

Role of Greeks in Derivatives – V (Rho)

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 the series of concept of Greeks, we now learn about Rho.

Rho

Rho is an estimate of how much the theoretical value of an option changes when interest rates move 1.00%. The rho for a call and put at the same strike price and the same expiration month are not equal. Rho is one of the least used Greeks. When interest rates in an economy are relatively stable, the chance that the value of an option position will change dramatically because of a drop or rise in interest rates is pretty low.

Long calls and short puts have positive rho. Short calls and long puts have negative rho. How does this happen? The cost to hold a stock position is built into the value of an option.

The more expensive it is to hold a stock position, the more expensive the call option. An increase in interest rates increases the value of calls and decreases the value of puts. A decrease in interest rates decreases the value of calls and increases the value of puts.

Back to the IFCI Mar 50 calls. They have a value of ₹2.00 and a rho of +.02 with IFCI at ₹48.00 and interest rates at 5.00%. If interest rates increase to 6.00%, the value of the IFCI Mar 50 calls would increase to ₹ 2.02. If interest rates decrease to 4.00%, the value of the IFCI Mar 50 calls would decrease to ₹ 1.98.

$\Delta\gamma\theta\nu\rho$
 $\gamma\theta\nu\rho\Delta$
 $\theta\nu\rho\Delta\gamma$
 $\nu\rho\Delta\gamma\theta$
 $\rho\Delta\gamma\theta\nu$