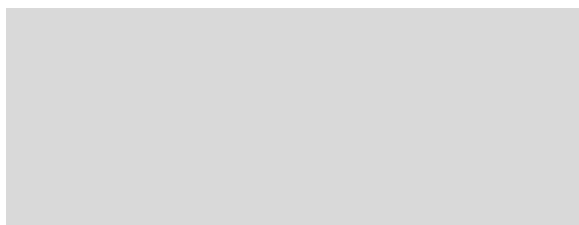




# DERIVATIVES ANALYST

RAHUL SARDANA  
CE21B102



## TASK 1

### 1. High Volatility Market

**Implied volatility (IV)** - Implied volatility is a metric used to assess the market's view of the future volatility. It is the market participant's perception of the future volatility which is different from **forecasted volatility or historical volatility**. IV is also a chief factor in computing option's price.

Generally higher the IV the higher would be the price of option contracts (both put and call). Factors such as supply & demand, time to expiry affect the IV. Higher demands and lower supplies result in higher IV and as a result higher option premiums. The closer the option is to expiry the lesser is the IV since longer time periods

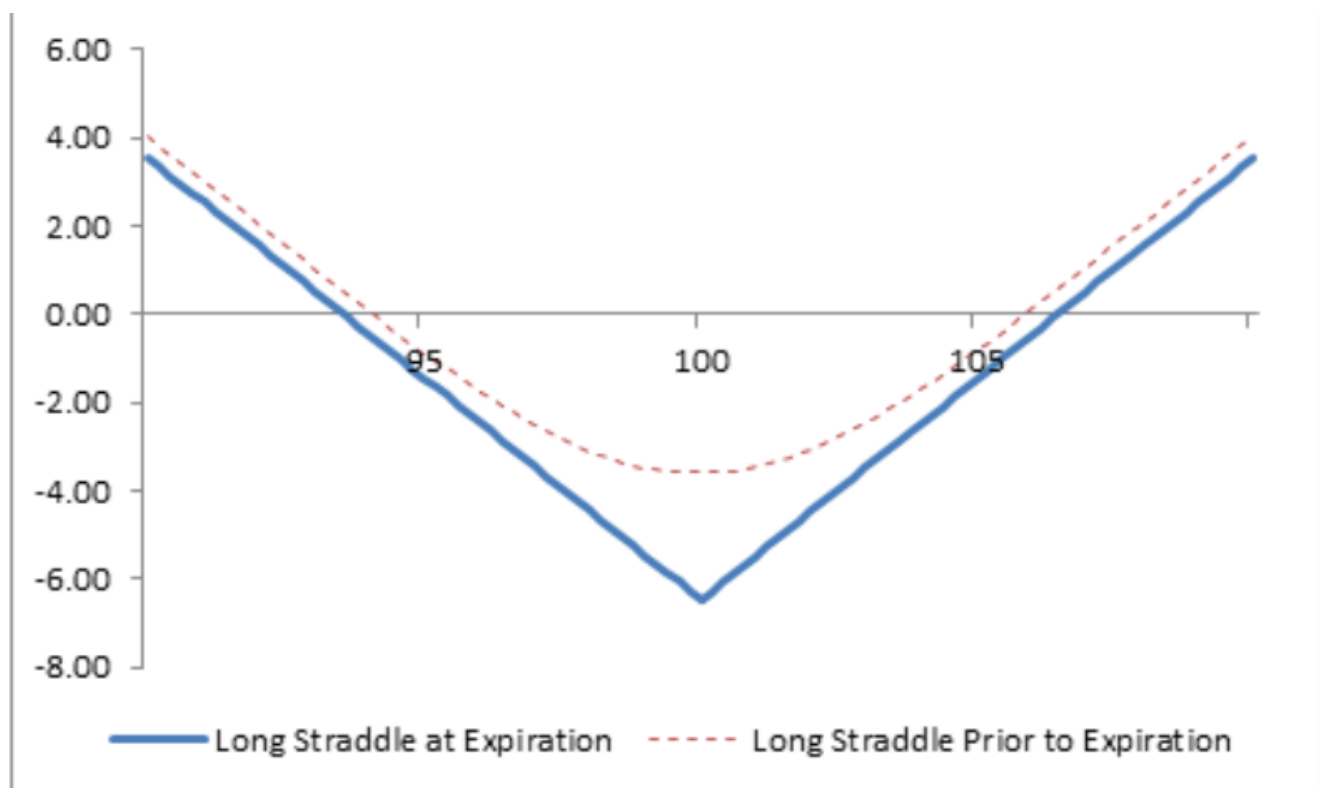
#### Strategy used:

##### *Long Straddle*

**Long straddle** - Long straddle is a strategy where the investor buys both call and put options of the same strike price and expiry for the same underlying asset. The investor makes advantage of a large move in either direction.

The strike price should be at the money (ATM) or slightly out of money (OTM) since **delta** for these options is less than or equal to 0.5 (for call and -0.5 for put) so when the option expires in the money (ITM) with a **delta** greater than 0.5 we could book a good profit.

The investor is able to make a profit since if the market moves significantly in either direction **then the gains realized would be far more than the loss incurred (net premium paid)**.



#### Observations:

## DERIVATIVES ANALYST

- The maximum loss incurred is when the options expire worthless, which is when the market does not move a lot and the spot price stays close to the strike price of at the money option.
- The maximum profit can be unlimited and in either direction if the market gives a large move in either direction.
- The deltas in long straddle add up to 0.

*Profit (up) = Spot Price – Strike Price – Net Premium Paid*

*Profit (down) = Strike price – Spot Price – Net Premium Paid*

*Breakeven (up) = strike price + premium paid*

*Breakeven (down) = strike price – premium paid*

*Max Loss = Net Premium Paid*

### Entry, Exit and Risk Management in Long Straddle

#### Entry Rules:

**India VIX** – The ideal time to enter the long straddle would be when the VIX is rising but is not at extreme levels of **30 or 35** since at levels above 30 the options would already be expensive making the trade less profitable. We will look for VIX to be in the **range from 18 – 25** indicating a volatile move and but still plenty of room left for a good trade. In general if the IV rises above the 40<sup>th</sup> – 60<sup>th</sup> percentile of its historical level then we would enter.

**Geopolitical Events** – Macroeconomic events such as elections, RBI/FED rate cuts or any other global events can lead to a surge in IV. For individual stocks, earnings announcements can lead to a similar surge for that particular stock.

**Time to expiry** – Options that are further from expiry gain more from increase in volatility since these options still have chance to expire in the money than options with very near expiry. This also reduces the effect of time decay (**theta**).

#### Exit Rules:

**Profit Target** - In general we want to exit once we've captured around 50% - 80% of the net premium paid for both the call and put options. This profit target helps us to book profits in a systematic manner and avoid moves that are not in our favor such as consolidation near ATM spot price.

**Expiry date** – Exit before expiry if there hasn't been a directional move yet since the value of both call and put options would decrease due to time decay.

**Implied Volatility** – If the IV rises to 80<sup>th</sup> or 90<sup>th</sup> percentile of the historical values then there is a high chance that there would be a mean reversion soon and we should exit the trade since when the IV falls the option premiums would fall too.

#### Risk Management:

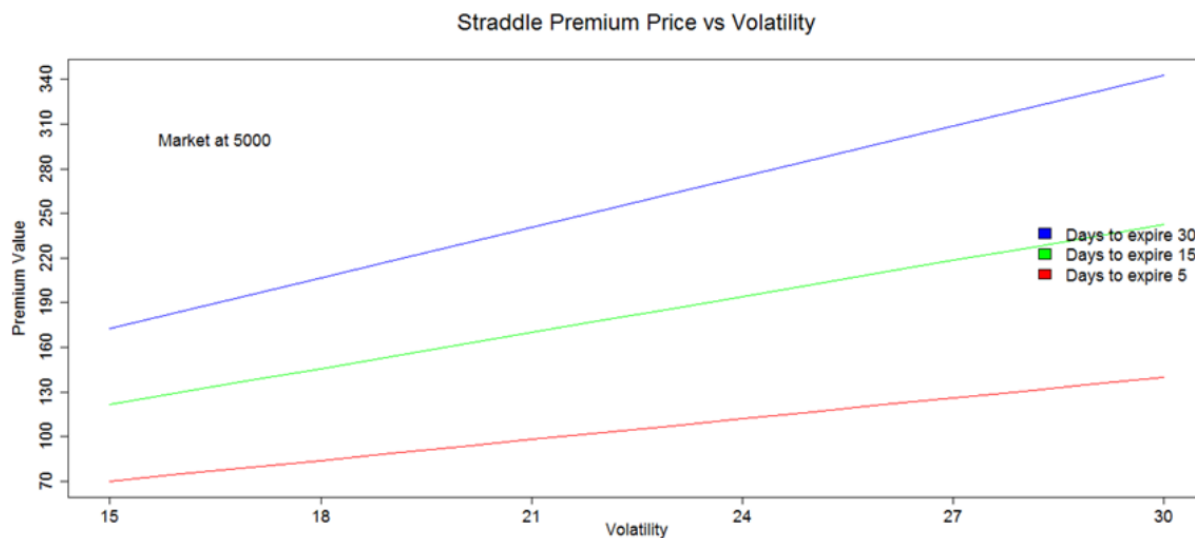
**Position Size** – Limit the position size since the loss in long straddle is at most the net premium paid which could be minimized by holding a smaller position.

**Stop loss** – We can add a SL which could be a specific percent loss of the net premium paid, we can also set a SL for days to expiry to minimize time decay and another way is to use specific price action such as resistance and support levels using technical.

**Hedge -** We can sell OTM call and put options with further expiration dates than long straddle options creating **reverse iron condor** (made up of two spreads, the bear call spread and bull call spread). This strategy reduces the net cost of the straddle and protects against small price movements. However, it also limits the upside if the price moves beyond the sold strikes.

**Roll one leg -** If the market moves in one direction significantly, you can **roll the losing leg** of the straddle (the option that's losing value) to a new strike to adjust your exposure.

Sell the put or call option that has lost value and buy a new option at a further strike price, allowing for more movement.



### Sharpe ratio

The Sharpe ratio measures risk adjusted return of a strategy. A value greater than 1 means that the strategy is performing well and returns generated are good relative to the risk.

### Sortino ratio

The Sortino Ratio is kind of like the Sharpe Ratio except that it only considers downside risk or negatively volatilized. That means that a fund has risk-adjusted returns calculated by harmful volatility, also otherwise referred to as negative volatility, rather than overall volatility

A value greater than 1 indicates that the strategy provides good returns with low downside risk.

### Max drawdown

Measures the steepest peak-to-trough decline of the strategy over a given period. Larger Max Drawdown (closer to -100%): Indicates that the strategy experienced severe loss at some point, thus it could have implied higher risk or poor downside protection. This might be the case either during the 2008 crisis or Covid-19.

### Annualized return

The compounded return over the years in back test period. A higher value indicates good returns annually over the years. Even though we lost a lot during crisis but still managed to get good annual returns over the back test period.

## BACKTEST RESULTS ON NIFTY FROM ALGOTEST SOFTWARE:

DETAILS:

**INDEX – NIFTY**

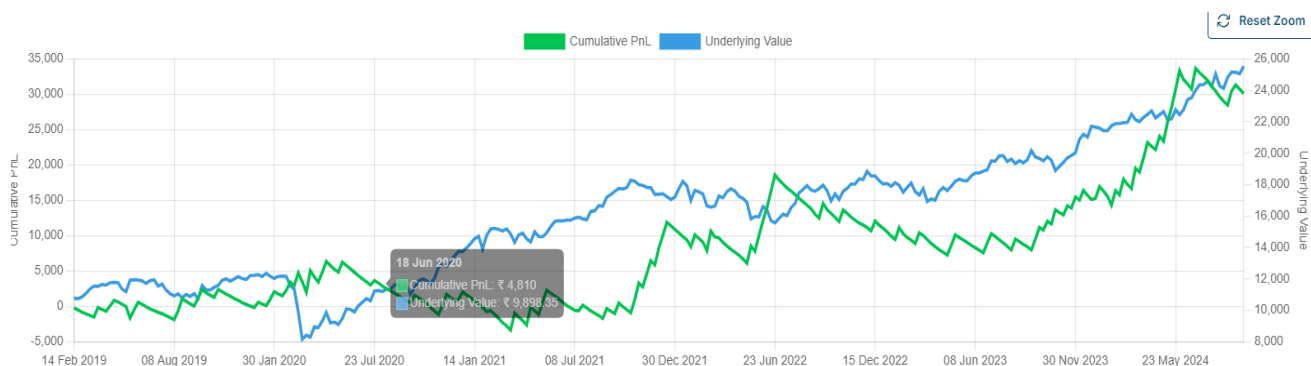
**TIME PERIOD – 2004 – 2024**

**OVERALL SL = 50% NET PREMIUM**

**TP = 200 POINTS IN UNDERLYING (ANY DIRECTION)**

**SL ON EACH LEG = 20% OF PREMIUM PAID**

Overall Profit AlgoTest.in	₹ 52,390	Average Loss on Losing Trades AlgoTest.in	₹ -478.92	Return/MaxDD AlgoTest.in	0.62
No. of Trades AlgoTest.in	293	Max Profit in Single Trade AlgoTest.in	₹ 4,832.5	Reward to Risk Ratio AlgoTest.in	5.01
Average Profit per Trade AlgoTest.in	₹ 178.81	Max Loss in Single Trade AlgoTest.in	₹ -1,617.5	Expectancy Ratio AlgoTest.in	0.37
Win % AlgoTest.in	22.87	Max Drawdown AlgoTest.in	₹ -15,146.25	Max Win Streak (trades) AlgoTest.in	3
Loss % AlgoTest.in	77.13	Duration of Max Drawdown AlgoTest.in	372 [4/9/2020 to 4/15/2021]	Max Losing Streak (trades) AlgoTest.in	12
Average Profit on Winning Trades AlgoTest.in	₹ 2,397.39			Max trades in any drawdown AlgoTest.in	81



The win rate is pretty low at 22.87% so that less than one in four trades would be profitable. However, the average profit on winning trades is substantially higher compared to the average loss on losing trades: ₹2,397.39 vs. ₹478.92. Such a low win rate is compensated by the balance of profit and loss amounts on winning and losing trades respectively.

The **reward-to-risk ratio** of 5.01 is highly favorable, meaning that for every ₹1 of risk, the potential reward is ₹5. This is consistent with straddle strategies, which are designed to capture significant moves in either direction.

The **max drawdown** of ₹15,146.25 is concerning. It represents a large portion of the overall profit and indicates that the strategy can experience substantial and prolonged periods of underperformance. The **max drawdown duration of 372 days** (over a year) highlights the possibility of long periods without recovery, which suggests that patience and adequate capital reserves would be crucial for executing this strategy effectively.

This strategy should do rather well in volatile markets, like 2008 crisis or 2020 COVID-19 crash. As this strategy thrives on large price movements in any direction, a sharp market decline or rapid recovery would be very likely to produce at least some of that very big returns witnessed in the trades which made the maximum profit say the Rs. 4,832.5 achieved in a particular trade.

## 2. Bullish Market with Low Volatility

### Strategy used:

#### *Bull call spread*

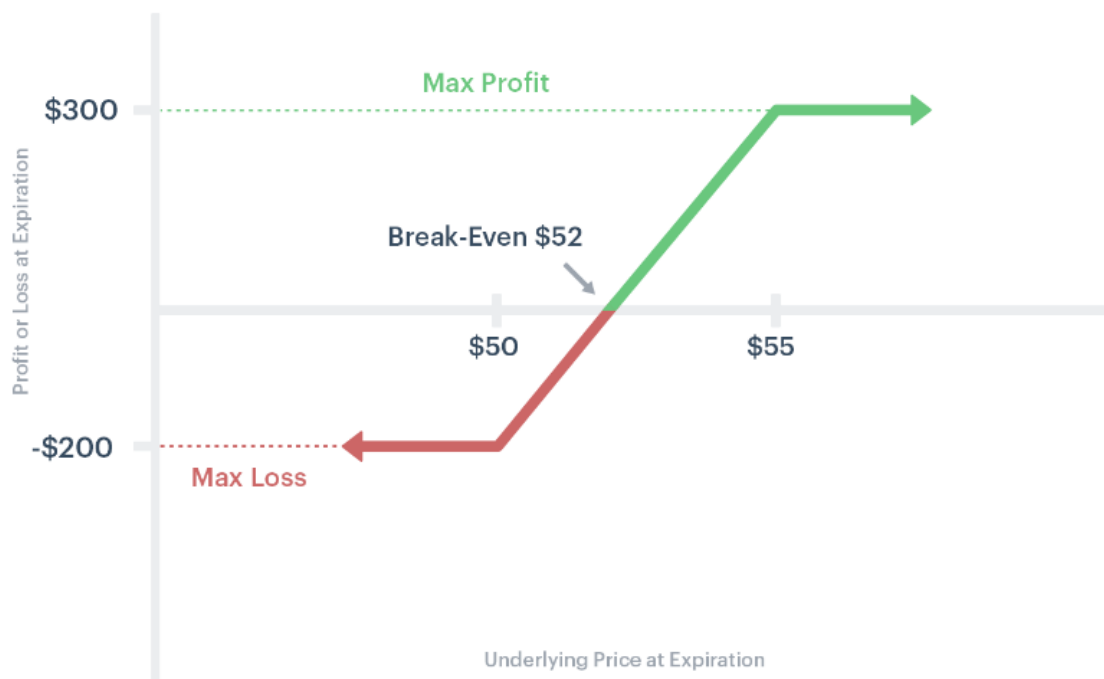
**Bull call Spread** – A bull call spread is a strategy where the investor buys a call option at a lower strike price (ATM or slightly ITM) and simultaneously sells a call option at a higher strike price (OTM), both of the same expiry. Select the strike price of OTM option as far as you expect the underlying to move.

If the investor predicts price of the underlying to rise moderately then we can employ bull call spread and we can expect to make the maximum profit if the underlying moves close to the higher strike price. But if the underlying does not move much then we would incur a loss which has a maximum limit to the premium paid. Employing a bull call spread is cheaper than only buying the call options and it limits the max loss incurred.

**Impact of low volatility on option premiums** – As we've already seen that option premium consists of two components namely intrinsic value and the time value. Intrinsic value represents how in the money an option is while time value is how much an investor is willing to pay above the intrinsic value.

Generally low volatility tends to make both put and call options cheaper since there is lower chance that the option expires in the money. Since the premiums would be lower so it would be a good time to buy options so we will focus on strategies with lower risk.

For a bull call spread Volatility is neutralized to a certain extent since we've entered both long and short call positions with the same expiry. This is known as **near zero Vega** (Measures the change in option premium with change in volatility). This implies the value of a bull call spread changes very little with changes in volatility.



*Maximum loss = (Out of the money option cost) – (In the money option cost)*

*Maximum gain = (Out of the money strike price) – (In the money strike price) – Net premium*

***Breakeven = (In the money strike price) + Net premium***

If the underlying rises above the higher strike price, max profit is realized.

If the underlying stays between the two strike prices, profit is realized but is lesser than max profit.

If the underlying falls below the lower strike, net loss is incurred.

### **Entry, Exit and Risk Management in Bull Call Spread**

#### **Entry Rules:**

**India VIX** – Bull call spread is employed when we expect moderate volatility which typically is the 10 - 15 range for India Vix, since at these levels the premiums are not very high which would make the strategy less profitable.

If the VIX is falling from higher levels to moderate – low levels then in anticipation of a stable market ahead, bull call spread could be used.

After major spikes in VIX levels due to some macroeconomic event, we can enter the trade after the event since the VIX would stabilize after the event and the premiums would be cheaper.

**Clear Support and Resistance** – If the price is between support and resistance levels and the investor good price action (formation of some pattern for e.g. Bounce from support with hammer or bullish Marubozu) and he believes that price cannot break the resistance then we can enter a bull call spread.

**Time Decay** – We want to enter the trade when there is some time left for expiry so that the price can rise above the lower strike but stays below or near the higher strike so that we benefit from the rise in lower strike call and from theta decay of the higher strike call. We would not enter too close to the expiry as theta might work against us and both are calls lose value quickly but we want to give ample time for the price to rise moderately. Weekly options are highly liquid for indices like **Nifty** and **Bank Nifty**. Entering 7-10 days before expiration provides enough time for a moderate move in the underlying asset without suffering too much from time decay, which accelerates rapidly in the last 5 days.

#### **Exit Rules:**

**Profit** - The maximum profit is realized when the underlying is above or at the higher strike price. Since at this point the call option we bought would be in the money and any rise in price further would not increase the profit since the additional gains would be offset by loss in call option sold.

Recall that ***Maximum gain = (Out of the money strike price) – (In the money strike price) – Net premium.***

**Time Decay** – If the time to expiry is less (like 5-7 days) and the price is not near the higher strike then we can consider exiting the position since time decay or theta is high near expiry and there is a chance that both options expire worthless.

**Stop loss** - We will exit the position if the loss hits a certain percent of the net premium paid let's say 50% (would vary with different risk appetite) or if the underlying moves below the lower strike since we want to further limit our losses.

**Early Movement** – If the underlying reaches the higher strike earlier than the expiry then we would close the position to prevent any reversals.

#### **Risk Management:**



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**Stop loss** – We will pre define our risk on the trade prior to taking it and exit if the underlying moves below the lower strike. This prevents huge loss if the position size is significant.

**Roll down the spread** - Rolling down" a bull call spread is a strategy used when the underlying stock or index drops significantly below your current spread's strike prices. This involves **closing the current spread** (which is losing value) and **opening a new bull call spread at lower strike prices** that are more aligned with the current price of the underlying asset.

**Risk Capital Allocation** – Do not allocate more than 2-3% of the account size for any trade is a general risk management strategy. Since the max loss in bull call spread is limited to net premium paid (out of money option cost – in the money option cost).

**Hedge** – We can buy a put at a strike price below the lower strike price so if the underlying moves below the lower strike the losses would be offset by the gains in put.

We can also create a bear call spread by further selling a call above the higher strike price. Through this we collect additional premium and if the underlying does not move much then this extra premium would help reduce losses.

**Calendar Spread** - The main goal of adding the calendar spread is to offset the losses from **time decay** in your bull call spread. Both the long and short options in your bull call spread lose value as expiration approaches, particularly if the stock/index doesn't move as expected. So here we will sell a short term call at the higher strike and at the same strike we will buy a call with longer maturity. By selling a short-term call with a closer expiration, you take advantage of **faster time decay** in the near-term option.

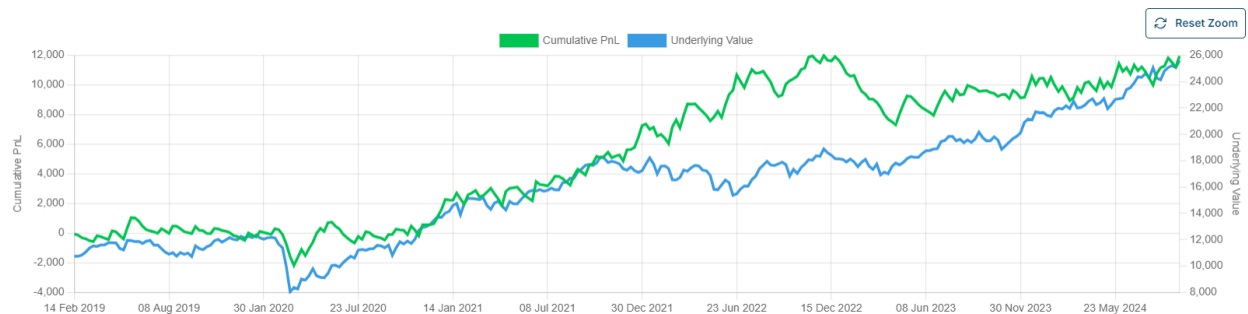
DETAILS:

**INDEX – NIFTY**

**TIME PERIOD – 2004 – 2024**

**SL = 50% NET PREMIUM**

**TP = 70% NET PREMIUM**



Overall Profit AlgoTest.In	₹ 11,942.5	Average Loss on Losing Trades AlgoTest.In	₹ -243.01	Return/MaxDD AlgoTest.In	0.46
No. of Trades AlgoTest.In	293	Max Profit in Single Trade AlgoTest.In	₹ 1,300	Reward to Risk Ratio AlgoTest.In	1.72
Average Profit per Trade AlgoTest.In	₹ 40.76	Max Loss in Single Trade AlgoTest.In	₹ -826.25	Expectancy Ratio AlgoTest.In	0.17
Win % AlgoTest.In	43.00	Max Drawdown AlgoTest.In	₹ -4,675	Max Win Streak (trades) AlgoTest.In	9
Loss % AlgoTest.In	57.00	Duration of Max Drawdown AlgoTest.In	127 [12/8/2022 to 4/13/2023]	Max Losing Streak (trades) AlgoTest.In	11
Average Profit on Winning Trades AlgoTest.In	₹ 416.87			Max trades in any drawdown AlgoTest.In	94

## DERIVATIVES ANALYST

The profit and trading data suggest that the approach is only marginally profitable but with a meager win rate of 43%. This approach may be feasible for spread strategies where a few winners would offset many small losses.

The risk return profile is decent with reward/risk ratio of 1.72; that is, you earn ₹1.72 on every buck you risk. However the Return/MaxDD ratio of 0.46 shows that for every buck invested, on ₹1 of maximum drawdown, it would fetch you ₹0.46, which is far from desirable in the high-risk scenario.

**Sharpe ratio**, the modest profit and significant drawdown suggest that the Sharpe ratio would likely be low.

**Sortino ratio**, which focuses on downside volatility, could also be relatively low due to the significant max drawdown and 11-trade losing streak.

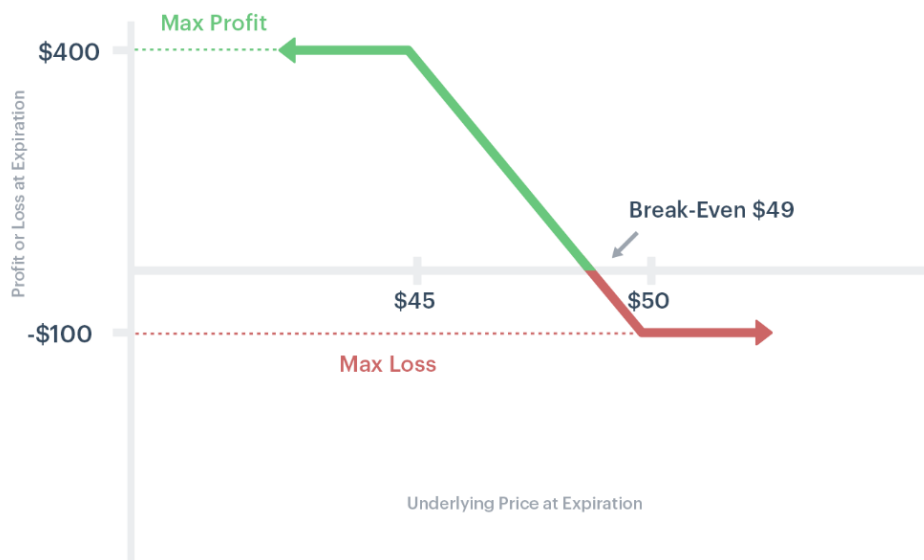
It would likely struggle in severe market downturns, such as the 2008 crisis or COVID-19, unless adapted with additional risk management measures (e.g., tighter stop losses or hedging techniques).

### 3. Bearish Market with High Implied Volatility

#### Strategy used:

##### *Bear put spread*

A bear put spread is an options strategy applied by investors with the expectation that the underlying may experience a moderate to significant price decline. This strategy leads to minimal cost in holding the option position and involves the act of buying a put option while concurrently selling equal numbers of put options on the same asset with the same expiration date but a lower strike price.



*Maximum loss = Net cost of the options*

*Maximum gain = (Higher strike price) – (lower strike price) – Net cost of options*

*Breakeven = (Higher strike price) - Net premium*

#### Entry, Exit and Risk Management in Bull Call Spread

##### Entry Rules:

**Market** – If the market outlook seems bearish or there is a future event where we might anticipate the IV to spike and market to have a bearish sentiment.

With respect to VIX levels we will enter when the VIX is slightly inflated at around 20-25 levels. Since at high VIX levels the premiums would be more making it better to sell options capturing more premium.

**Time to Maturity** - For example, we can enter a bear put spread if we think the price of the underlying asset will collapse rather quickly. Short-term trades are appropriate for fast moves that depend on some technical indicators or market news.

But the ideal scenario would be to enter in medium term maturity this is often an ideal time frame for a bear put spread. Entering here allows for a reasonable window to capture a price decline, while still benefiting from higher premiums than short-term options.

### **Exit Rules:**

**Profit Target Achieved** - Set a predefined profit target based on your analysis. This could be a specific percentage of profit from the maximum potential gain or a certain price level of the underlying asset. The max profit is (Higher strike price) – (lower strike price) – Net cost of options and we can set a certain percent of this let's say 70% and when we reach that level we can exit the trade so that we exit with some profit and avoid further changes in volatility.

**Time to expiry** – If we approach expiry and we are close to breakeven or are profitable then we should consider exiting since theta decay might work against us.

**Exiting in Parts** - Depending on market conditions, you might choose to close one leg of the spread while keeping the other leg open. For example:

**Close the Short Put:** If the underlying asset is moving favourably, you might close the short put to lock in profits while keeping the long put for further downside protection.

**Close the Long Put:** If the underlying asset has declined significantly, you could sell the long put to realize profits before expiration.

### **Risk Management:**

**Position Size** - Only allocate a small percentage of your overall portfolio to any single options trade, including a bear put spread. Typically, this would be between 1-5% of your capital, depending on your risk tolerance.

**Stop loss** - A stop-loss helps minimize your risk if the trade moves against you. A typical stop-loss might be set at 50% of the maximum loss or a specific price level of the underlying asset.

**Time-based Stop:** Exit the trade if it is losing value after a certain time period.

**Trailing Stop:** As the position moves in your favour, you can apply a trailing stop to lock in a percentage of gains, allowing profits to run while limiting potential losses if the price reverses.

**Time Decay** - If the underlying asset has not moved as expected and expiration is approaching, consider exiting early to avoid further losses due to time decay.

### **Rolling the Position**

**Roll Down:** If the underlying asset has moved down (but not significantly enough for max

profit), consider rolling the bear put spread down to lower strike prices with the same or later expiration. This adjustment can lock in some profits and give more room for further downside.

**Roll Forward:** If you need more time for the trade to develop, consider rolling the position to a later expiration date, extending the duration of the trade and allowing the bearish thesis to play out.

#### DETAILS:

**INDEX – NIFTY**

**TIME PERIOD – 2004 – 2024**

**SL = 50% NET PREMIUM**

**TP = 70% NET PREMIUM**



Overall Profit AlgoTest.In	₹ 64,523.75	Average Loss on Losing Trades AlgoTest.In	₹ -303.72	Return/MaxDD AlgoTest.In	2.38
No. of Trades AlgoTest.In	293	Max Profit in Single Trade AlgoTest.In	₹ 4,963.75	Reward to Risk Ratio AlgoTest.In	3.81
Average Profit per Trade AlgoTest.In	₹ 220.22	Max Loss in Single Trade AlgoTest.In	₹ -1,226.25	Expectancy Ratio AlgoTest.In	0.73
Win % AlgoTest.In	35.84	Max Drawdown AlgoTest.In	₹ -4,832.5	Max Win Streak (trades) AlgoTest.In	4
Loss % AlgoTest.In	64.16	Duration of Max Drawdown AlgoTest.In	343 [6/4/2020 to 5/12/2021]	Max Losing Streak (trades) AlgoTest.In	10
Average Profit on Winning Trades AlgoTest.In	₹ 1,158.31			Max trades in any drawdown AlgoTest.In	72

**Win Rate (35.84%)** is on the lower side, but bear put spreads are designed to profit during downward price movements, which may not happen frequently depending on the market conditions.

**Average Profit on Winning Trades (₹1,158.31) vs Average Loss on Losing Trades (₹303.72):** The strategy compensates for the lower win rate by generating *larger profits on winning trades* compared to losses on losing trades.

**Max Profit per Trade (₹4,963.75) and Max Loss per Trade (₹1,226.25):** These numbers indicate that even though the bear put spread is a limited-profit strategy, the individual winners can be much larger than individual losses. This is critical because it suggests that, when the market moves strongly in your favour, the payoff can be significant despite the capped profit potential.

**Max Drawdown (₹4,832.5):** The drawdown is relatively moderate compared to the overall profit. Bear put spreads are designed to limit losses, and this figure aligns with that structure. A bear put spread strategy can face challenges during prolonged **bullish or sideways markets**, which could explain the **long drawdown duration** of almost a year.

**Return/Max Drawdown (2.38):** A strong ratio, indicating that for every ₹1 of drawdown (or maximum loss), the strategy has returned ₹2.38. This is a good indicator of the **risk-adjusted return** of the strategy, particularly for one that is bearish in nature and may face long stretches of market conditions where it does not perform well (such as bull markets).

**Reward to Risk Ratio (3.81):** This means that, on average, for every ₹1 risked, the strategy aims to return ₹3.81 in profit. This ratio is excellent, indicating that the strategy has a high potential for reward in comparison to the risk it takes on.

This strategy would likely perform poorly in **bull markets** or **sideways, low-volatility markets**, where the underlying asset either rises or doesn't decline enough to make the spread profitable. The **low win rate (35.84%)** and **long drawdown duration (343 days)** could be reflective of extended bullish or neutral market conditions.

A **bear put spread** would likely perform well in **strongly bearish markets**, such as during the 2008 financial crisis or the COVID-19 market crash in 2020. In these scenarios, the market declines sharply, which is exactly the type of environment where bear put spreads would thrive.

## TASK 2

**Call Calendar Spread** – is a strategy used when the investor believes that the underlying would either be neutral or slightly bearish in the short term. In this strategy we sell one call option with a near expiry and we buy a call option of a later expiration of the same strike price. We expect to make profit from time decay of the short term call and from increasing volatility in the long run for the long call. The maximum loss is the cost to enter the trade initially while there is an unlimited profit potential. When we enter the trade the price would be either below or at the short call and this call would expire worthless. Then we have to wait to see whether the implied volatility is rising to decide if we want to hold the long call or sell it before the later maturity.



If the **underlying price is above the short call's strike** at the front-month expiration and the investor decides to close both positions, the loss incurred would equal the initial cost of the trade.

If the **underlying price is below the short call's strike**, then the short call will expire worthless and the OTM long call will still have time value remaining so we can decide whether to hold this call or not based on market outlook.

**Scenario 1: Short call with 60 days to expiry and long call with 70 days to expiry.**

### Risk Reward Profile

The **maximum profit** occurs if near the front expiry the underlying price stays below the short call strike since then the short call would expire worthless and we get to keep the premiums. The long call would still have extrinsic value remaining for the last 10 days to expiry. If we believe the underlying to make a good bullish move or we expect high IV in these 10 days

The main risk here comes from the possibility of the underlying asset price moving sharply in either direction.

The **maximum loss** is when the underlying moves significantly in either direction. If the price falls below the strike significantly then both the calls expire worthless OTM. The maximum loss is capped to the net debit paid (net premium).

### Time Decay

Theta or time decay will positively impact the short call and negatively impact the long call. Theta is not very significant for the long call near the front expiry while it does become crucial as the back expiry nears. As a result the short call will experience rapid time decay as we near the front expiry benefiting us. The long call, having a 10-day longer expiration, decays slower initially, but as the gap between the expiration dates narrows, its decay will pick up. During the final 10 days (when the short call has expired and only the long call remains), the long call will experience sharper time decay.

### Volatility

Volatility effects are larger when there is more time left to expiry since there is higher chance that the trade ends up in our favor.

For the short call, the price of it becomes less sensitive to volatility changes and if the volatility drops then it benefits us. Since the long call has a higher Vega due to farther maturity so it is more sensitive to volatility changes.

In overall the spread gains value as volatility increases because long call gains more in value than short call due to higher Vega and so we make profit.

As volatility falls the long call lose more than the short call so the overall spread loses money.

The spread's profit is **Vega Positive** meaning the spread thrives in high volatility market due to the long call option.

## Scenario 2: Short call with 0 days to expiry and long call with 1 day to expiry

### Risk Reward Profile

This is a **near-expiration calendar** spread because both calls have very short time horizons, namely, 0 days for the short call and 1 day for the long call. Any sharp move in the underlying price will immediately impact this situation, thus the risk involved is very high.

The short call is at expiry. If the underlying moves above the strike then the remaining long call will have only one day left to make up for the loss; otherwise, it creates a limitation of opportunity for adjustments and introduces substantial risk of loss right away

The reward is pretty low in this scenario. The long call has only one day of life remaining, so even if the short call expires worthless, the long call will not have much value unless the underlying makes some huge move over the course of that single day

So essentially this setup has high risk and minimal profit potential where the amount of profit depends on 1 day move of the underlying.

### Time Decay

For the **short call** since the expiry is on that day only so the time value part of the premium would have almost completely eroded and theta is maximum now. If the option still has any value left then it would be the intrinsic value which is  $\max(\text{Spot} - \text{Strike}, 0)$  if the option is in the money and the extrinsic (time value) part of it will be close to 0. If the short call did have **intrinsic value** remaining then it **will not expire worthless** otherwise if it is OTM then it will expire worthless.

For the **long call** since it still has a day for expiry so there is some time value left but it is small. But again being this close to expiry theta decay is very high. If the long call is ITM then at expiry it will

retain its intrinsic value. Otherwise it would expire worthless since theta would strip away the time value component.

### **Volatility**

As already mentioned the impact of volatility is high when there is enough time left for expiry but since both the options are almost at expiry so the impact of volatility is insignificant for these. Vega tends to approach 0 when we reach expiry. Even if there is a significant increase in volatility premiums of both the options would not be affected much since their values are derived from intrinsic value.

### **Differing Time Horizons and Performance Analysis**

#### ***Time Decay***

In Scenario 1, we will be better able to handle the impact of time decay which is much more gradual. The short call has nearly two months of life remaining until expiry, so the fall in theta would be slow. In Scenario 2, we are compelled to cope with time decay that is almost extremely rapid.

#### ***Volatility Sensitivity***

For Scenario 1, the longer the expiration, the more we have an opportunity to adjust for volatility. The increases in implied volatility will now have an even greater impact, especially on the long call, with 70 days to expiration. For Scenario 2, volatility has no impact whatsoever, as the options are nearly expiring.

#### ***Sensitivity to Price Movements***

Scenario 2 is much more sensitive to immediate price movements as the time to expiration is very short. We will look forward to having the underlying asset move in a price movement desired almost at once for the position to be viable. In Scenario 1, the trader can afford to wait for gradual price movements because it takes longer for the position to build and the shares to change.

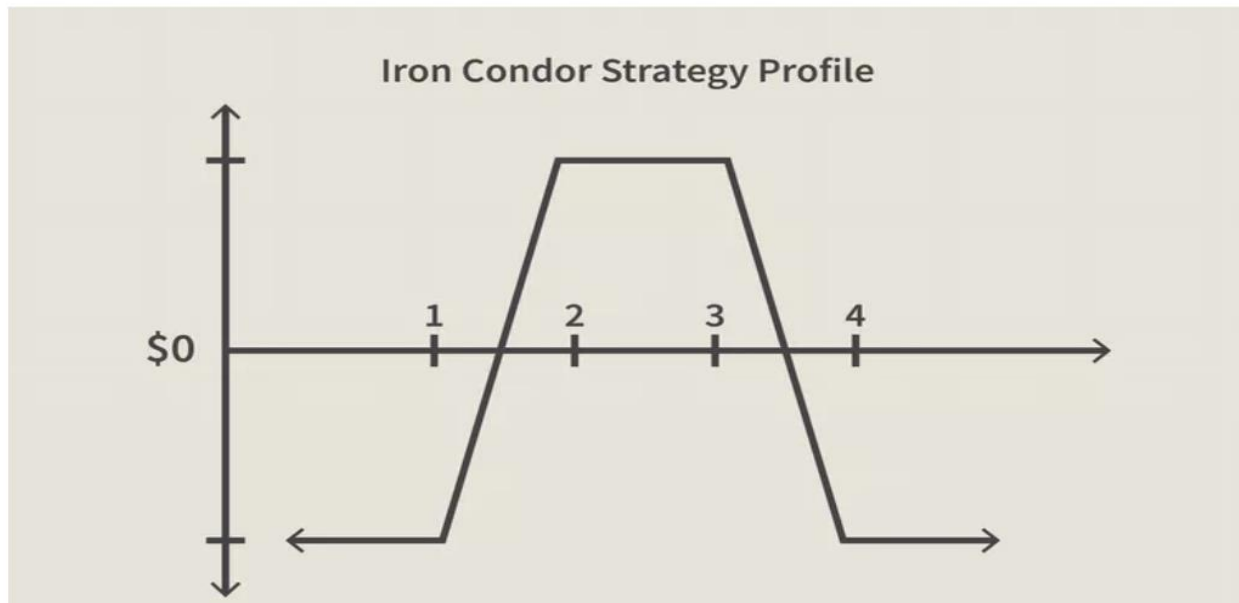


### Task 3: Best Options-Based Strategy Development

#### Strategy used:

##### *Iron Condor*

It is a strategy which involves two put options (one long, one short) and two call options (one long, one short) at four different strike prices but same expiry. It thrives in a low volatile or sideways market where the underlying does not move much. It is a delta neutral strategy which gains maximum profit when the underlying does not move much.



Purchase one out-of-the-money (OTM) put with a strike price below the current level of the underlying asset to guard against a significant downside move.

Sell one OTM or at-the-money (ATM) put with a strike price closer to the current price of the underlying asset.

Sell one OTM or ATM call with a strike price above the current price of the underlying asset.

Purchase one OTM call with a strike price further above the current level of the underlying asset to protect against a substantial upside move.

Due to this setup this strategy has limited risk in either directions because of the long OTM options which protect against sharp moves. The max loss occurs if the price moves above long call or below long put. The max profit occurs when the price is between the middle strike prices at expiry so we can collect the premium received by selling the options.

This strategy has two breakeven points 1 between the two call strikes and other between the two put strikes.

***Max Profit = Premium received***

***Max Loss = Long call strike – long put strike – net premium***

***B/E 1 = short put strike – net premium received***

***B/E 2 = short call strike + net premium received***

### Entry, Exit and Risk Management in Bull Call Spread

#### Entry Rules:

**IV** - Look for a **VIX level of 20-25** or above to sell Iron Condors, as premiums will generally be higher due to increased volatility. However, if VIX is too high (above 30), the market may be more unpredictable, and large moves can blow through your strikes. An Iron Condor performs best when the implied volatility is higher than average but is expected to decrease or remain stable.

**Time to expiry** - **30-45 days to expiration** would be optimal for entering the trade. This timeframe allows for enough premium collection while still benefiting from the acceleration of time decay (theta) as expiration approaches.

#### Exit Rules:

**Profit target** - Close the Iron Condor trade when you can capture 50-70% of the maximum profit. This helps you retain most of the profit and avoid further volatility and risk of losing the collected premium if the market gives a sudden move in either direction.

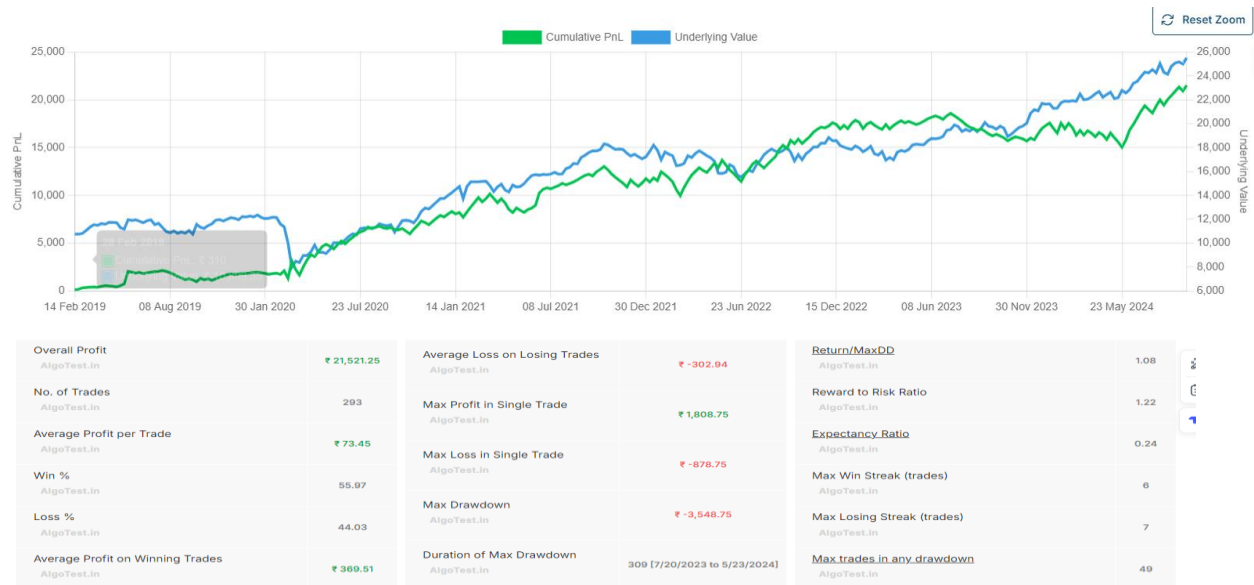
**Stop Loss** - A typical stop loss would be around 50%- 100% of max loss or we can also set it in such a way as to get an optimal risk –reward ratio of let's say 1:2 being conservative.

**Closing the trade 7-10 days before expiration** is a common approach to avoid excessive gamma risk, even if the profit target hasn't been reached yet. Time decay (theta) is highly nonlinear, and sharp moves close to expiration can quickly erode any gains or deepen losses.

#### Risk Management:

**Rolling Strategies** - If the underlying asset approaches one of your short strikes (either on the call or put side), consider **rolling the untested side** closer to the money to collect more premium and reduce overall delta risk. **Rolling up/down the tested side** (moving the short strikes further out in time) is also possible if you're willing to extend the trade's duration.

**Delta hedging** - If the underlying price moves toward the short call strike, the delta of the call spread increases, making your position more sensitive to further upward price movements. Similarly, if the price moves toward the short put strike, the delta of the put spread increases, making your position more sensitive to downward movements. **Delta hedging allows you to reduce this directional risk.** By buying or selling shares (or ETFs) of the underlying asset, you can counteract the changes in delta, effectively flattening your overall delta exposure. Iron condor is a delta neutral strategy and by delta hedging we aim to keep it this way.



The strategy wins in 55.97% of trades, indicating an excellent win rate. For an Iron Condor, a neutral-to-slightly-bullish market is ideal for max profits and this indicates the market was mostly in favor of this. The average profit on winning trades is slightly greater than average loss on losing trades which is decent considering a win rate of more than 50%.

The max profit on single trade is more than twice the max loss on single trade which is favorable for us since the strategy performs well in good time than the risk associated in bad times.

The overall profit is lesser than other strategies because the 4 legged strategy tends to cap risks but it also tends to cap the profits.

The maximum drawdown (the largest peak-to-trough decline) is ₹-3,548.75. While not a huge figure relative to total profit, this indicates that there have been periods where the strategy struggled. Duration of Max The duration of the maximum drawdown lasted 309 days, meaning the strategy took almost a year to recover from its worst performance period. This could indicate that the strategy underperforms during certain market conditions and can take time to rebound. A ratio of 1.08 suggests the overall returns slightly exceed the maximum drawdown. Ideally, a higher ratio (above 2) would show better risk-adjusted returns. This indicates a **moderate risk profile** — the profits barely compensate for the drawdowns.

In comparison with the other systems, this strategy will likely produce consistent profits and a good expectancy ratio but probably at the expense of outsized returns. Overall, it shows good performance in low-volatility and range-bound markets with a modest win rate and acceptable risk/reward balance.

