European Option Valuation

This Shiny app provides a simple plot showing the variation of the value of a European Call or Put option as a function of the underlying stock price.

Inputs

The user needs to provide the following inputs:

1. Type of option (Put or Call) - default is a Call option.
2. Strike price - default value is $50.
3. Volatility as a percentage value - default value is 30%.
4. Interest Rate as a percentage value - default value is 1%
5. Time to Expiry in months - default value is 12 months.

Plot

The plot displays the variation of the option value as a function of the stock price using the Black-Scholes equations:

$$c = S_0 N(d_1) - K e^{-rT} N(d_2)$$

$$p = K e^{-rT} N(-d_2) - S_0 N(-d_1)$$

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

$$d_2 = \frac{ln(S_0/K) + (r - \sigma^2/2)T}{\sigma\sqrt{T}}$$

where,

c = Call Option Value

p = Put Option Value

S_0 = Stock Price

K = Strike Price

r = Risk-free Interest Rate

T = Time to Expiry

σ = Volatility

N() = Normal cumulative distribution function

The stock prices used are from 0 to twice the strike price entered by the user. The plot is created using the "plotly" package and hence the user can place the cursor anywhere along the dotted line and read off the Stock Price/Option Value pair.

Note: Setting the time to expiry equal to zero shows the intrinsic value of the option.