Δγθνρ
γθνρΔ
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Role of Greeks in Derivatives – III (Theta)

The Greeks are various functions that show the sensitivity of Fair Value of an option to changes in market conditions. These functions are very helpful in assessing and comparing various option positions. They show what effect different variables will have on the fair value price of an option. There are ways of estimating the risks associated with options, such as the risk of the stock price moving up or down, implied volatility moving up or down, or how much money is made or lost as time passes. They are numbers generated by mathematical formulas. Collectively, they are known as the "Greeks", because most use Greek letters as names. Each Greek estimates the risk for one variable:

- ✓ **delta** measures the change in the option price due to a change in the stock price,
- ✓ **gamma** measures the change in the option delta due to a change in the stock price,
- ✓ **theta** measures the change in the option price due to time passing,
- ✓ **Vega** measures the change in the option price due to volatility changing, and
- ✓ **Rho** measures the change in the option price due to a change in interest rates.

Further in this series of concept of Greeks, we now learn about Theta.

Theta

Theta, a.k.a. time decay, is an estimate of how much the theoretical value of an option decreases when 1 day passes and there is no move in either the stock price or volatility. Theta is used to estimate how much an option's extrinsic value is whittled away by the always-constant passage of time.

Long calls and long puts always have negative theta. Short calls and short puts always have positive theta. Stock has zero theta – its value is not eroded by time. All other things being equal, an option with more days to expiration will have more extrinsic value than an option with fewer days to expiration. The difference between the extrinsic value of the option with more days to expiration and the option with fewer days to expiration is due to theta. Therefore, it makes sense that long options have negative theta and short options have positive theta. If options are continuously losing their extrinsic value, a long option position will lose money because of theta, while a short option position will make money because of theta.

But theta doesn't reduce an option's value in an even rate. Theta has much more impact on an option with fewer days to expiration than an option with more days to expiration. For example, the IFCI Oct 75 put is worth ₹3.00, has 20 days until expiration and has a theta of -.15. The IFCI Dec 75 put is worth ₹4.75, has 80 days until expiration and has a theta of -.03. If one day passes, and the price of IFCI stock doesn't change, and there is no change in the implied volatility of either option, the value of the IFCI Oct 75 put will drop by ₹0.15 to ₹2.85, and the value of the IFCI Dec 75 put will drop by ₹0.03 to ₹4.72.

Theta is highest for ATM options, and is progressively lower as options are ITM and OTM. This makes sense because ATM options have the highest extrinsic value, so they have more extrinsic value to lose over time than an ITM or OTM option. The theta of options is higher when either volatility is lower or there are fewer days to expiration. The longer the stock price does not move big, the more theta will hurt your position.