

OPTIONS BASIC

S_0	Today's Stock Price
S_u	Estimated Stock price – upper limit (used in the Binomial Option Pricing Model)
S_d	Estimated Stock price – lower limit (used in the Binomial Option Pricing Model)
X	Exercise Price (Contractual Future Price)
C	Call Premium (C_u and C_d higher and lower payoffs respectively – used in BOPM)
P	Put Premium (P_u and P_d higher and lower payoffs, respectively – used in BOPM)
i	Free interest rate or borrowing rate
t	Time to exercise
σ	Standard Deviation of the Stock
δ	Dividend Yield

Basic Option:

- **Call Options** Payoff= $\text{Max}(0, S - X)$ Profit = Payoff – Premium - *Bullish View*
- **Put Option** Payoff= $\text{Max}(0, X - S)$ Profit = Payoff – Premium - *Bearish View*

Basic Strategies:

- **Protective Put:** Own the Stock and Buy Put Option – *Protective View*
- **Covered Call:** Own the Stock and Sell Call – *View of selling the stock*
- **Straddle:** Buy Call and Buy Put – *Volatility View*
- **Collar:** Buy Put and Sell Call – *Protective View paying \$0 premium*

Advanced Strategies:

- **Bull Spreads (Vertical Spread):**
 - Buy Low (Call) Exercise Price (X_1) and Sell High (Call) Exercise Price (X_2) with the same expiration – *Bullish - View and paying less premium*
 - Sell High (Put) Exercise Price (X_1) in-the-money and Buy Low (Put) Exercise Price (X_2) out-of-the-money with the same expiration – *Bullish View*
- **Bear Spreads (Vertical Spread):**
 - Buy high (Put) Exercise Price (X_1) in the money and Sell Low (Put) Exercise Price (X_2) out-of-the-money with the same expiration – *Bearish View*
 - Buy High (Call) Exercise Price (X_1) and Sell Low (Call) Exercise Price (X_2) with the same expiration – *Bearish View and paying less premium*
- **Butterfly Spreads** (Combination of Bull and Bear Spreads) with 3 strike prices:
 - Buy the Low (Call) Exercise Price (X_1), Sell two middle (Call) Exercise Price, Buy the High (Call) Exercise Price (X_3) - Stability View and paying less premium

Option Valuation Approaches:

- **Binomial Option Pricing Model – Single Period Approach:**

- Calculating Call Premiums - Method #1:

- $C = [S_0 - (S_d / ((1 + i)^t))] [(C_u - C_d) / (S_u - S_d)]$ where
 $C_u = S_u - X$ and $C_d = \text{Max}(0, S_d - X)$

- Calculating Call Premiums - Method #2:

- $C = [p(C_u) + (1-p)(C_d)] / (1+i)$ where $C_u = S_u - X$ and
 $C_d = \text{Max}(0, S_d - X)$

- and $p = [(1+i) - d] / (u - d)$ for probability

- **Binomial Option Pricing Model – Two Period Approach:**

- Calculating Call Premiums – using the two period approach

- $[(p^2 C_u^2) + (2p(1-p) C_{ud}) + (1-p)^2 C_d^2] / (1+i)^2$
where $C_u = S_u - X$, $C_{ud} = \text{Max}(0, S_{ud} - X)$ and $C_d = (\text{Max}(0, S_d - X))$

- **Black-Sholes Valuation Model:**

- Calculating Call and Put Premium:

- $C = S_0 e^{-\delta t} N(d_1) - X e^{-it} N(d_2)$ where

- $P = X e^{-it} N(1 - d_2) - S_0 e^{-\delta t} N(1 - d_1)$

- $d_1 = [\ln(S_0/X) + (i - \delta + \sigma^2/2)t] / (\sigma \sqrt{t})$ and

- $d_2 = d_1 - (\sigma \sqrt{t})$

- **Put Call Parity Method**

$$\underline{C - P = S_0 - X e^{-it} \text{ then,}}$$

$$C = S_0 - X e^{-it} + P \quad \text{or} \quad P = X e^{-it} - S_0 + C$$