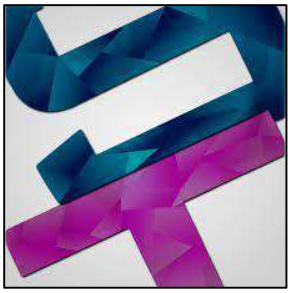

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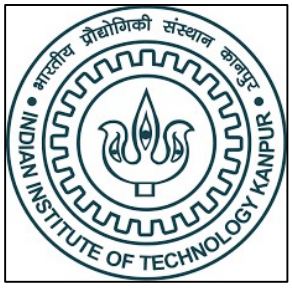

OPTION STRATEGIES & HEDGING A CORPUS

FINAL DOCUMENTATION

Sunday,24 July 2022

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Acknowledgement

We are immensely grateful to the Finance and Analytics club, IIT Kanpur and Science and Technology Council, IIT Kanpur for providing us with resources and motivation for this summer project. We thank our mentors: Sujal Harkut and Yash Manihar and Aditya Anand for their guidance, constant support and invaluable inputs without which we would not be able to do this project in a timely manner.

2. Basic Terminology in Stock Market

2.1 Why to invest?

To Fight Inflation: By investing one can deal better with the inevitable, growing cost of living, generally referred to as inflation.

1. To Create Wealth – By investing, one can aim to have a better corpus by the end of the defined time period.
2. Investing fulfills the investor's life's financial aspiration.
3. Investing benefits, the investor from Power of Compounding.

2.2 Where to invest?

When it comes to investing, one has to choose an asset class that suits the individual's risk and return temperament. An asset class is a category of investment with particular risk and return characteristics. The following are some of the popular asset classes.

1. Fixed income instruments
2. Equity
3. Real estate
4. Commodities (precious metals)

2.3 The Stock Market

2.3.1 OHLC

It refers to the stock's open, high, low and close price for a certain time period.

2.3.2 Market Capitalisation

Market capitalization is the aggregate valuation of the company based on its current share price and the total number of outstanding stocks. It is calculated by multiplying the current market price of the company's share with the total outstanding shares of the company.

For instance, a company has 20 million outstanding shares and the current market price of each share is Rs100. Market capitalization of this company will be 200,00,000 x 100=Rs 200 crore.

2.3.3 CAGR

It stands for Compounded Annual Growth Rate. CAGR (Compound Annual Growth Rate) measures your investments' average annual growth over a given period. It shows you the average rate of return on your investments over a year. CAGR is a helpful tool for investors because it precisely measures investment growth (or decline) over time.

The formula for calculation for CAGR is as follows:

$$CAGR = \left(\frac{End\ Value}{Begin\ Value}\right)^{\frac{1}{years}} - 1$$

2.3.4 Volatility

It is a rate at which the price of a security increases or decreases for a given set of returns. Volatility is measured by calculating the standard deviation of the annualized returns over a given period of time. It shows the range to which the price of a security may increase or decrease. Volatility measures the risk of a security. It is used in option pricing formula to gauge the fluctuations in the returns of the underlying assets.

2.3.5 Return

A return is the change in price of an asset, investment, or project over time, which may be represented in terms of price change or percentage change.

2.4 Indices in Stock Market

An index is a group or basket of securities, derivatives, or other financial instruments that represents and measures the performance of a specific market, asset class, market sector, or investment strategy.

Sensex and Nifty are two most important indices in India. They are the benchmark indices meaning, the important ones, a standard point of reference for the entire stock market in India.

A stock Market in India is an indicator of its respective stock exchange. Hundreds and thousands of companies are listed on both the exchanges but indicators are a gauge of only a few top performing companies.

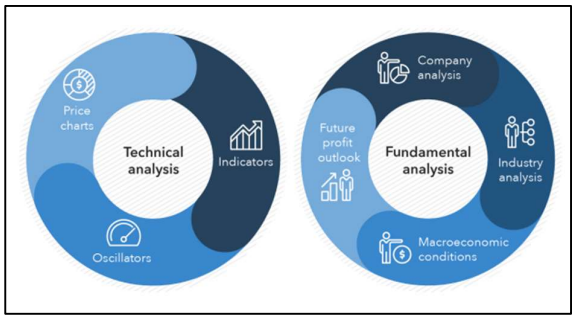
2.5 Fundamental Analysis

Fundamental Analysis is the art of evaluating the intrinsic value of a stock to find long-term investing opportunities. Fundamental analysis uses revenues, earnings, future growth, return on equity, profit margins, and other data to determine a company's underlying value and potential for future growth. It mainly consists of three parts of analysis:

1. Economic Analysis
2. Industry Analysis
3. Company Analysis

For a stock, fundamental analysis typically includes reviewing many elements related to stock prices, including:

- Performance of the overall industry in which the company participates.
- Domestic political environment.
- Relevant trade agreements and external politics.
- Company's financial statements and press releases.
- News released related to the company and its business.
- Competitor analysis with its peer group.



2.6 Technical Analysis

Technical Analysis seeks to predict price movement by examining historical data, mainly price and volume. Most Technical analysis is focussed on determining whether or not a current trend will continue and if not, will it reverse.

2.6.1 Support and Resistance

The support price is a price at which one can expect more buyers than sellers. Likewise, the resistance price is a price at which one can expect more sellers than buyers. The resistance level is always above the current market price. The support level is always below the current market price.

2.6.2 Indicators

A technical indicator helps a trader analyse the price movement of security. Indicators are independent trading systems introduced to the world by successful traders. Indicators are built on pre-set logic using which traders can supplement their technical study (Candlesticks, Volumes, S&R) to arrive at a trading decision. Indicators help in buying, selling, confirming trends, and sometimes predicting trends.

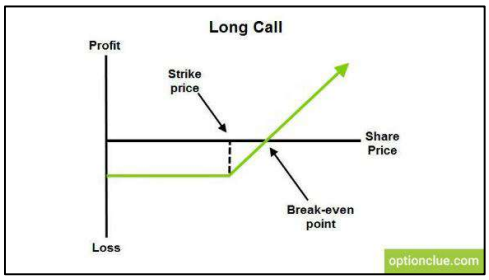
3. Option Theory in Trading

The term '*option*' refers to a financial instrument that is based on the value of underlying securities such as stocks and indexes. Each contract will have a specific expiration date by which the holder must exercise their option. The stated price on an option is known as the strike price.

Call Option

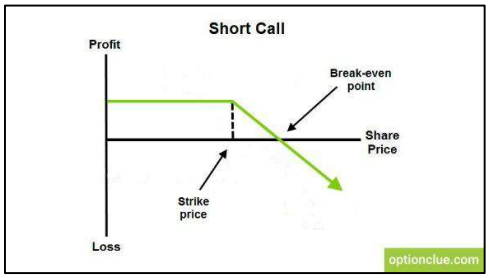
The buyer of the call option has the right, but not the obligation to buy an agreed quantity of a particular commodity or financial instrument (the underlying) from the seller of the option at a certain time (the expiration date) for a certain price (the strike price).

3.1 Long Call Option



Long Call option' is the most basic & simplest strategy. It is implemented when we expect the underlying asset to show significant upside move i.e., this is a directional strategy where we are bullish on the market direction.Buying a Call or Long Call is the same as future but capped with downside risk and requires less margin for implementation.

3.2 Short Call Option

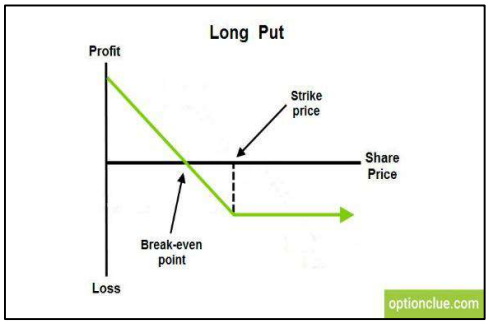


Short Call option is a simple but risky strategy & hence qualified as an advanced strategy. Short Call or Selling Call is recommended when the price of the underlying asset is expected to fall & the stock is not expected to rise further or remain sideways. Generally, we expect the price to stay below the sold strike price.

Put Option

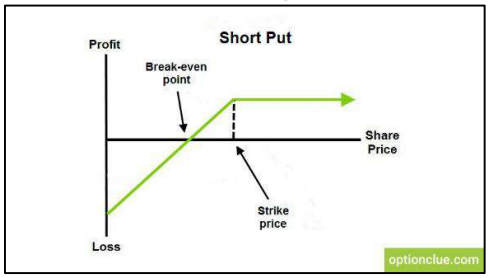
Put option is a derivative contract between two parties. The buyer of the put option earns a right (it is not an obligation) to exercise his option to sell a particular asset to the put option seller for a stipulated period of time.

3.3 Long Put Option



Long Put option' is again the most basic & simplest strategy among all. It is recommended or implemented when we expect the underlying asset to show significant downside move in near term i.e., this is directional strategy where we are bearish on the market direction. Buying a Put or Long Put is the same as the future but capped with upside risk and requires less margin for implementation.

3.4 Short Put Option



Short Put option is a simple but risky strategy & hence qualified as an advanced strategy. Short Put or Selling Put is recommended when the price of the underlying asset is expected to rise & the stock is not expected to fall further and remain sideways. Generally, we expect the price to stay above the sold strike price.

4. Black Scholes Model

Black-Scholes is a pricing model used to determine the fair price or theoretical value for a Call or a Put option.

The quantum of speculation is more in case of stock market derivatives and proper pricing of options eliminates the opportunity for any arbitrage.

The model is used to determine the price of a European call option which simply means that the option can only be exercised on the expiration date.

Though usually accurate, the Black-Scholes model makes certain assumptions that can lead to prices that deviate from the real-world results.

The Black-Scholes model requires five input variables: the strike price of an option, the current stock price, the time to expiration, the risk-free interest rate, and the volatility.

The formula for Black-Scholes Model is a given below:

$$C = N(d_1)S_t - N(d_2)Ke^{-rt}$$

$$\text{where } d_1 = \frac{\ln \frac{S_t}{K} + (r + \frac{\sigma^2}{2})t}{\sigma\sqrt{t}}$$
$$\text{and } d_2 = d_1 - \sigma\sqrt{t}$$

4.1 Derivatives Greeks

The variables that are used to assess risk in the options market are commonly referred to as the Greeks. Each Greek variable is a result of an imperfect assumption or relationship of the option with another underlying variable. Greeks are used by options traders and portfolio managers to understand how their options investments will behave as prices move, and to hedge their positions accordingly.

4.1.1 Delta

Delta is a ratio that relates changes in the price of a security such as company stock to a change in the price of a derivative of that stock.
Consider that you have a stock worth Rs. 5428 and a Call option on that stock is worth Rs.170. Further assume that the delta is 0.50. This indicates that the value of the Option is expected to rise by 0.50 Rs. for every 1 Rs. increase in the price of the stock. If the stock price moves to Rs. 5448, then the value of the option becomes Rs.180.

4.1.2 Theta

The term theta refers to the rate of decline in the value of an option due to the passage of time. It can also be referred to as the time decay of an option. This means an option loses value as time moves closer to its maturity as long as everything is held constant. Theta is generally expressed as a negative number and can be thought of as the amount by which an option's value declines every day.

A theta of -6.70 means that Option will lose 6.70 on a daily basis if all other factors are held constant.

4.1.3 Gamma

Gamma is the first derivative of delta and is used when trying to gauge the price movement of an option, relative to the amount it is in or out of the money. In that

same regard, gamma is the second derivative of an option's price with respect to the underlying price. Gamma is the rate of change in an option's delta per 1-point move in the underlying asset's price.

5. Option Strategies

5.1 Butterfly Strategy

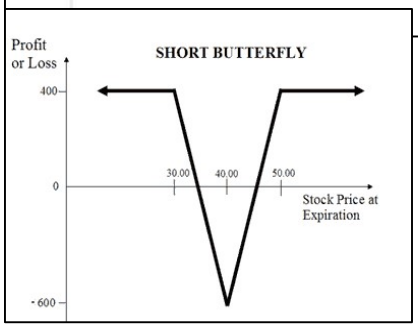
A butterfly is a limited risk, non-directional options strategy that is designed to have a high probability of earning a limited profit when the future volatility of the underlying asset is expected to be lower or higher than that asset's current implied volatility.

5.1.1 Long Call Butterfly

This strategy makes profit if the underlying stock is at the body of the butterfly at expiration. Combining two short calls at a middle strike, and one long call each at a lower and upper strike creates a long call butterfly. The upper and lower strikes

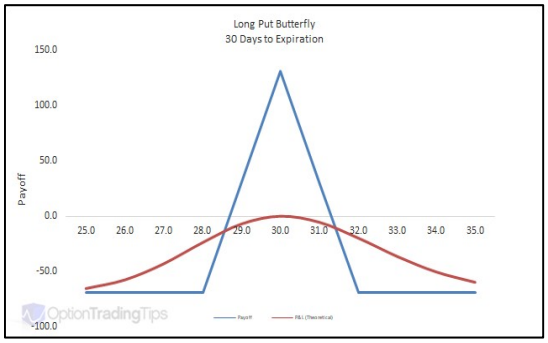
(wings) must both be equidistant from the middle strike (body), and all the options must have the same expiration date.

5.1.2 Short Call Butterfly



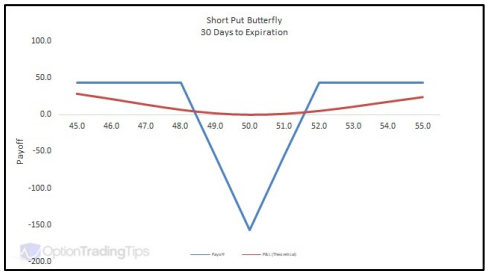
This strategy profits if the underlying stock is outside the wings of the butterfly at expiration. A short call butterfly consists of two long calls at a middle strike and short one call each at a lower and upper strike. The upper and lower strikes (wings) must both be equidistant from the middle strike (body), and all the options must have the same expiration date.

5.1.3 Long Put Butterfly



This strategy profits if underlying stock is at body of the butterfly at expiration. A long-put butterfly is composed of two short puts at a middle strike, and long one put each at a lower and a higher strike. The upper and lower strikes(wings) must both be equidistant from the middle strike (body), and all the options must be the same expiration.

5.1.4 Short Put Butterfly

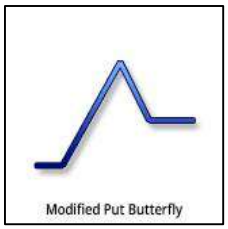


This strategy profits if the underlying stock is outside the wings of the butterfly at expiration. Buying two puts at a middle strike, and selling one put each at a lower and upper strike results in a short put butterfly. The upper and lower strikes (wings) must both be equidistant from the middle strike (body), and all the options must be the same expiration.

5.1.5 Modified Call Butterfly

Modified Call Butterfly is similar to Long Call Butterfly, but the difference between the strike of the middle Call and the higher Long Call is smaller than the difference between the strike of the lower Call and the other middle Call. Consequently, the profit is maximised when the share price closes close to the middle components' strike price. This strategy requires the investor to pay close attention to details. To establish the position, the trader must buy a lower strike ITM Long Call, sell two middle ATM Short Calls, and buy a higher strike OTM Long Call. The investor can profit from increasing share prices or the share prices moving within given limits.

5.1.6 Modified Put Butterfly



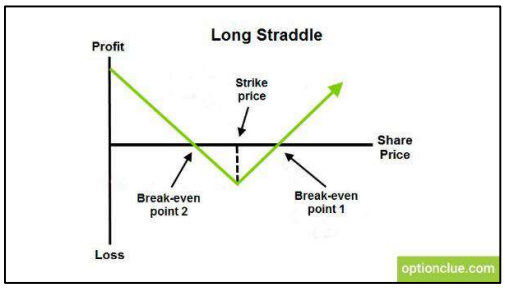
Modified Put Butterfly is similar to Long Put Butterfly, but the difference between the strike of the middle Call and the higher Long Call is smaller than the difference between the strike of the lower Call and the other middle Call. This strategy is very similar to the Modified Call Butterfly. The profit is maximised when the share price closes close to the middle components' strike price. This strategy requires the investor to pay close attention to details. To establish the position, the trader needs to have a lower strike Long Put, two middle ATM Short Puts, and higher strike OTM Long Put in the portfolio. The investor can profit from increasing share prices or the share prices moving within given limits.

5.2 Straddle Strategy

A straddle is an options strategy involving the purchase of both a put and call option for the same expiration date and strike price on the same underlying security. The strategy is profitable only when the stock either rises or falls from the strike price by more than the total premium paid.

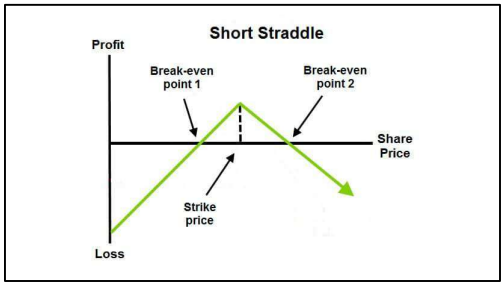
5.2.1 Long Straddle

This strategy consists of buying a call option and a put option with the same strike price and expiration. A long straddle is a combination of buying a call and buying a put,



both with the same strike price and expiration. Together, they produce a position that should profit if the stock makes a big move either up or down.Typically, investors buy the straddle because they predict a big price move and/or a great deal of volatility in the near future.

5.2.2 Short Straddle



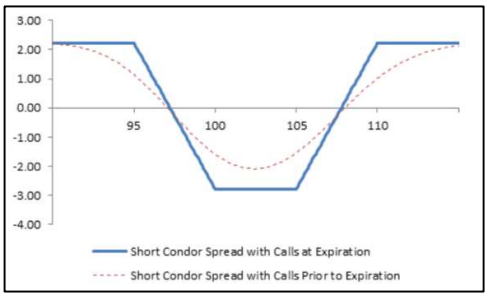
This strategy involves selling a call option and a put option with the same expiration and strike price. A short straddle is a combination of writing uncovered calls (bearish) and writing uncovered puts (bullish), both with the same strike price and expiration. Together, they produce a position that predicts a narrow trading range for the underlying stock.

5.3 Condor Strategy

A condor is a limited-risk, non-directional options trading strategy consisting of four options at four different strike prices.

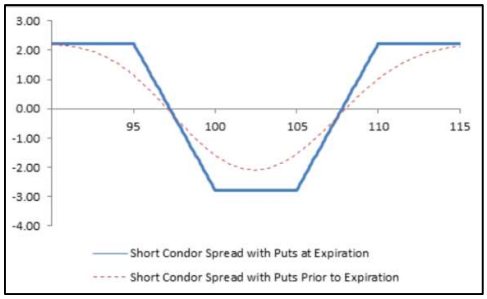
5.3.1 Short Call Condor

A short call condor is a four-leg strategy that is created by selling one call at a lower strike price, buying one call with a higher strike price, buying another call with an



even higher strike price and selling one more call with an even higher strike price. All calls have the same expiration date, and the strike prices are equidistant.

5.3.2 Short Put Condor

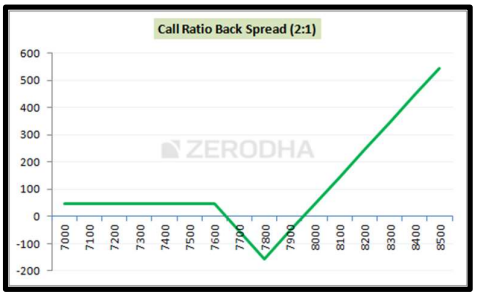


A short put condor is a four-part strategy that is created by selling one put at a higher strike price, buying one put with a lower strike price, buying another put with an even lower strike price and selling one more put with an even lower strike price. All puts have the same expiration date, and the strike prices are equidistant.

5.4 Spread Strategy

A strategy that involves a position in one or more options so that the cost of buying an option is funded entirely or in part by selling another option in the same underlying.

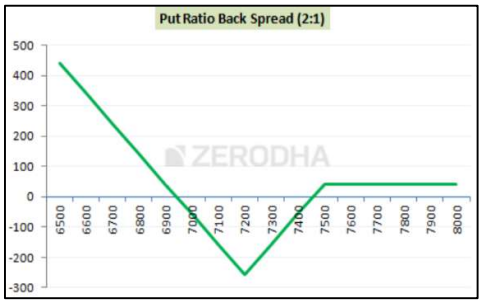
5.4.1 Call Ratio Backspread



A call ratio backspread is a bullish options strategy that involves buying calls and then selling calls of different strike price but same expiration, using a ratio of 1:2, 1:3, or 2:3. In the long call ratio backspread, more calls are purchased than are sold. A call backspread is a bullish spread strategy that seeks to gain

from a rising market, while limiting potential downside losses.

5.4.2 Put Ratio Backspread



A put ratio backspread is an options trading strategy that combines short puts and long puts to create a position whose profit and loss potential depends on the ratio of these puts. Put ratio spread is constructed to have unlimited potential profit with limited loss, or limited potential profit with the prospect of unlimited loss, depending on how it is structured. The ratio of long to short puts in a put ratio backspread is typically 2:1, 3:2 or 3:1.

5.4.3 Ratio Call Spread

A call ratio spread involves buying one ATM or OTM call option, while also selling or writing two call options that are further OTM at higher strike.

5.4.4 Ratio Put Spread

A put ratio spread is buying one ATM or OTM put option, while also writing two further options that are further OTM at lower strike.

Submitted Assignment PDF

https://drive.google.com/file/d/1L-pDXENuEyWsjiLocqm85iOOe_RmkU_7/view?usp=sharing

6. Opstra Strategy Builder

Opstra Options Strategy builder is a platform for Options and Futures traders. It provides many tools for trading derivatives, Some of these include Options Simulator, Options backtesting, Implied Volatility Chart, Option Chain Analysis and much more. Both beginners, as well as advanced traders, can use this platform as it offers all the necessary features for both these groups.

6.1 Tools in Opstra: Opstra Option Analytics Software offers a wide variety of tools such as:

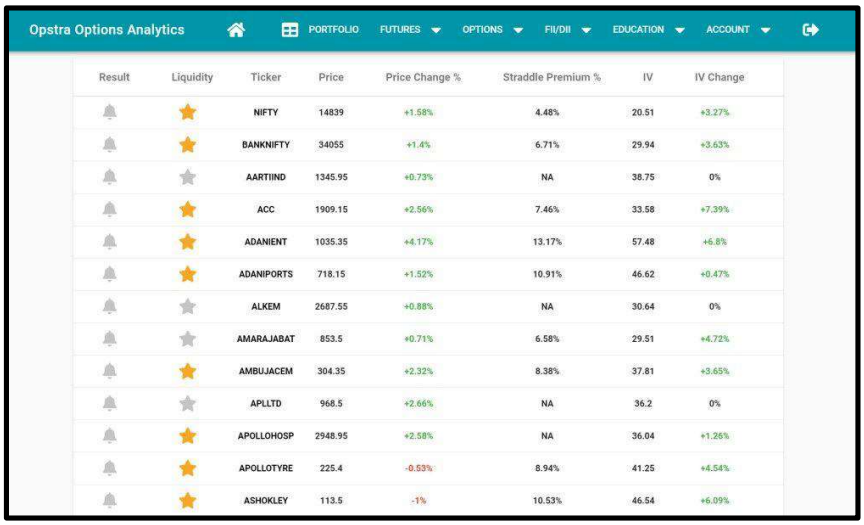
6.1.1 Options Algorithm

Options Algorithm enables users to find out Option trading opportunities on their desired asset based on real-time data. The options algorithm provides various parameters and signals based on which a Buying or selling signal is provided based on which one can trade the underlying asset.

6.1.2 Options Dashboard

Options dashboard provides all the information about Option data like Price change, Straddle Premium%, Total IV (Implied Volatility), IV change for Stocks and Indexes.

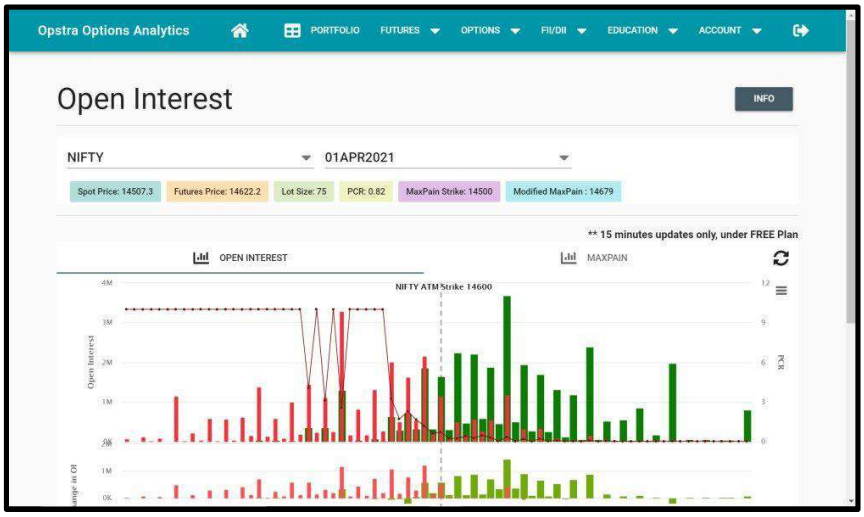
All these data are useful for options traders as these provide basic information about how the overall market sentiments are. The overall data can be seen as shown in the image below:



Result	Liquidity	Ticker	Price	Price Change %	Straddle Premium %	IV	IV Change
		NIFTY	14839	+1.58%	4.48%	20.51	+3.27%
		BANKNIFTY	34055	+1.4%	6.71%	29.94	+3.63%
		AARTIIND	1345.95	+0.73%	NA	38.75	0%
		ACC	1909.15	+2.56%	7.46%	33.58	+7.39%
		ADANIENT	1035.35	+4.17%	13.17%	57.48	+6.8%
		ADANIPORTS	718.15	+1.52%	10.91%	46.62	+0.47%
		ALKEM	2687.55	+0.88%	NA	30.64	0%
		AMARAJABAT	853.5	+0.71%	6.58%	29.51	+4.72%
		AMBUJACEM	304.35	+2.32%	8.38%	37.81	+3.65%
		APLLTD	968.5	+2.66%	NA	36.2	0%
		APOLLOHOSP	2948.95	+2.58%	NA	36.04	+1.26%
		APOLLOTYRE	225.4	-0.53%	8.94%	41.25	+4.54%
		ASHOKLEY	113.5	-1%	10.53%	46.54	+6.09%

6.1.3. Open Interest Analysis

The Open Interest section provides the Important data points of Open Interest and the Max Pain. Max pain is the Strike Price where the highest amount of Open Interest is placed. Opstra provides all the calculated data of the real time change and change percentage of Open Interest and Max Pain. This also provides the real-time Put-Call ratio of the Index as well as of the individual stocks. The Open Interest chart can be viewed as shown below in the image.

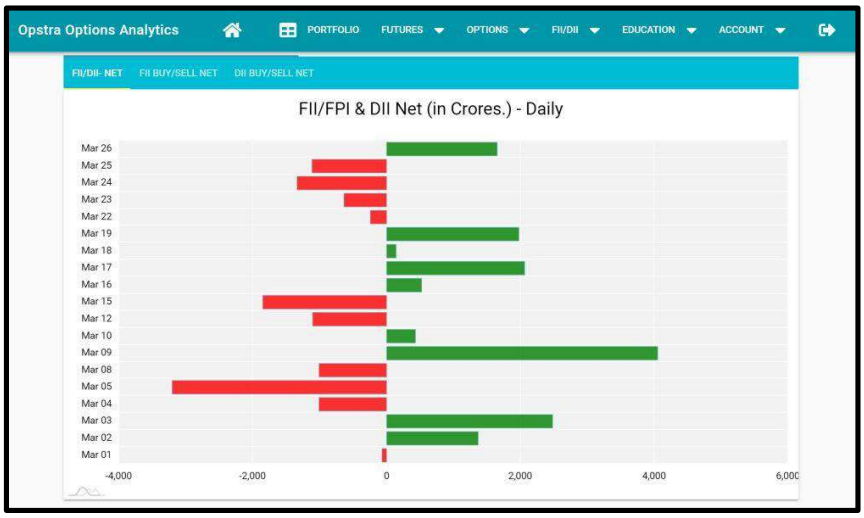


6.1.4. Results Calendar and Results Timing

The results calendar comes in handy for Traders who make trades based on the Results of any Stock option. Results can cause the Price of the Stock to be very Volatile which benefits the Option traders as they deploy option strategies that can benefit from the increase in Implied Volatility. The Historic Results Timing gives the exact time of the previous Earnings release time from which a Trader can anticipate the exact time on which the results might be declared.

6.1.5. FII/DII Actions

Opstra also gives important data about the FIIs (Foreign Institutional Investors) and DIIs (Domestic Institutional Investors). These two data alone tells a lot about the current market sentiments. If one of these Parties is on the Buy or Sell-side largely then the whole market moves in that direction to some extent. Opstra provides this data in a very detailed and convenient way. It gives access to the users the FII & DII data separately in the Cash Market as well as the Derivatives market. One can check the data on a daily basis or Yearly basis. A sample of the interface of this feature is shown in the image below.



As seen above the FII & DII's Buying and selling action can be clearly seen by the green and red bars. The Green Bar denotes Buying by the FII & DII and Red Bars denotes Selling by them. The individual figures in Crores are also available for more detailed analysis.

6.1.6 In the Options section, there are some more useful tools like these given below:

- Options Backtesting
- Options Simulator
- Options Algorithm
- Straddles

These features are a great tool for Advanced Option Traders who use multi-leg Option strategies. The Options Backtesting and Options Algorithm can be a useful tool for professional and advanced traders.

7. Combinations of Strategies

Traders and investors use combinations for a wide variety of trading strategies because they can be constructed to provide specific risk-reward payoffs that suit the individual's risk tolerance and preferences and expectations for the current market environment.

7.1 What is a Combination?

In options trading a combination is a blanket term for any options trade that is constructed with more than one option type, strike price, or expiration date on the same underlying asset. These trades can have a wide variety of strategies including extracting profit from up, down, or sideways trends in the

market. Combinations offer carefully tailored strategies for specific market conditions.

7.2 Why to use combinations of strategies?

Depending on the individual's needs, option combinations can create risk and reward profiles which either limit risk or take advantage of specific options characteristics such as volatility and time decay. Options combination strategies take advantage of the many choices available in the options series for a given underlying asset.

7.2.1 Strategy for Sideways/Neutral Market

- Iron Butterfly(🦋)

  It is a combination of two vertical spreads of differing types: a bull put spread and a bear call spread. These spreads may or may not share a central strike price. Its goal is to profit from low volatility in the underlying asset. In other words, it earns the maximum profit when the underlying asset closes at the middle strike price at expiration.

7.2 Strategy for Volatile Market

A very popular combination for this category is Long Straddle and long strangle, gives profit for high volatility irrespective of whether market goes upside or downside.

7.3 Strategy for Trending Market

For bullish trend one can use the combination like buy put option and sell call option, another one is bear Put spread and bear call spread, similarly a

combination of long straddle and long Strangle, bear put spread and bear call spread, etc is good for bullish trend. These combination gives an accuracy and profit more than using single option strategies for this type of market.

8. Correlation of Indian market with Singapore market

8.1 What is SGX (Singapore Exchange) Nifty?

SGX Nifty is a derivative of the Nifty index, which is traded in the Singapore stock exchange platform, where this trade sets a predetermined price of a share and reduces the future risk of any investments.

As the Singapore Stock Exchange is the leading stock exchange in India, the SGX nifty helps to predict and observe the behaviour of the Indian Nifty and thus has an important role to play in the Indian stock market.

8.2 How does SGX Nifty impact the Indian Market?

There is a time difference between the Indian Nifty and the SGX Nifty, wherein the Singapore market opens about two and a half hours before the Indian market. This allows investors to keep an eye on the SGX nifty to know the fluctuations in the market and observe how the overall trading process is going. By observing this, the investors get an idea about the Indian market and whether it will open with positive or negative results.

Although this may be a convenient way to judge the Indian market and weigh out your chances, not all results these investors get are accurate and subject to the various economic factors existing in both countries. As both these countries—India and Singapore have very different economic structures it has different yet prominent effects on the market behaviour.

8.3 Advantage of Trade using SGX Nifty

Encourages more foreign investors to invest in the Indian derivative market. The proximity in location between India and Singapore ensures that there is better connectivity between the two exchanges and lesser time lapse. It serves as a good alternative to investors who do not have access to Indian markets especially if they seek to transact in terms of US Dollars. The expanded working hours of SGX Nifty provides leverage in transactions, especially with regard to the hedge funds. The 16 hour time window also allows market participants to take a view on the Indian markets

based on overnight developments in Wall Street enhancing their decision making capacity.

8.4 Disadvantage of Trade using SGX Nifty

SGX Nifty is more volatile than NSE Nifty, affected by world economic cycles and global political events. Indian residents are prohibited from trading in SGX Nifty contracts. Difference Between SGX Nifty and NSE Nifty. The Indian stock market opens at 9:15 AM and closes at 3:30 PM, providing it a six and a half hour window to operate. The SGX Nifty, on the other hand, operates from 6:30 AM to 11:30 PM IST, trading for 16 hours a day in the Singapore Stock exchange. The longer trading hours on the SGX ensures that the impact of global events is more advanced on the stocks traded in that exchange. Additionally, the SGX Nifty futures is referred to by the traders for early decision making as juxtaposed to NSE Nifty.