# Option Greeks Explained : Boost Your Trading Strategy

## Description

Estimated reading time: 7 minutes



Mastering the “Option Greeks” is key to successful options trading. These tools help you understand how different factors impact option prices, helping traders make smart choices. Learning Option Greeks through formulas can be tough, so we’ll explain them in an easy way using an option chain.

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## What is an Option Contract?

An option contract is a financial instrument that grants an investor the right, but not the obligation, to buy or sell an underlying asset at a predetermined price before a specified date. The underlying asset can be stocks, commodities, currencies, or other financial instruments.

# Types of option contract

**Call Option:** Gives the holder the right to buy the underlying asset at a specified price (called the strike price) before the option expires.

**Put Option:** Gives the holder the right to sell the underlying asset at the strike price before the option expires.

[Online Trading for Beginners: How to Get Started and Succeed]



**Important** : Don't get confused with call and put options. If you're a options buyer, you've right to either take long position (call buy) or short position (put buy) for the specific strike price.

## Key Components of an Option Contract

**Strike Price:** The price at which the underlying asset can be bought or sold.

**Expiration Date:** The date by which the option must be exercised or it will expire worthless.

**Premium:** The cost of purchasing the option contract.

# What Are Option Greeks?

Option Greeks are financial measures that show how sensitive the price of an option is to different factors. These factors include changes in the underlying asset price, time decay, volatility, and interest rates. The primary Greeks are Delta, Gamma, Theta, Vega, and Rho. Each of these plays a unique role in option pricing and risk management.

Accelerator Oscillator Indicator: Bill Williams Momentum Tool

## Option Greeks Delta

Delta indicates how much the price of an option will change for every $1 change in the price of the underlying asset.

**Call Options:** The Delta of a call option ranges from 0 to 1. For instance, if a call option has a Delta of 0.5, a $1 increase in the underlying stock's price will result in a $0.50 increase in the option's price.

**Put Options:** The Delta of a put option ranges from -1 to 0. For example, a put option with a Delta of -0.5 will decrease by $0.50 for every $1 increase in the stock price.

## 1. Delta Formula for Call Options

For a call option, Delta is given by:

$$\Delta_{\text{call}} = N(d_1)$$

## 2. Delta Formula for Put Options

For a put option, Delta is given by:

$$\Delta_{\text{put}} = N(d_1) - 1$$

## Where:

- $N(d_1)$ is the cumulative distribution function of the standard normal distribution (i.e., the probability that a random draw from the standard normal distribution will be less than or e to $d_1$).
- $d_1$ is a parameter calculated as part of the Black-Scholes model, defined by:

$$d_1 = \frac{\ln(S_0/K) + (r + \sigma^2/2)T}{\sigma\sqrt{T}}$$



## Parameters:

- $S_0$: Current price of the underlying asset
- $K$: Strike price of the option
- $r$: Risk-free interest rate (continuously compounded)
- $\sigma$: Volatility of the underlying asset (standard deviation of the asset's returns)
- $T$: Time to expiration (in years)
- $\ln$: Natural logarithm

Suppose Bitcoin (BTC) trading at 63800, if market goes up says 64100, then the option value of call increase, put value decreases. If market goes down says 63500, then the option value of call decreases and put value increases. Call option follows the market direction that's why the delta of call option always positive and vice versa. The value of delta range between 0 to 1. If we combine the delta of same strike price, the value will be 1.

Cup and Handle Pattern: A Proven Strategy for Bullish Markets

## Terms Related To Option Greeks

Deep ITM: High delta (0.80 to 1).

ITM: Moderate to high delta (0.6 to 0.80).

ATM: Moderate delta (0.4 to 0.6).

OTM: Low to moderate delta (0.2 to 0.4).

Far OTM: Very low delta (0 to 0.20).

| Delta | Bid (Price / IV) | Ask (Price / IV) | OI | Strike | OI |
|---|---|---|---|---|---|
| 0.94 | 922.0 0.0% | 972.0 50.6% | $767.57 | 63000 | $236.09K |
| 0.93 | 729.0 0.0% | 770.0 41.8% | $767.57 | 63200 | $134.20K |
| 0.87 | 547.0 25.5% | 582.0 36.9% | $383.79 | 63400 | $184.15K |
| 0.76 | 385.0 28.2% | 412.0 34.1% | $224.52K | 63600 | $294.27K |
| 0.62 | 248.0 28.8% | 268.0 32.3% | $3.84K | 63800 | $319.89K |
| 0.44 | 146.0 29.6% | 159.0 31.8% | $149.36K | 64000 | $160.55K |
| 0.28 | 73.0 29.2% | 87.0 31.9% | $260.12K | 64200 | $57.47K |
| 0.16 | 31.0 28.7% | 44.0 32.3% | $136.12K | 64400 | $9.79K |
| 0.07 | 9.0 27.2% | 20.9 33.0% | $148.27K | 64600 | $1.28K |
| 0.03 | 0.2 20.2% | 12.0 35.5% | $192.73K | 64800 | $101.13K |
| 0.02 | 0.4 26.0% | 8.9 39.5% | $59.23K | 65000 | $0.00 |



For example, if you punch a long position of ITM 63400 and it moves to 64800 from 64000. The approximate change in option price will be 800×0.87 = 696.

## Option Greeks Theta

It represents the amount an option’s price will decrease as the option approaches its expiration date, assuming all other factors remain constant.

**Call and Put Options:** Both types of options experience time decay, but it is typically more pronounced for at-the-money options. Options lose value as they approach expiration because the likelihood of them ending up in-the-money decreases with time.

Theta is a critical consideration for options traders, especially for those who sell options. A high Theta value indicates that the option is losing value quickly over time, which can be advantageous for option sellers.

### 1. Theta for a European Call Option ($\Theta_{\text{call}}$):

$$\Theta_{\text{call}} = -\frac{S\sigma N'(d_1)}{2\sqrt{T}} - rKe^{-rT}N(d_2)$$

### 2. Theta for a European Put Option ($\Theta_{\text{put}}$):

$$\Theta_{\text{put}} = -\frac{S\sigma N'(d_1)}{2\sqrt{T}} + rKe^{-rT}N(-d_2)$$

### Where:

- $S$ = Current price of the underlying asset (e.g., BTC).
- $K$ = Strike price of the option.
- $T$ = Time to expiration (in years).
- $r$ = Risk-free interest rate (annualized).
- $\sigma$ = Volatility of the underlying asset (annualized).
- $N(\cdot)$ = Cumulative distribution function of the standard normal distribution.
- $N'(\cdot)$ = Probability density function of the standard normal distribution (i.e., the derivative $N(\cdot)$).
- $d_1$ and $d_2$ are intermediate calculations defined as:

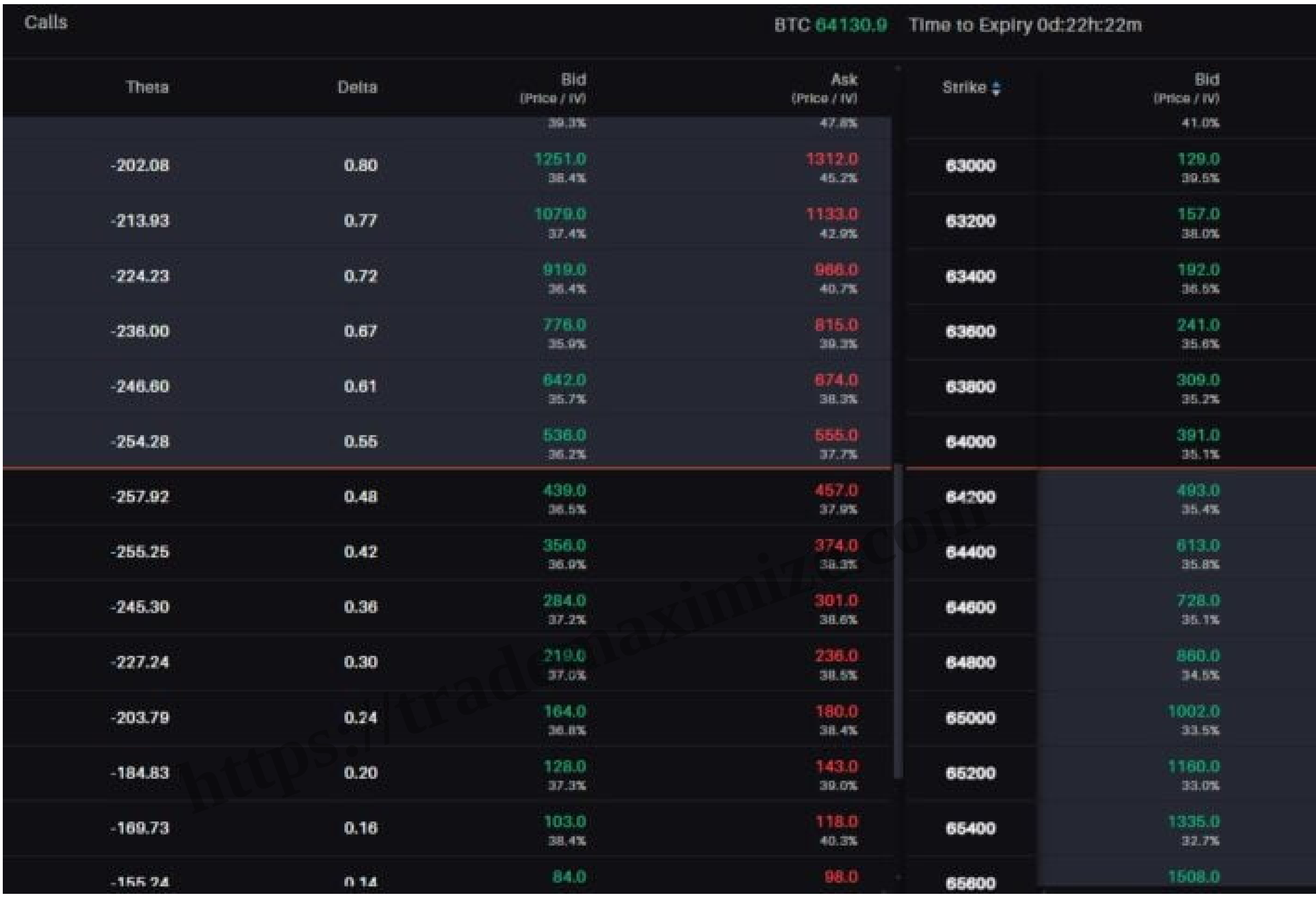
$$d_1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$



Theta is per day decay in option premium for weekly, monthly expiry. Time is money emphasizes the idea that time is a valuable resource, much like money, and should be used wisely.

For example, if the current BTC price trading at 64000 and moves up to 64800. If you punch a long position (option buying) for ITM 63400, the option price will move 800×0.72 =576 but due to time decay the exact amount will be 576 – 254.28 = 321.72.



Calls — BTC 64130.9 — Time to Expiry 0d:22h:22m

| Theta | Delta | Bid (Price / IV) | Ask (Price / IV) | Strike | Bid (Price / IV) |
|---|---|---|---|---|---|
| | | 39.3% | 47.8% | | 41.0% |
| -202.08 | 0.80 | 1251.0 38.4% | 1312.0 45.2% | 63000 | 129.0 39.5% |
| -213.93 | 0.77 | 1079.0 37.4% | 1133.0 42.9% | 63200 | 157.0 38.0% |
| -224.23 | 0.72 | 919.0 36.4% | 966.0 40.7% | 63400 | 192.0 36.5% |
| -236.00 | 0.67 | 776.0 35.9% | 815.0 39.3% | 63600 | 241.0 35.6% |
| -246.60 | 0.61 | 642.0 35.7% | 674.0 38.3% | 63800 | 309.0 35.2% |
| -254.28 | 0.55 | 536.0 36.2% | 555.0 37.7% | 64000 | 391.0 35.1% |
| -257.92 | 0.48 | 439.0 36.5% | 457.0 37.9% | 64200 | 493.0 35.4% |
| -255.25 | 0.42 | 356.0 36.9% | 374.0 38.3% | 64400 | 613.0 35.8% |
| -245.30 | 0.36 | 284.0 37.2% | 301.0 38.6% | 64600 | 728.0 35.1% |
| -227.24 | 0.30 | 219.0 37.0% | 236.0 38.5% | 64800 | 860.0 34.5% |
| -203.79 | 0.24 | 164.0 36.8% | 180.0 38.4% | 65000 | 1002.0 33.5% |
| -184.83 | 0.20 | 128.0 37.3% | 143.0 39.0% | 65200 | 1160.0 33.0% |
| -169.73 | 0.16 | 103.0 38.4% | 118.0 40.3% | 65400 | 1335.0 32.7% |
| -155.24 | 0.14 | 84.0 | 98.0 | 65600 | 1508.0 |

## Option Greeks Vega

Vega measures the sensitivity of an option's price to changes in the volatility of the underlying asset. It represents the amount the option's price will change for a 1% change in the implied volatility of the underlying asset. Higher volatility increases the potential for the underlying asset to make large moves, which can increase the option's price. Lower volatility decreases the likelihood of significant price movements, reducing the option's value.

## Vega Formula

For both European call and put options, the formula for Vega is the same:

$$\text{Vega} = S\sqrt{T}N'(d_1)$$

## Where:

- $S$ = Current price of the underlying asset (e.g., the price of BTC).
- $T$ = Time to expiration (in years).
- $N'(\cdot)$ = Probability density function of the standard normal distribution (essentially, the "bell curve" height at a given point).
- $d_1$ = A term from the Black-Scholes model, defined as:

$$d_1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$



## Additional Definitions:

- $K$ = Strike price of the option.
- $r$ = Risk-free interest rate (annualized).
- $\sigma$ = Volatility of the underlying asset (annualized).

Vega is particularly important in markets with high volatility. Options traders must be aware of changes in volatility and how they can impact option pricing. Since Vega represents how much the price of an option will change with a 1% change in volatility, a higher Vega means the option's price will increase more with rising volatility. Option buyers benefit because their purchased options increase in value, allowing them to sell at a profit or exercise the option under more favorable conditions.

For example, Imagine an trader buys a call option for BTC when implied volatility is low, and the Vega of the option is relatively high. If a market event causes the volatility of BTC to spike, the Vega component will increase the value of the call option, even if the underlying price has not moved significantly. The option buyer can sell the option at this higher price, benefiting from the increased volatility.

# Option Greek Gamma

Gamma measures the rate of change in Delta relative to the change in the price of the underlying asset. It helps traders understand how much the Delta of an option will change as the underlying asset price changes. Gamma is highest when the option is at-the-money and decreases as the option moves further in- or out-of-the-money.

A high Gamma value indicates that Delta can change rapidly, making the option’s price more sensitive to small changes in the underlying asset. Low Gamma suggests that Delta will change more slowly, leading to less price sensitivity.

### Gamma Formula

For both European call and put options, the formula for Gamma is the same:

$$\Gamma = \frac{N'(d_1)}{S\sigma\sqrt{T}}$$

### Where:

- $S$ = Current price of the underlying asset (e.g., the price of BTC).
- $\sigma$ = Volatility of the underlying asset (annualized).
- $T$ = Time to expiration (in years).
- $N'(\cdot)$ = Probability density function of the standard normal distribution (i.e., the bell curve's height at $d_1$). This represents the likelihood of the asset price being at a particular level.
- $d_1$ = A term from the Black-Scholes model, defined as:

$$d_1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$



### Additional Definitions:

- $K$ = Strike price of the option.
- $r$ = Risk-free interest rate (annualized).
- $\ln$ = Natural logarithm.

# Option Greeks Rho

Rho measures the sensitivity of an option’s price to changes in interest rates. It represents the amount the option’s price will change for a 1% change in interest rates.

**Call Options:** Typically, call options have a positive Rho, meaning their value increases as interest rates rise.

**Put Options:** Put options generally have a negative Rho, so their value decreases when interest rates rise.

While Rho is often considered less critical than other Greeks, it can become significant in certain market conditions, such as during periods of changing interest rates.

***Ready to boost your options trading game? Which Option Greek are you eager to master next for maximizing your profits?***