OPTIONS VALUATIONS AND STRATEGIES

Module 5

PRICE DIFFERENCE APPROACH

Price Difference Approach

The Price Difference Approach, also known as the Dollar Price Differential or Dollar-Offset Approach, is a method used in options trading and valuation. This approach focuses on the absolute dollar difference between the current stock price and the option's strike price.

Price Difference Approach

Determine the potential profit or loss based on the calculated price difference. This is done by considering the option premium paid or received.

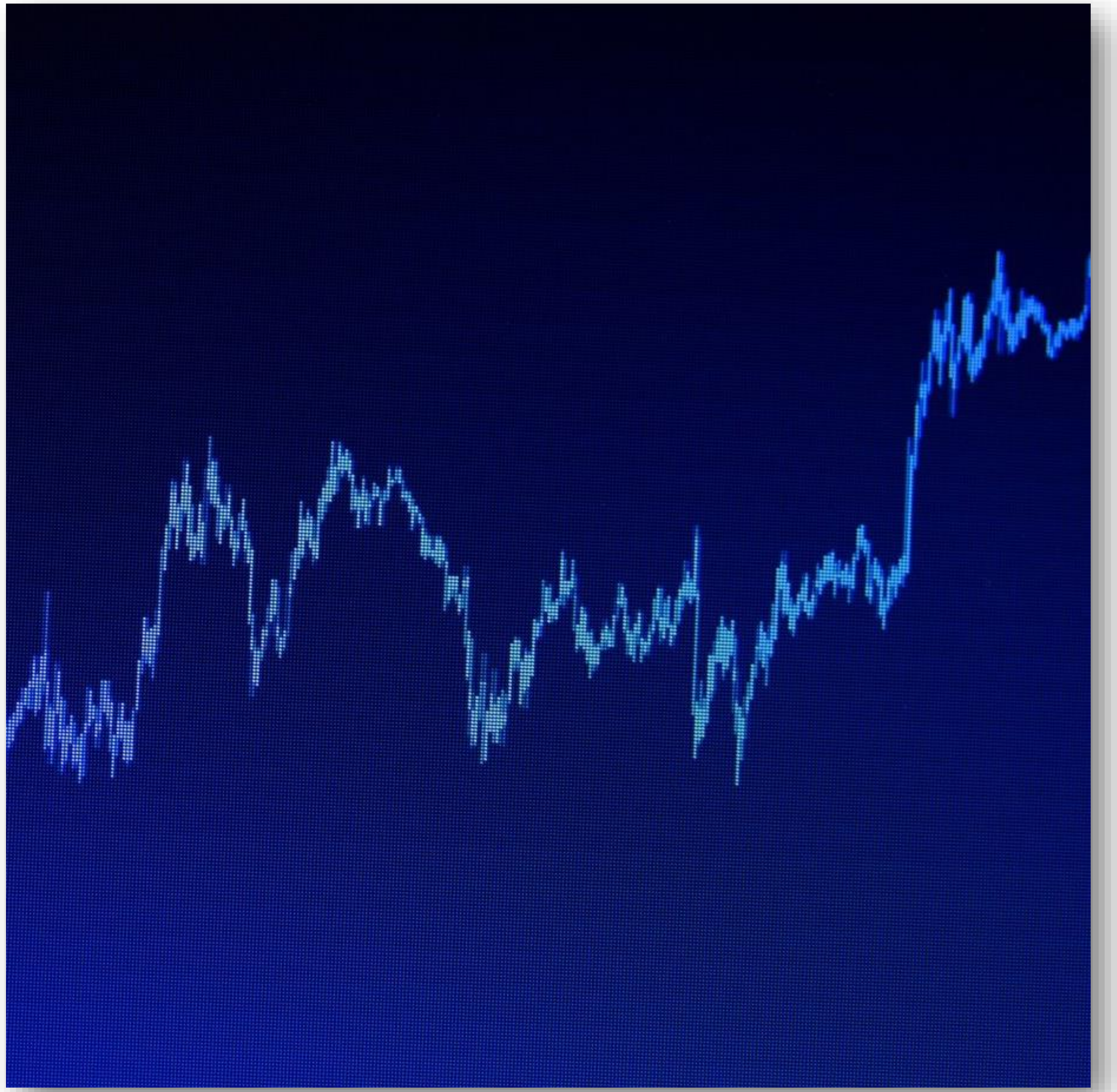
If the option is a call and the stock price is higher than the strike price, the profit is calculated as Stock Price−Strike Price−Call PremiumStock Price−Strike Price−Call Premium.

If the option is a put and the stock price is lower than the strike price, the profit is calculated as Strike Price−Stock Price−Put PremiumStrike Price−Stock Price−Put Premium.

Price Difference Approach

Calculate the absolute dollar difference between the current stock price and the strike price of the option.

Price Difference=|Current Stock Price−Option Strike Price/Price Difference=|Current Stock Price−Option Strike Price|



Expected Gains Approach

Expected Value (EV): This is a statistical concept that represents the average outcome of a series of potential scenarios, each weighted by its probability of occurrence. In options trading, the expected value can be used to estimate the potential gains or losses of a particular strategy.

Probability Analysis: Traders often use probability analysis to assess the likelihood of different market scenarios and their impact on option positions. Tools like the Black-Scholes model or more sophisticated simulations can help estimate the probability of reaching certain price levels.

Risk-Return Profile: Assessing the risk-return profile of an options strategy involves analyzing the potential gains and losses at different stock price levels. This helps traders make informed decisions based on their risk tolerance and market outlook.

BINOMIAL MODEL

The Binomial Model is a mathematical model widely used in finance for pricing options. It provides a discrete-time framework for valuing options, where the underlying asset's price can change in discrete intervals over time. The model is particularly useful for valuing American-style options, which can be exercised at any time before expiration.

Time Discretization:

Time is divided into discrete intervals or steps.
For example, consider a European call option with an expiration of TT years. The time to expiration is divided into nn intervals of length
Δt=Tn**Δ**t=nT

Asset Price Movement:
In each time step, the underlying asset's price can move up or down by a certain factor.
The factor is usually denoted by uu for an upward movement and dd for a downward movement.
The stock price at each node in the model is determined by multiplying the previous price by uu for an up movement and dd for a down movement.

Risk-Neutral Probability:
The probability of an up or down movement is calculated based on a risk-neutral probability measure, often denoted by pp.
The risk-neutral probability is derived to ensure that the expected return on the stock is equal to the risk-free rate.

Option Valuation: At each node in the model, the option value is calculated by considering the discounted expected value of future cash flows. For a call option, the value at each node is the maximum of either the difference between the stock price and the strike price (S−KS−K) or zero. For a put option, the value at each node is the maximum of either the difference between the strike price and the stock price (K−SK−S) or zero.

RISK NEUTRAL METHOD

The Risk-Neutral Method is a concept used in financial mathematics, particularly in the context of option pricing. The key idea is to value financial derivatives, such as options, by assuming a risk-neutral probability measure. This measure is chosen in such a way that, under it, all risky assets are treated as if they grow at the risk-free rate.

Assumption of Constant Risk-Free Rate:

The method assumes a constant risk-free interest rate over the life of the derivative.

The present value of future cash flows, including the payoff of the derivative at expiration, is calculated by discounting these cash flows at the risk-free rate.

The present value represents the fair market value of the derivative under the risk-neutral measure.

Under the risk-neutral measure (QQ), the expected return on any risky asset is equal to the risk-free rate.
The risk-neutral measure is used to discount future cash flows in order to calculate the present value of the derivative.

BLACK-SCHOLES MODEL

The Black-Scholes Model is a mathematical model used for calculating the theoretical price of European-style options. Developed by economists Fischer Black and Myron Scholes in 1973, with contributions from Robert Merton, the model has become a fundamental tool in option pricing. However, it is essential to be aware of the assumptions underlying the Black-Scholes Model.

ASSUMPTIONS OF BLACK-SCHOLES

Constant Volatility: The model assumes that the volatility of the underlying asset's returns is constant over the life of the option. In reality, volatility can change over time.

Log-Normal Distribution of Stock Prices: The model assumes that the logarithm of the stock price follows a normal distribution. This assumption is based on the idea that small price changes are more likely than large ones, leading to a log-normal distribution.

Random Walk: The model assumes that the stock price follows a geometric Brownian motion, which is a continuous-time stochastic process. This implies that the future stock price movements are independent of past movements.

Risk-Free Interest Rate: The model assumes a constant risk-free interest rate over the life of the option. This rate is used to discount the future cash flows associated with the option to their present value.

No Dividends: The original Black-Scholes Model assumes that the underlying stock does not pay dividends during the option's life. This assumption can be relaxed by adjusting the model for dividend-paying stocks.

European-Style Options: The model is designed specifically for European-style options, which can only be exercised at expiration. It does not apply directly to American-style options, which can be exercised at any time before expiration.

No Transaction Costs or Taxes: The model assumes the absence of transaction costs, taxes, and other frictions. In a real-world scenario, these factors can affect the actual returns and values of options.

Efficient Markets: The Black-Scholes Model assumes that markets are efficient, meaning that all relevant information is reflected in the stock price. This assumption is tied to the use of risk-neutral probability in the model.

INTERPRETATIONS OF BLACK SCHOLES MODEL

The primary output of the Black-Scholes Model is the calculated option premium. For a European call option, this represents the price a trader should be willing to pay for the right to buy the underlying asset at the specified strike price before the option's expiration. For a European put option, the premium is the price of the right to sell the underlying asset.

The Black-Scholes Model takes into account several factors that influence option pricing:

Underlying Stock Price (SS): The current market price of the underlying asset.

Strike Price (KK): The price at which the option holder can buy (for a call option) or sell (for a put option) the underlying asset.

Time to Expiration (TT): The remaining time until the option expires.

Risk-Free Interest Rate (rr): The rate of return on a risk-free investment, such as a government bond.

Volatility (**σσ**): The standard deviation of the stock's returns, indicating the level of price fluctuation.

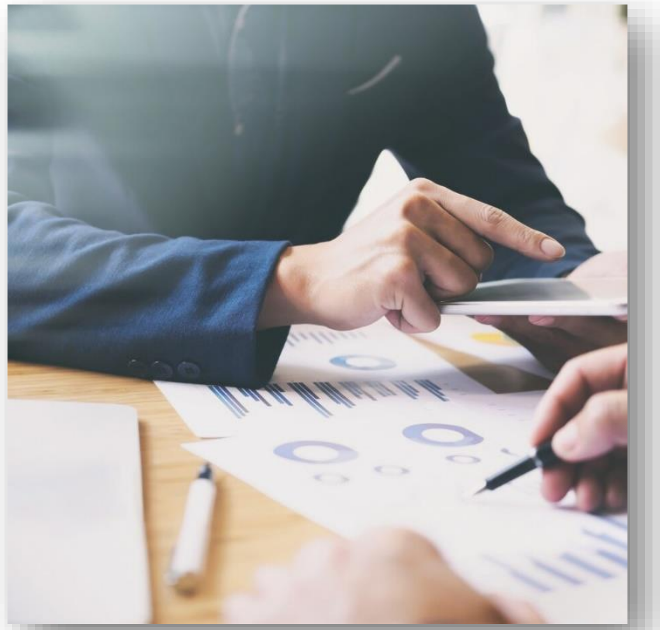
FACTORS AFFECTING OPTION PRICE

Underlying Stock Price (*S*)

For call options, as the underlying stock price increases, the potential for the option to be profitable (in-the-money) also increases, leading to a higher option premium. Conversely, for put options, as the stock price decreases, the potential for profit increases, resulting in a higher premium.

Strike Price (*K*):

The relationship between the strike price and the current stock price influences option prices. In general, as the strike price moves closer to the current stock price for call options (or further away for put options), the option premium tends to increase.



Time to Expiration (*T*):

The more time an option has until expiration, the higher its premium tends to be. This is because options with more time have a greater chance of becoming profitable. As expiration approaches, the time value decreases, leading to a decrease in the option premium.

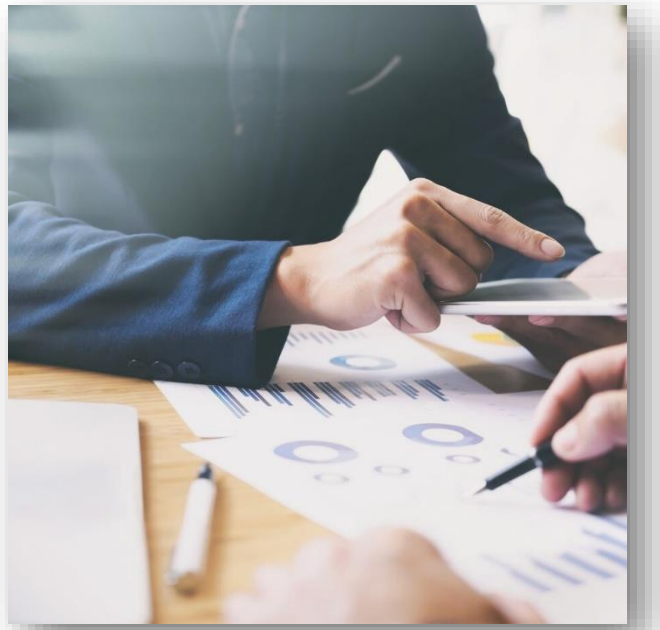
FACTORS AFFECTING OPTION PRICE

Volatility (σ)

Volatility measures the degree of variation of a trading price series over time. Higher volatility increases the option premium because there is a greater likelihood of significant price movements, which can benefit option holders.

Risk-Free Interest Rate (r):

The risk-free interest rate is used to discount future cash flows to their present value. As the risk-free rate increases, the present value of future cash flows decreases, resulting in lower call option premiums and higher put option premiums.



Dividends

For stocks that pay dividends, the ex-dividend date can affect option prices. Generally, the higher the dividends paid by the stock, the lower the call option premium (because the stock price is expected to decrease) and the higher the put option premium.

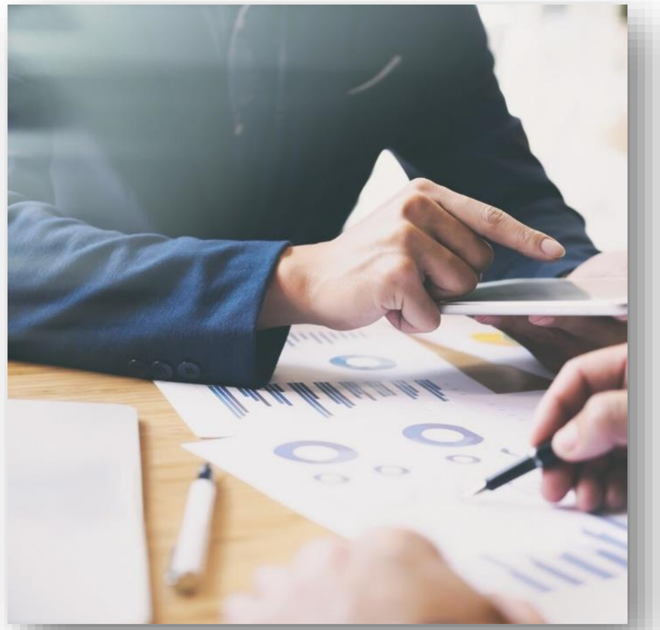
FACTORS AFFECTING OPTION PRICE

Market Conditions

Overall market conditions and trends can influence option prices. In bullish markets, call option premiums may be higher, reflecting increased demand. In bearish markets, put option premiums may be higher. Moreover, extreme market events, such as economic crises or geopolitical tensions, can lead to changes in option pricing.

Implied Volatility (IV):

Implied volatility is the market's expectation of future volatility. High implied volatility increases option premiums, and low implied volatility decreases them. Traders often monitor IV to assess potential opportunities or risks in the options market.

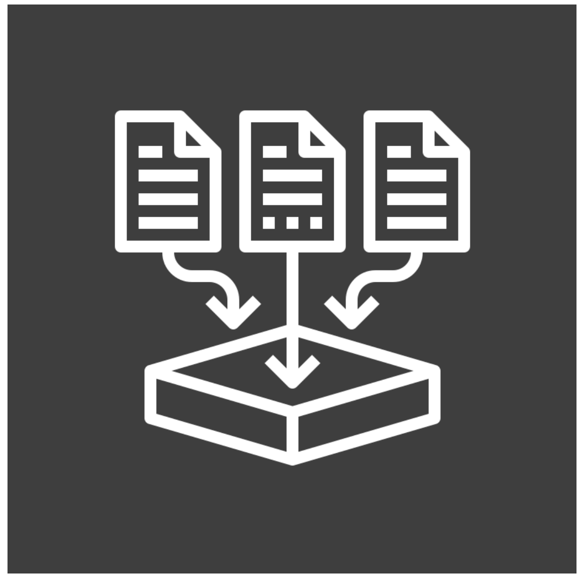


Interest Rates

While the risk-free interest rate is a specific factor, broader interest rate movements in the economy can also impact option prices. Changes in interest rates can affect the present value of future cash flows, influencing option premiums.

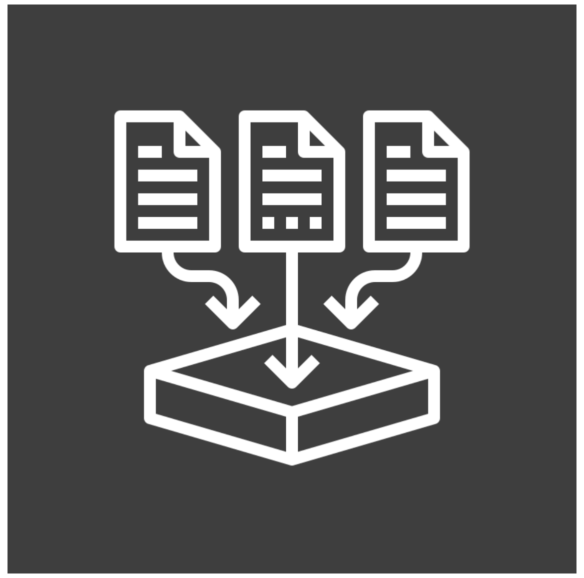
OPTION STRATEGIES

MAIN STRATEGIES



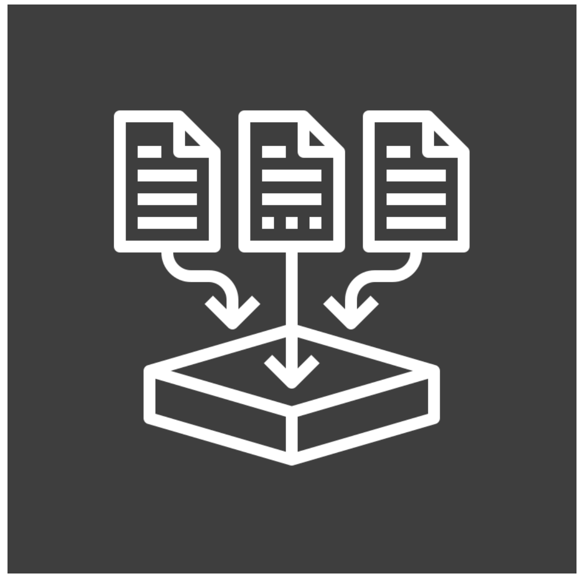
Put-Call Parity:

Put-Call Parity is a principle in options trading that establishes an equivalence relationship between the prices of European call and put options with the same strike price and expiration date. It states that the sum of a European call option's price and the present value of the strike price equals the sum of a European put option's price and the current stock price. This relationship helps in understanding and arbitraging discrepancies in option prices.



Protective Put

A Protective Put is a strategy where an investor buys a put option for shares of a stock they already own. The purpose is to protect against a potential drop in the stock's price. If the stock price falls, the put option provides a right to sell the stock at the strike price, limiting the losses. Essentially, it's like having insurance to safeguard the value of the stock.



Covered Call

A Covered Call is a strategy involving two transactions: owning the underlying stock and selling a call option on that stock. The investor receives a premium from selling the call option, which provides some downside protection. However, if the stock price rises above the call's strike price, the investor may have to sell the stock at that price, potentially missing out on higher profits. It's a strategy often used when the investor is comfortable with selling the stock at a specific price and wants to generate additional income from the call premium.

AUXILIARY STRATEGIES

Straddle

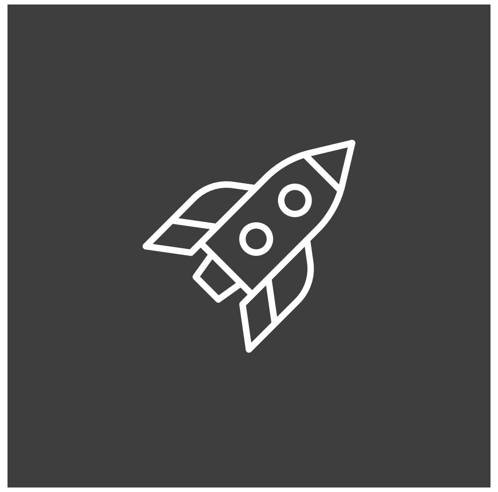
A Straddle is an options strategy where an investor simultaneously buys a call option and a put option with the same strike price and expiration date. The goal is to profit from significant price movement in the underlying asset, regardless of whether it moves up or down. It's like placing bets on both sides, anticipating a big move one way or the other

Strap

A Strap is the opposite of a Strip. It involves three transactions: buying two call options and selling one put option. All options have the same expiration date and strike price. This strategy is used when an investor expects a substantial increase in the stock's price. It's a more bullish version of a ratio spread.

Strip

A Strip is an options strategy involving three transactions: buying two put options and selling one call option. All options have the same expiration date and strike price. This strategy is used when an investor expects a significant decrease in the stock's price. It's essentially a more bearish version of a ratio spread.



Strangle

A Strangle is an options strategy where an investor buys a call option and a put option with different strike prices but the same expiration date. This strategy is used when the investor anticipates significant price movement but is uncertain about the direction. It profits from volatility, especially if the stock makes a large move in either direction.

BUTTERFLY SPREAD

The only thing that you will watch spread in Bangalore

A Butterfly Spread is an options strategy that involves three strike prices and two expiration dates. It consists of buying one lower strike option, selling two middle strike options, and buying one higher strike option. The goal is to profit from minimal price movement in the underlying asset. It's like betting on the stock staying close to a particular price.

DELTA

Delta represents the sensitivity of an option's price to changes in the underlying asset's price. It measures how much the option premium is expected to change for a $1 change in the stock price.

A delta of 0.5 means that for every $1 increase in the stock price, the option premium is expected to increase by $0.50 (for calls) or decrease by $0.50 (for puts).

DELTA HEDGING

Delta hedging is a strategy to reduce or eliminate directional risk in a portfolio by taking offsetting positions in the underlying asset. If you own options with positive delta, you might sell a portion of the underlying stock to create a delta-neutral position.

It helps traders manage the impact of stock price movements on their options positions.

THETA

Theta measures the rate of change in an option's price concerning the passage of time. It reflects how much the option premium is expected to decrease as time passes.

A theta of -0.05 means that the option premium is expected to decrease by $0.05 per day, all else being equal.

GAMMA

Gamma measures the rate of change in an option's delta concerning changes in the underlying asset's price. It indicates how much the delta will change for a $1 change in the stock price.

A gamma of 0.02 means that if the stock price increases by $1, the option's delta will increase by 0.02.

NEUTRALITY

Delta-Neutral: A delta-neutral position is one where the overall delta of a portfolio is close to zero, meaning the portfolio is less sensitive to directional moves in the underlying stock.

Gamma-Neutral: Achieving gamma neutrality involves managing a portfolio to keep the gamma close to zero, reducing the impact of large stock price movements on the portfolio's delta.

Purpose: Greek letters, such as Delta, Theta, and Gamma, are used to represent these sensitivity measures in options pricing models.

Role: Traders and investors use Greek letters to understand and manage the risks and exposures associated with their options positions.

Thanks For Watching!