109	+2.50	(1.30)	+1.20
108	+1.50	(1.30)	+0.20
107	+0.50	(1.30)	(0.80)
106	(0.50)	(1.30)	(1.80)
105	(1.50)	(1.30)	(2.80)
104	(1.50)	(1.30)	(2.80)
103	(1.50)	(1.30)	(2.80)
102	(1.50)	(1.30)	(2.80)
101	(1.50)	(1.30)	(2.80)
100	(1.50)	(1.30)	(2.80)
99	(1.50)	(1.30)	(2.80)
98	(1.50)	(1.30)	(2.80)
97	(1.50)	(1.30)	(2.80)
96	(1.50)	(1.30)	(2.80)
95	(1.50)	(1.30)	(2.80)
94	(1.50)	(0.30)	(1.80)
93	(1.50)	+0.70	(0.80)
92	(1.50)	+1.70	+0.20

91	(1.50)	+2.70	+1.20
90	(1.50)	+3.70	+2.20

The calculations are as follows:

$$Net\ Premium\ =\ Net\ Debit$$
$$=\ Premium\ of\ Call\ Option\ +\ Premium\ of\ Put\ Option$$
$$Maximum\ Loss\ =\ Net\ Premium\ Paid$$
$$Maximum\ Profit\ =\ Unlimited$$
$$Upper\ Breakeven\ =\ Strike\ Price\ +\ Net\ Premium$$
$$Lower\ Breakeven\ =\ Strike\ Price\ -\ Net\ Premium$$

A long strangle is established for a net debit (or net cost) and profits if the underlying stock rises above the upper break-even point or falls below the lower break-even point. Profit potential is unlimited on the upside and substantial on the downside. Potential loss is limited to the total cost of the strangle.

The effect of the option Greeks is similar to that on the Long Straddle.

Benefits of the Strategy

- This strategy has risk that is limited to the extent of net premium paid
- This strategy has a potential for unlimited reward
- This strategy can profit from either side move in the price of the underlying instrument, provided the move is substantial
- Compared to a Long Straddle, this strategy costs less

Drawbacks of the Strategy

- This is a net debit strategy because of the two options that are purchased
- There is a possibility that the trader could lose 100% of his/her investment if the underlying price is somewhere between the two strikes on expiration

- Because both the options are long, time decay is the biggest enemy of this strategy
- If volatility does not pick up or if the underlying price stays range bound, time decay would erode the values of both the options

Comparison of LONG STRADDLE and LONG STRANGLE:

Cost and Maximum Risk	Higher in Straddle than in Strangle which means a greater number of strangles can be purchased than straddles for a given capital.
Breakeven Points	Closer for Straddle than for Strangle
Time Decay	Long straddles are less sensitive to time decay than long strangles. Thus, when there is little or no stock price movement, a long straddle will experience a lower percentage loss over a given time period than a comparable strangle.

Short Strangle:

A short strangle is a neutral strategy which aims to profit from little to no price movement in the underlying stock and is opposite to the long strangle.

Strategy:

Sell one OTM call option
Sell one OTM put option

Example of short strangle	
Sell 1 XYZ 105 call at	1.50
Sell 1 XYZ 95 put at	-1.30

Note that the options belong to the same underlying, have same expiration date, have the same strike price and are in the same ratio (1:1).

A short strangle is established for a net credit (or net receipt) and profits if the underlying stock trades in a narrow range between the break-even points. Profit potential is limited to the total premiums received. Potential loss is unlimited if the stock price rises and substantial if the stock price falls.

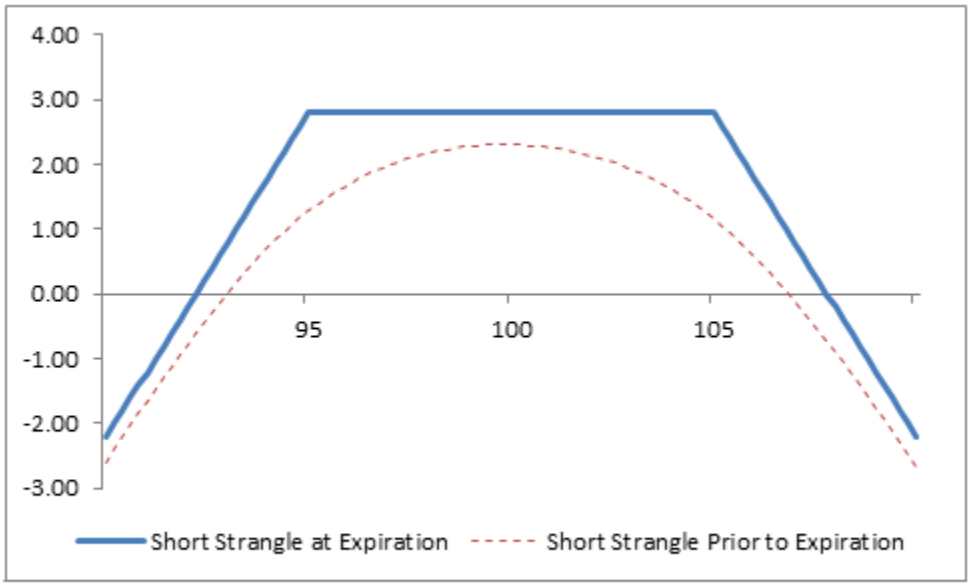
The calculations are as follows:

$$Net\ Premium = Net\ Credit$$
$$= Premium\ of\ OTM\ call\ option$$
$$+ Premium\ of\ OTM\ Put\ option$$
$$Maximum\ Gain = Net\ Credit$$
$$Maximum\ Loss = Unlimited$$
$$Lower\ Breakeven = Strike\ Price - Net\ Premium$$
$$Upper\ Breakeven = Strike\ Price + Net\ Premium$$

Stock Price at Expiration	Short 105 Call Profit/(Loss) at Expiration	Short 95 Put Profit/(Loss) at Expiration	Short Strangle Profit / (Loss) at Expiration
110	(3.50)	+1.30	(2.20)
109	(2.50)	+1.30	(1.20)
108	(1.50)	+1.30	(0.20)
107	(0.50)	+1.30	+0.80
106	+0.50	+1.30	+1.80
105	+1.50	+1.30	+2.80
104	+1.50	+1.30	+2.80
103	+1.50	+1.30	+2.80
102	+1.50	+1.30	+2.80
101	+1.50	+1.30	+2.80
100	+1.50	+1.30	+2.80
99	+1.50	+1.30	+2.80
98	+1.50	+1.30	+2.80
97	+1.50	+1.30	+2.80
96	+1.50	+1.30	+2.80
95	+1.50	+1.30	+2.80
94	+1.50	+0.30	+1.80
93	+1.50	(0.70)	+0.80

92	+1.50	(1.70)	(0.20)
91	+1.50	(2.70)	(1.20)
90	+1.50	(3.70)	(2.20)

The graph of the strategy is as follows:



The effect of Greeks is similar to that of Short Straddle

Benefits of the Strategy

- This strategy is a net credit strategy
- This strategy can be a good source of income if used under right market conditions
- For this strategy, time decay is immensely beneficial
- Compared to a Short Straddle, this strategy has a wider maximum profit zone
- Compared to a Short Straddle, this strategy has wider breakeven points

Drawbacks of the Strategy

- This strategy has an unlimited risk profile
- This strategy has a limited reward profile
- Compared to a Short Straddle, this strategy has a smaller net credit
- An unexpected rise in volatility would be detrimental to the success of the strategy
- Any unexpected price-sensitive news or event could spell big trouble to the trader

Comparison of SHORT STRADDLE and SHORT STRANGLE:

Profit	The premium received and maximum profit potential for selling one strangle are lower than for one straddle.
Breakeven Points	Closer for Strangle than for Straddle which means there is a greater chance of making 100% of the premium received if a short strangle is held to expiration when compared to a Straddle.
Time Decay	Short strangles are less sensitive to time decay than short straddles. Thus, when there is little or no stock price movement, a short strangle will experience a greater percentage profit over a given time period than a comparable short straddle.

Long Iron Condor:

A long iron condor spread is four-part strategy consisting of a bear put spread and a bull call spread in which the strike price of the long put is lower than the strike price of the long call. All options have the same expiration date.

Example of long iron condor spread	
Sell 1 XYZ 95 put at 0.70	0.70
Buy 1 XYZ 100 put at 2.10	-2.10
Buy 1 XYZ 105 call at 2.35	-2.35
Sell 1 XYZ 110 call at 0.95	0.95
Net debit =	-2.80

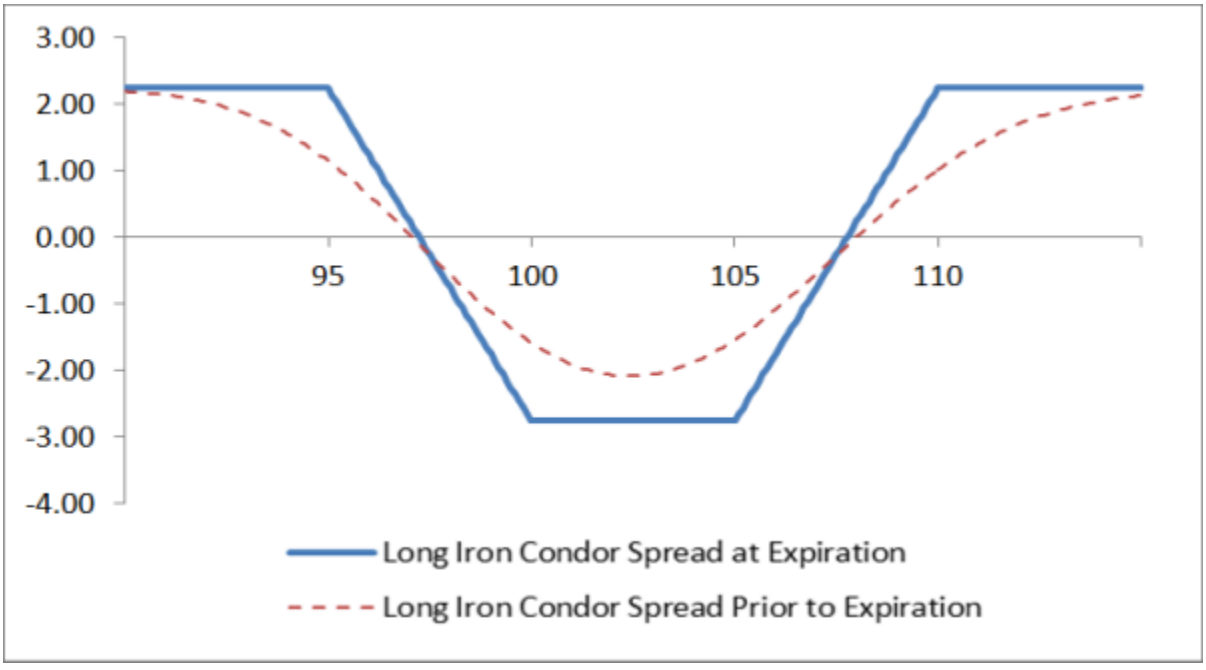
A long iron condor spread is the strategy of choice when the forecast is for a stock price move outside the range of the highest and lowest strike prices. Unlike a long strangle, however, the profit potential of a long iron condor spread is limited. Also, the commissions for a condor spread are higher than for a strangle. The trade-off is that a long iron condor spread has breakeven points closer to the current stock price than a comparable long strangle.

Strategy:

- Sell a slightly OTM call option (Upper Middle Strike)
- Sell a slightly OTM put option (Lower Strike)
- Buy a further OTM call option to protect the short Call option (Upper Strike)
- Buy a further OTM put option to protect the short Put option (Lower Middle Strike)

A long iron condor spread is established for a net debit, and both the potential profit and maximum risk are limited. The maximum profit potential is realized if the stock price is above the highest strike or below the lowest strike at expiration. The maximum risk is realized if the stock price is equal to or between the strike prices of the long options on the expiration date, in which case all options expire worthless.

Stock Price at Expiration	Short 1 95 Put Profit/(Loss) at Expiration	Long 1 100 Put Profit/(Loss) at Expiration	Long 1 105 Call Profit/(Loss)at Expiration	Short 1 110 Call Profit/(Loss) at Expiration	Net Profit/(Loss) at Expiration
115	+0.70	(2.10)	+7.65	(4.05)	+2.20
110	+0.70	(2.10)	+2.65	+0.95	+2.20
105	+0.70	(2.10)	(2.35)	+0.95	(2.80)
100	+0.70	(2.10)	(2.35)	+0.95	(2.80)
95	+0.70	+2.90	(2.35)	+0.95	+2.20
90	(4.30)	+7.90	(2.35)	+0.95	+2.20



In the example above, one 95 Put is sold, one 100 put is purchased, one 105 Call is purchased and one 110 Call is sold, so the four strike prices are equidistant. However, it is normal for the distance between the long call and long put to be greater than the distance between the long and short options of the same type. For example, an 85-90 Bear Put Spread might be combined with a 105-110 Bull Call Spread to create a long iron condor in which the distance between the strike prices of the long options is 15 points while the distance between the strike prices of the bull and bear spreads are 5 points.

The calculations are as follows:

$$Net\ Debit\ =\ Premium\ of\ long\ options\ -\ Premium\ of\ short\ options$$

$$Maximum\ Loss\ =\ Net\ Debit$$

$$Maximum\ Profit\ =\ Maximum\ (Strike\ Price\ of\ Long\ Call\ -\ Strike\ Price\ of\ Short\ Call, Strike\ Price\ of\ Long\ Put\ -Strike\ Price\ of\ Short\ Put)\ -\ Net\ Debit$$

$$Lower\ Breakeven\ =\ Strike\ Price\ of\ Long\ Put\ -\ Net\ Debit$$

$$Upper\ Breakeven\ =\ Strike\ Price\ of\ Long\ Call\ -\ Net\ Debit$$

Option Greeks:

Delta:

Delta is at or near zero at initiation. It tends to bottom out below zero when the underlying price is below the lower strike and peak out above zero when the underlying price is above the higher strike. That said, while Delta does become non-zero as the underlying price moves, it does not deviate much from zero. As such, changes in the price of the underlying do not have much impact on this strategy because of the way it is structured

Gamma:

Gamma is positive and is at its highest point in between the two middle strikes. As the underlying price moves away from the midpoint of the two middle strike and approaches either the lower or the higher strike, Gamma tends to move into negative before bottoming out around these extreme strikes.

Vega:

Vega is positive and is at its highest point between the two middle strikes, meaning the positive impact of a rise in volatility is the greatest around the middle strikes. Volatility benefits as long as the position in unprofitable. That said, Vega turns negative when the position becomes profitable, meaning rising volatility now starts hurting the position.

Theta:

Theta is negative and is at its lowest point between the two middle strikes, meaning time decay hurts the most around the middle strikes. Time decay hurts the position as long as it is unprofitable. That said, Theta turns positive when the position becomes profitable, meaning time decay now starts benefiting the position.

Benefits of the Strategy

- This strategy is direction neutral as the trader can profit from either direction, up or down
- Maximum loss under this strategy is limited
- Rising volatility has a beneficial impact on the strategy payoff

Drawbacks of the Strategy

- The cost/risk of this strategy tends to exceed the potential reward
- There are chances that the trader could lose 100% of his net investment

- When the underlying price is within the confines of the two middle strikes, a decline in volatility would hurt the position
- A sharp move below the lower strike or above the higher strike would lead to an opportunity loss as maximum profit potential under this strategy is capped
- Time decay would hurt the trader, especially when the position is unprofitable

Short Iron Condor:

A short iron condor is a neutral strategy which aims to profit from neutral stock price action between the strike price of the short options with limited risk.

A short iron condor spread is a four-part strategy consisting of a bull put spread and a bear call spread in which the strike price of the short put is lower than the strike price of the short call. All options have the same expiration date.

Example of short iron condor spread	
Buy 1 XYZ 95 Put at 0.70	-0.70
Sell 1 XYZ 100 Put at 2.10	2.10
Sell 1 XYZ 105 Call at 2.35	2.35
Buy 1 XYZ 110 Call at 0.95	-0.95
Net Credit =	2.80

Strategy:

- Buy a slightly OTM Put Option (Lower Strike)
- Buy a slightly OTM Call Option (Upper Strike)
- Sell a farther OTM Put Option (Lower Middle Strike)
- Sell a farther OTM Call Option (Upper Middle Strike)

A Short Iron Condor is a strategy that involves buying a lower strike Put, selling a lower middle strike Put, selling a higher middle strike Call, and buying a higher strike Call. Each of these options would have the same underlying instrument and expiration date. Usually, the lower strike and the lower middle strike Puts are OTM Puts, whereas the higher middle strike and the higher strike Calls are OTM Calls. At the time of initiating this strategy, the underlying price is usually somewhere between the two middle strikes. Usually, all the four options are equidistant from each other. That said, this is not a hard and fast rule.

A Short Iron Condor is a net credit strategy. In terms of the risk reward profile, a Short Iron Condor is quite attractive. In absolute terms, the maximum potential profit under this strategy tends to be larger than the maximum potential loss. As a result, this strategy can be initiated by intermediate option traders as well. Also, as we shall later see, Short Iron Condor has a similar payoff structure as a Long Call Condor or a Long Put Condor. However, there are

differences. The major difference is that Long Call/Put Condor are net debit strategies, while a Short Iron Condor is a net credit strategy.

An iron condor improvises a short strangle by plugging in the open ends. Essentially, it is like hedging a short strangle. This decreases the risk of the strategy, but the trade-off is lower profits.

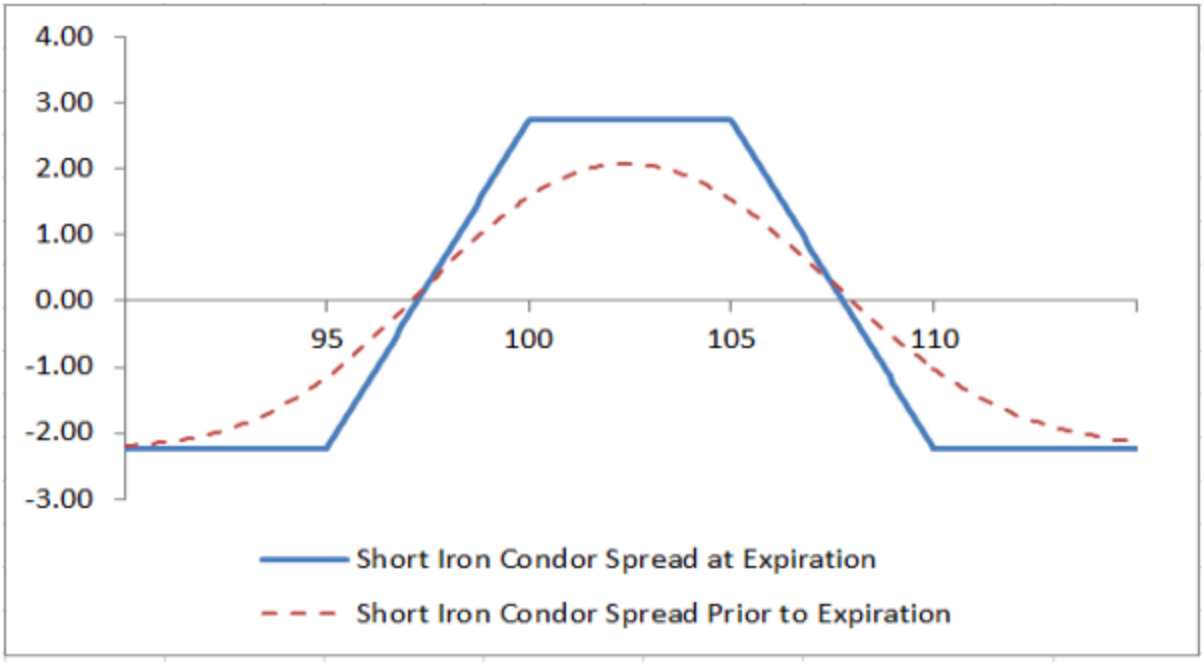
The calculations are as follows:

$$Spread = Difference\ in\ Prices\ of\ the\ Bull\ Put\ Spread\ (or\ Bear\ Call\ Spread)$$

$$Net\ Credit = Premium\ of\ Short\ Calls - Premium\ of\ Long\ Calls$$

$$Maximum\ Profit = Net\ Credit$$

$$Maximum\ Loss = Spread - Net\ Credit$$



Stock Price at Expiration	Long 1 95 Put Profit/(Loss) at Expiration	Short 1 100 Put Profit/(Loss) at Expiration	Short 1 105 Call Profit/(Loss)at Expiration	Long 1 110 Call Profit/(Loss) at Expiration	Net Profit/(Loss) at Expiration
115	(0.70)	+2.10	(7.65)	+4.05	(2.20)
110	(0.70)	+2.10	(2.65)	(0.95)	(2.20)
105	(0.70)	+2.10	+2.35	(0.95)	+2.80
100	(0.70)	+2.10	+2.35	(0.95)	+2.80
95	(0.70)	(2.90)	+2.35	(0.95)	(2.20)
90	+4.30	(7.90)	+2.35	(0.95)	(2.20)

Option Greeks:

Delta:
Delta is at or near zero at initiation. It tends to peak out above zero when the underlying price is below the lower strike and bottom out below zero when the underlying price is above the higher strike. That said, while Delta does become non-zero as the underlying price moves, it does not deviate much from zero. As such, changes in the price of the underlying do not have much impact on this strategy because of the way it is structured.

Gamma:
Gamma is negative and is at its lowest point in between the two middle strikes. As the underlying price starts moving away from the midpoint of the two

middle strikes and approaches either the lower or the higher strike, Gamma tends to move into positive before peaking out around these extreme strikes.

Vega:

Vega is negative and is at its lowest point between the two middle strikes, meaning the negative impact of a rise in volatility is the highest around the middle strikes. Volatility hurts as long as the position in profitable. That said, Vega turns positive when the position becomes unprofitable, meaning a rise in volatility now starts helping the position.

Theta:

Theta is positive and is at its highest point between the two middle strikes, meaning time decay is most helpful around the middle strikes. Time decay benefits the position as long as it is profitable. That said, Theta turns negative when the position becomes unprofitable, meaning time decay now starts hurting the position.

Benefits of the Strategy

- This is a net credit strategy
- The risk of this strategy tends to be smaller than the potential reward
- Time decay benefits the position, as long as it is profitable
- Maximum loss under this strategy is limited

Drawbacks of the Strategy

- When the underlying price is between the middle strikes, rise in volatility would hurt the position
- If the underlying price moves outside one of the two breakeven points, the trader will incur a loss

Max Pain:

Max pain, or the max pain price, is the strike price with the most open contract puts and calls and the price at which the stock would cause financial losses for the largest number of option holders at expiration.

According to the Max Pain Theory, almost 90% of the options expire worthless. While this number varies among different books and sources, the main idea is that a huge number of the options expire worthless. Based on this statement, a set of logical deductions can be made which in turn are used to predict a price at which the market is most likely to expire.

The deductions are as follows:

- As options are "**zero-sum**", only one party can make money, that is, either the option writers make money or the option buyers do. From the above statement, the option-writers are making money.
- If the option writers are the ones making money, then the price of the underlying on the date of expiry will be driven to the point where it causes the least amount of loss to option writers.

This means that the option prices are driven to a point which causes least pain to the option writers. Based on the open interest, we can calculate this price. If this theory holds, then the market would expire at that price. As we can calculate the position of maximum pain, we can essentially know the expiry strike price. Note that this value changes on a daily basis and thus, calculating it on the day of expiry gives the best result.

Steps to Calculate Max Pain:

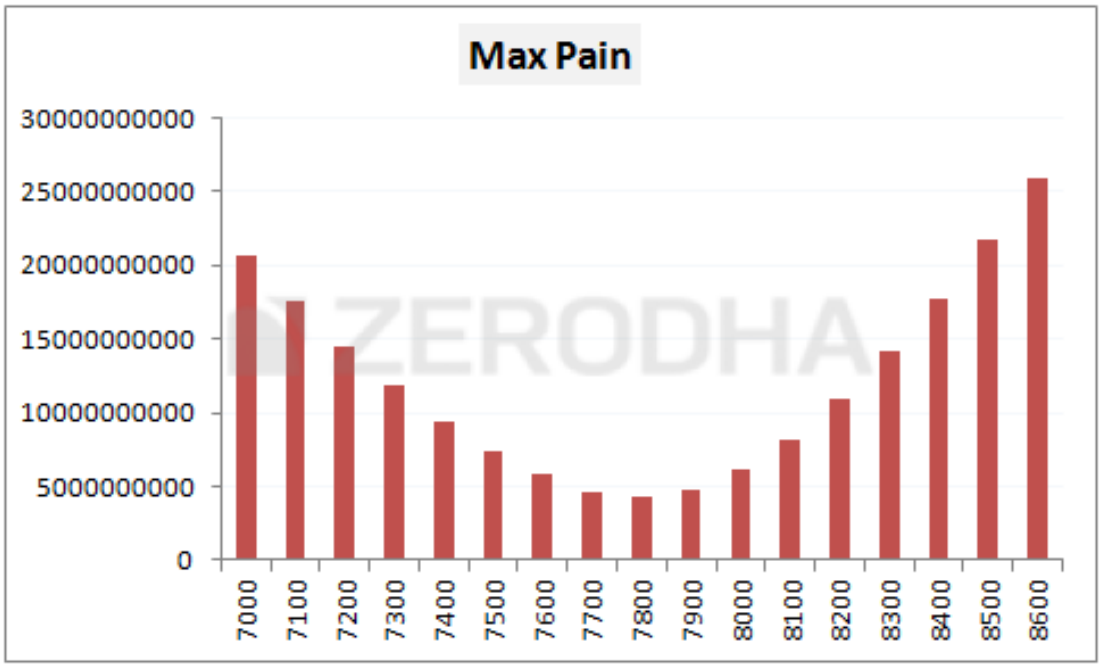
- List down the various strikes on the exchange and note down the open interest of both calls and puts for these strikes.
- For each of the strike price that you have noted, assume that the market expires at that strike.

- Calculate how much money is lost by option writers (both call option and put option writers) assuming the market expires as per the assumption in step 2.
- Add up the money lost by call and put option writers.
- Identify the strike at which the money lost by option writers is least

This level, at which least amount of money is lost by option writers is the point at which maximum pain is caused to option buyers. Therefore this is the price at which the market is most likely to expire.

Strike	Call OI	Put OI	Cumulative Call	Cumulative Put	Total Value
7000	1404300	4087050	0	20691180000	20691180000
7100	335700	1029150	140430000	17398192500	17538622500
7200	482100	2977875	314430000	14208120000	14522550000
7300	422475	1975650	536640000	11315835000	11852475000
7400	963900	2336700	801097500	8621115000	9422212500
7500	999975	4548450	1161945000	6160065000	7322010000
7600	785550	3690900	1622790000	4153860000	5776650000
7700	1823400	5783025	2162190000	2516745000	4678935000
7800	3448575	4864125	2883930000	1457932500	4341862500
7900	5367450	2559375	3950527500	885532500	4836060000
8000	6510975	1447125	5553870000	569070000	6122940000
8100	5900325	310500	7808310000	397320000	8205630000
8200	5113350	248775	10652782500	256620000	10909402500
8300	3844500	355725	14008590000	140797500	14149387500
8400	2135625	255525	17748847500	60547500	17809395000
8500	2252250	488475	21702667500	5850000	21708517500
8600	1083750	58500	25881712500	0	25881712500

Plotting the above values on a graph we get,



As you can see, the 7800 strike is the point at which option writers would lose the least amount of money, so as per the option pain theory, 7800 is where the market is likely to expire

Call Butterfly

The call butterfly is not exactly bullish in the sense that it does not make money when there are huge jumps in the market. It is a neutral or a moderately bullish strategy, depending on the relationship of the selected strikes.

Strategy:

- Buy one ITM call option
- Sell two OTM call options
- Buy one OTM call option

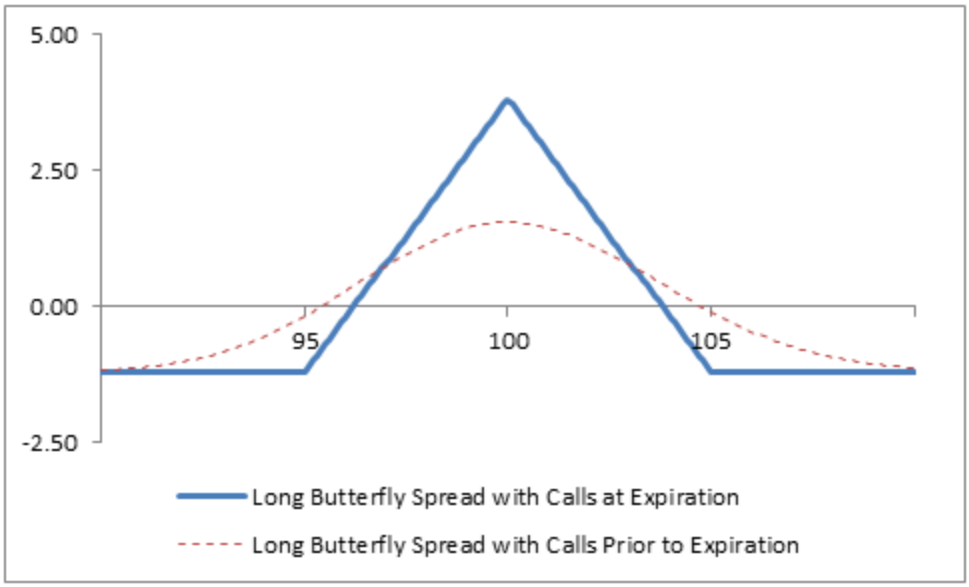
Example of long butterfly spread with calls	
Buy 1 XYZ 95 call at 6.40	-6.40
Sell 2 XYZ 100 calls at 3.30	6.60
Buy 1 XYZ 105 call at 1.45	-1.45

This is a net debit strategy as the selling of two OTM options is not sufficient to finance an ATM and a higher OTM. However, in this strategy both the risk and the maximum profit are capped.

The calculations of the strategy are as follows:

$$\begin{aligned}
Net\ Debit\ &= 2 * Premium\ of\ OTM\ options \\
&\quad - (Premium\ of\ higher\ strike\ OTM\ option \\
&\quad + Premium\ of\ ITM\ option) \\
Maximum\ Loss\ &= Net\ Debit \\
Maximum\ Profit\ &= 2 * Premium\ of\ OTM\ options \\
&\quad + (Strike\ of\ OTM\ option \\
&\quad - Strike\ of\ ITM\ option - Premium\ of\ ITM\ option) \\
&\quad - Premium\ of\ higher\ strike\ OTM \\
Lower\ Breakeven\ &= ITM\ strike\ price\ + Net\ Debit \\
Upper\ Breakeven\ &= Strike\ of\ higher\ OTM\ option - Net\ Debit
\end{aligned}$$

Stock Price at Expiration	Long 1 95 Call Profit/(Loss) at Expiration	Short 2 100 Calls Profit/(Loss) at Expiration	Long 1 105 Call Profit/(Loss) At Expiration	Net Profit/(Loss) at Expiration
110	+8.60	(13.40)	+3.55	(1.25)
105	+3.60	(3.40)	(1.45)	(1.25)
100	(1.40)	+6.60	(1.45)	+3.75
95	(6.40)	+6.60	(1.45)	(1.25)
90	(6.40)	+6.60	(1.45)	(1.25)



Both the maximum loss and profit are capped for this strategy. If the stock price is at or near the center strike price when the position is established, then the forecast must be for unchanged, or neutral, price action. If the stock price is below the center strike price when the position is established, then the forecast

must be for the stock price to rise to the center strike price at expiration (modestly bullish).
A long butterfly spread with calls can also be described as the combination of a bull call spread and a bear call spread. The bull call spread is the long lowest-strike call combined with one of the short center-strike calls, and the bear call spread is the other short center-strike call combined with the long highest-strike call.

Option Greeks:

Delta:

Regardless of time to expiration and regardless of stock price, the net delta of a long butterfly spread remains close to zero until one or two days before expiration. If the stock price is below the lowest strike price in a long butterfly spread with calls, then the net delta is slightly positive. If the stock price is above the highest strike, then the net delta is slightly negative. Overall, a long butterfly spread with calls does not profit from price stock price change; it profits from time decay as long as the stock price is between the highest and lowest strikes.

Vega:

Long butterfly spreads with calls have a negative Vega. This means that the price of a long butterfly spread falls when volatility rises (and the spread loses money). When volatility falls, the price of a long butterfly spread rises (and the spread makes money). Long butterfly spreads, therefore, should be purchased when volatility is “high” and forecast to decline.

Theta:

A long butterfly spread with calls has a net positive theta as long as the stock price is in a range between the lowest and highest strike prices. If the stock price moves out of this range, however, the theta becomes negative as expiration approaches.

Advantages:

- Ability to make profit from a range bound stock with relatively lower cost outlay.
- Limited risk exposure compare to Short Straddle strategy when the underlying stock moved beyond the breakeven point on expiration date.

Disadvantages:

- The profit potential only come from the narrow range between the 2 wing strikes.
- Bid/Ask spread from the various option legs may adversely affect the profit potential of the strategy.