CHAPTER 1
Risk Management

VAR:

\[ \text{VAR}_{t \text{ days}} = \text{SD}_{t \text{ days}} \times Z \text{ Score} \]

\[ \text{VAR}_{t \text{ days}} = \frac{\text{VAR}_{1 \text{ day}} \times \sqrt{t \text{ days}}}{\text{VAR}_{1 \text{ day}}} = \frac{\text{SD}_{1 \text{ day}} \times \sqrt{t \text{ days}}}{\text{SD}_{1 \text{ day}}} \]

-CA Mayank Kothari
CA Final SFM | CA Inter FM ECO
CHAPTER 8

Security Valuation

Dividend Based (EQ)

**Single Period Holding**

\[
\frac{D_1}{1 + Ke} + \frac{P_n}{(1 + Ke)^n}
\]

**Multi Period Holding**

- **No Growth**
  \[
  \frac{D_1}{Ke}
  \]
- **Constant Growth**
  \[
  \frac{D_0(1 + g)}{Ke - g} \text{ or } \frac{D_1}{Ke - g}
  \]

- **Two Stage Model**
  \[
  \left[ \frac{D_0(1 + g_1)}{(1 + ke)^1} + \frac{D_1(1 + g_1)}{(1 + ke)^2} + \ldots + \frac{D_{n-1}(1 + g_1)}{(1 + ke)^n} \right] + \frac{P_n}{(1 + ke)^n}
  \]

- **Three Stage Model**
  \[
  \left[ \frac{D_0(1 + g_1)}{(1 + ke)^1} + \frac{D_1(1 + g_1)}{(1 + ke)^2} + \frac{D_2(1 + g_2)}{(1 + ke)^3} + \frac{D_3(1 + g_2)}{(1 + ke)^4} + \frac{D_4(1 + g_2)}{(1 + ke)^5} + \ldots + \frac{P_n}{(1 + ke)^n} \right]
  \]

CA Mayank Kothari
CA Final SFM | CA Inter FM ECO
EARNING BASED (EQ)

GORDON'S GROWTH MODEL
\[ \text{EPS}_{t+1} \times (1-b) / (K_e - b) \]

WALTERS MODEL
\[ P = D + \frac{r}{K_e} \times (E - D) / K_e \]

PE MULTIPLE
\[ MP = \text{EPS} \times \text{PE multiple} \]
BENEFITS TO BUY

1. Duration Only 230 Hours (500+ Problem Solved).
4. 13 Charts for Easy Revision.
5. Revision Videos For Each Chapter At The End.
8. Available in both English & Hindi Language

CA MAYANK KOTHARI

CA-FINAL

NEW

LEARNING DESTINATION

Conferenza.in
SmartLearningDestination.com

767 767 66 11 | 767 767 88 11
Security Valuation

Enterprise Value =

Market Value of Equity +
Market Value of Preference +
Minority Interest +
Market Value of Debt +
Cash & Cash Equivalents

EV multiple

Enterprise Value / EBITDA

EV multiple

Enterprise Value / Sales

CA Mayank Kothari
SFM.
Cash Flow based

FCFE =

- Net Income
+ Depreciation
- Capital Expenditure
- \( \Delta \) non Cash Wrkg Cap.
+ New debt issued
- Debt Repayment
**FCFF**

\[ \text{EBITDA} = \]  
- EBITDA \times (1 - \text{tax})  
- Depreciation \times (\text{tax})  
- Capital Expenditure  
- Δ Non Cash Wrgk. Cap.

\[ \text{EBIT} = \]  
- EBIT \times (1 - \text{tax})  
- Depreciation  
- Capital Expenditure  
- Δ Non Cash Wrgk. Capital

**FCFF**

\[ \text{EAT} = \]  
- EAT  
- Interest \times (1 - \text{tax})  
- Depreciation  
- Cap Expenditure  
- Δ Non Cash Wrgk. Cap.

\[ \text{FCFE} = \]  
- FCFE  
- Interest \times (1 - \text{tax})  
- Principal prepaid  
- New debt issued  
- Preference dividend

---

Security Valuation  
CA Mayank Kothari  
CA Final SFM | CA Inter FM ECO
Right Shares

\[
\text{Ex-Right Price (P_r)} = \frac{n P_0 + n S}{n + n_S}
\]

Where,
- \( n \) = No. of existing shares
- \( P_0 \) = Price of share Pre-Right issue
- \( n_S \) = No. of new shares issued under right issue
- \( S \) = Subscription price of each right share
- \( P_r \) = Ex Right Price

\[
\text{Value of right} = \frac{n S (P_0 - S)}{n + n_S}
\]

- \( n P_0 \) = Value of existing Shares
- \( n S \) = Funds raised through right issue
- \( n + n_S \) = No. of shares outstanding after the right issue

-Ca Mayank Kothari
CA Final SFM | CA Inter FM ECO
PREFERENCE VALUATION

Re redeemable: -

\[
\frac{\text{Dividend}_1}{(1+r)^1} + \frac{\text{Dividend}_2}{(1+r)^2} + \cdots + \frac{\text{Dividend}_n + \text{Maturity Value}}{(1+r)^n}
\]

Irre redeemable: -

\[
\frac{\text{Irredeemable Preference}}{\text{Share Value}} = \frac{\text{Dividend}}{\text{Required return on Pref Share}}
\]
Bond Valuation

- Yield
  - Current Yield
    \[ \text{Current Yield} = \frac{\text{Interest}}{\text{Market Price}} \]
  - Yield to Maturity
    \[ \text{YTM} = \frac{C + \frac{(RV - MV)}{N}}{\frac{(RV + MV)}{2}} \]

- Valuation
  \[ \text{BV} = I \times PVAF_{YTM,n} + RV \times PVF_{YTM,n} \]
  \[ \text{BV} = \text{Theoretical Value of Bond} \]
  \[ I = \text{Annual Interest/Coupon Amount} \]
  \[ PVAF = \text{Present Value Annuity Factor} \]
  \[ YTM = \text{Yield to Maturity (Investors Required Rate of Return)} \]
  \[ RV = \text{Redemption Value} \]
  \[ MV = \text{Market Value (Purchase Price)} \]
  \[ N = \text{No. of periods to expiry} \]
**Duration**

- **Macaulay Duration**
  \[ \text{MACD} = \sum \text{Weight} \times \text{Year} \]

- **MacD**
  \[ \text{MacD} = \frac{\sum \text{PV} \times Yr}{\sum \text{PV}} \]

- **MacD**
  \[ \text{MacD} = \frac{1 + \text{YTM} - (1 + \text{YTM})^c \times (c - \text{YTM})}{\text{YTM} \times c \times [(1 + \text{YTM})^c - 1] + \text{YTM}} \]

- **MACD**
  \[ \text{MACD} = \sum \frac{txc}{(1 + i)^t} + \frac{nxM}{(1 + i)^n} \]
  \[ P \]

**Volatility**

- **Modified Duration**
  \[ \text{ModD} = \frac{\text{Macaulay's Duration}}{1 + \text{YTM}} \]

**Convexity**

- **Convexity**
  \[ \text{Convexity} = \frac{\text{PV}_+ + \text{PV}_- - 2\text{PV}_0}{2 \text{PV}_0 \times (\Delta \text{Yield})^2} \]

- **%ΔPV**
  \[ \% \Delta \text{PV} = \frac{-\text{AnnModDur} \times \Delta \text{Yield}}{\text{Convexity} \times (\Delta \text{Yield})^2} + \text{AnnModDur} \times \Delta \text{Yield} \]

- **PV+** = Bonds Price on Increase ΔYield
- **PV-** = Bonds Price on Decrease in ΔYield
- **PV0** = Initial Bond Price
- **AnnModDur** = Annual Modified Duration
Forward Rates

- Year 1:
  \[ f_1 = \frac{(1 + S_1)^1}{1} - 1 \]

- Year 2:
  \[ f_2 = \frac{(1 + S_2)^2}{(1 + S_1)} - 1 \]

- Year 3:
  \[ f_3 = \frac{(1 + S_3)^3}{(1 + S_1)(1 + f_2)} - 1 \]

- Year 4:
  \[ f_4 = \frac{(1 + S_4)^4}{(1 + S_1)(1 + f_2)(1 + f_3)} - 1 \]
Convertible Bond

Conversion Value

\[ CV = \text{Market price per share} \times \text{Conversion Ratio} \]

Conversion Premium

\[ CP = MP - CV \]
- \( MP \) = Market price of Convertible Bond.
- \( CV \) = Conversion Value.

Conversion Premium Ratio

\[ CP(\%) = \left( \frac{MP}{CV} - 1 \right) \times 100 \]

Downside Risk

\[ DR(\%) = \left( \frac{MP}{CV} - 1 \right) \times 100 \]
Conversion Parity Price or Market Conversion

$$CPP = \frac{MP}{N} \times 100$$

Favourable Income Differential Per Share

$$FID = \left[ \text{Interest from Bond} - \left( \text{Dividend from Equity} \times CR \right) \right]$$

Conversion Ratio

Premium Payback Period

$$PPP = \frac{\text{Conversion Premium}}{\text{Favourable Income Differential}}$$
Subscribe Telegram Channel
Search CA Mayank Kothari

Subscribe YouTube Channel
Search CA Mayank Kothari

Follow Instagram Page
Search CA Mayank Kothari
Return

Portfolio Return

\[ R_p = \sum_{i=1}^{n} R_i \cdot W_i \]

Where,
- \( R_p \) = Portfolio Return
- \( R \) = Expected return of securities in the portfolio
- \( W_i \) = Weightage of the respective security in the portfolio

Security Return

Without probability

\[ \bar{R} = \frac{D + CA}{II} \]

Without probability

\[ R = \sum_{i=1}^{n} R_i \cdot P_i \]

Where,
- \( R \) = Return
- \( D \) = Dividend
- \( II \) = Initial Investment
- \( CA \) = Capital Appreciation
- \( \bar{R} \) = Expected Return
- The possible returns \( R_i \) and probabilities by \( P_i \)
CHAPTER Portfolio Management

**Single Index Model**

\[ R_i = \alpha_i + \beta_i R_m + \epsilon_i \]

Where,
- \( R_i \) = expected return on security i
- \( \alpha_i \) = alpha coefficient of the straightline
- \( \beta_i \) = beta coefficient
- \( R_m \) = the return on market index
- \( \epsilon_i \) = error term.

**Arbitrage Pricing Theory**

\[ R_j = R_f + \beta_1 \lambda_1 + \beta_2 \lambda_2 + \beta_3 \lambda_3 + \ldots + \beta_n \lambda_n \]

Where,
- \( \lambda_1, \lambda_2, \lambda_3 \) are averages risk premium for each of the factors in the model.
- \( \beta_1, \beta_2, \beta_3 \) are betas of the security for each of the factors.

**Capital Asset Pricing Model**

Return of Security:
\[ R_j = R_f + \beta_1 (R_m - R_f) \]

Return of Portfolio
\[ R_p = R_f + \beta_p (R_m - R_f) \]

Where,
- \( R_i \) = return on Security
- \( R_f \) = risk free rate of return
- \( R_m \) = market return
- \( \beta \) = beta of the security (i) or portfolio (P).
Risk

Single Security Risk (Markowitz Model/Modern Portfolio Theory)

Without probability:
$$\sigma = \sqrt{\frac{\sum (R_i - \bar{R})^2}{N}}$$

N = Number of observations

With probability:
$$\sigma = \sqrt{\sum_{i=1}^{n} [(R_i - \bar{R})^2][p_i]}$$

$p_i$ = Probability of $i$th return.

Portfolio Risk (2 securities) (Markowitz Model/Modern Portfolio Theory)

$$\sigma_p = \sqrt{W_a^2 \sigma_a^2 + W_b^2 \sigma_b^2 + 2W_a W_b \sigma_a \sigma_b \rho_{ab}}$$

Where,
- $\sigma_p$ = Portfolio std deviation,
- $W_a$ = Proportion of funds invested in security 'a',
- $W_b$ = Proportion of funds invested in security 'b',
- $\sigma_a$ = Std deviation of security 'a',
- $\sigma_b$ = Std deviation of security 'b',
- $\rho_{ab}$ = Correlation coefficient between the returns of the two securities.

Perfectly Positively Correlated

- When $\text{Corr}_{ab} = \rho_{ab} = 1$
- $\text{Risk}_{\sigma_p} = (W_a \sigma_a + W_b \sigma_b)$

Perfectly Negatively Correlated

- When $\text{Corr}_{ab} = \rho_{ab} = -1$
- $\text{Risk}_{\sigma_p} = (W_a \sigma_a - W_b \sigma_b)$

Uncorrelated/Independent

- When $\text{Corr}_{ab} = \rho_{ab} = 0$
- $\text{Risk}_{\sigma_p} = \sqrt{W_a^2 \sigma_a^2 + W_b^2 \sigma_b^2}$
Single Security/Asset Beta

**Regression Analysis**

\[ \beta_x = \frac{\sum xy - n \bar{x} \bar{y}}{\sum y^2 - n \bar{y}^2} \]

- \( \beta_x \): Beta of the stock \( x \)
- \( x \): Return (\%) from the stock
- \( y \): Return (\%) from the market
- \( \bar{x} \): Expected or mean value of returns from stock
- \( \bar{y} \): Expected or mean value of returns from market
- \( n \): Number of observations

**Correlation Analysis**

\[ \beta_x = \frac{\text{Corr}_{xy} \delta_x \delta_y}{\delta_y^2} \]

or

\[ \beta_x = \frac{\text{Corr}_{xy} \delta_x}{\delta_y} \]

or

\[ \beta_x = \frac{\text{Cov}_{xy}}{\delta_y^2} \]

Where,

- \( \beta_x \): Beta of the stock \( x \)
- \( \text{Corr}_{xy} \): Correlation between return of the stock and returns of the market
- \( \delta_x \): Std. deviation of the returns of stock \( x \)
- \( \delta_y \): Std. deviation of returns of market index
- \( \delta_y^2 \): Variance of the market index
- \( \text{Cov}_{xy} \): Covariance of Stock \( x \) & \( y \)

**Covariance**

\[ \text{Cov}_{ab} = \frac{\text{Cov}_{ab}}{\delta_a \delta_b} = \frac{\sum [R_a - \bar{R}_a][R_b - \bar{R}_b]}{N} \]

Where,

- \( \text{Cov}_{ab} \): Covariance between \( a \) and \( b \)
- \( R_a \): Return on Stock \( a \)
- \( R_b \): Return on Stock \( b \)
- \( \bar{R}_a \): Expected or mean return on Stock \( a \)
- \( \bar{R}_b \): Expected or mean return on Stock \( b \)
**Portfolio Management**

**Portfolio Risk (3 Securities) (Markowitz Model/Modern Portfolio Theory)**

$$\sigma_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} \sigma_{ij}^2$$

$$\sigma_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j \text{Cov}_{ij}$$

**Single Index Model**

**Security Variance ($\sigma_i^2$)**

$$\sigma_i^2 = \beta_i^2 \sigma_m^2 + \epsilon_i^2$$

Where,
- $\sigma_i^2$ = total Variance
- $\beta_i$ = Systematic Variance
- $\epsilon_i$ = Unsystematic Variance
- $\sigma_m^2$ = Expected Variance of Index
- $\beta_i$ = beta of the stock i in the portfolio

**Portfolio Variance ($\sigma_p^2$)**

Total Risk ($\sigma_p^2$) = Systematic + Unsystematic

$$\sigma_p^2 = \left( \sum_{i=1}^{n} w_i \beta_i \right)^2 \sigma_m^2 + \left( \sum_{i=1}^{n} w_i \epsilon_i \right)^2$$

Where,
- $\sigma_p^2$ = Variance of the portfolio
- $\sigma_m^2$ = Expected Variance of index
- $\beta_i$ = Systematic
- $\epsilon_i$ = Unsystematic
- $w_i$ = the portion of the stock i in portfolio

**The covariance of returns between Securities i & j:**

$$\text{Cov}_{ij} = \beta_i \beta_j \sigma_m^2$$

---

-CA Mayank Kothari
CA Final SFM | CA Inter FM ECO
Portfolio Management:

**Portfolio Beta**

\[ \beta_p = \sum_{i=1}^{N} w_i \beta_i \]

- \( w_i \) is the weight of security \( i \)
- \( \beta_i \) is the beta of security \( i \)

**Levered (\( \beta_L \)) & Unlevered (\( \beta_U \)) Beta**

\[ \beta_L = \beta_U [1 + \frac{D}{E}] \quad \text{or} \quad \beta_U = \frac{\beta_L}{[1 + \frac{D}{E}]} \]

- Where, \( D/E \) is the Debt Equity Ratio of the respective company.

**Minimum Variance Portfolio**

\[ W_A = \frac{\sigma_B^2 - \text{Cov} A \beta}{\sigma_A^2 - \sigma_B^2 - 2 \text{Cov} A \beta} \]

\[ W_B = 1 - W_A \]

- Where, \( W_A W_B \) = Weight of security A and B in minimum Variance portfolio.
Portfolio Evaluation Measures

1. **Sharpe Ratio**
   \[ \frac{R_i - R_f}{\sigma_i} \]

2. **Treynor Ratio**
   \[ \frac{R_i - R_f}{\beta_i} \]

3. **Jensen’s Alpha**
   \[ \text{Actual Return} - \text{Required Return} = \text{Actual Return} - \text{CAPM Return} \]

Portfolio Rebalancing Theories

1. **Buy & Hold Policy:**
   Do nothing approach

2. **Constant Mix Policy**
   Balancing the portfolio in the set proportion (say 70:30) at each interval when the portfolio value changes.

3. **Constant Proportion**
   **Portfolio Insurance Policy:**
   Proportion of Risky Assets
   \[ \text{EQUITY} = M \times (PV - FV) \]
   Where, \( M > 1 \), \( PV \) is the revised portfolio value due to changes in Index, \( FV \) is the floor value.

-CA Mayank Kothari
CA Final SFM | CA Inter FM ECO
Market Lines

Capital Market Line

\[ R_i = R_f + \delta_i \sigma_m \]  
\[ \delta_i = \text{Std deviation of the security.} \]
\[ \sigma_m = \text{Std deviation of the market.} \]

Security Market Line

\[ R_i = R_f + \beta_i (R_m - R_f) \]
\[ \text{SML} \] is the graphical representation of Capital Asset pricing Model.

Security Characteristic Line

\[ \delta_i = \alpha_i + \beta_i \sigma_m \]
\[ \alpha_i = \text{Expected return on Security } i \]
\[ \beta_i (\sigma_m) = \text{Component of return due to market movement.} \]
Optimum Portfolio theory

Step 1: Calculate Treynor's ratio of given data, arrange in highest to lowest order and then find cut off C* using given formula:

\[ C_i = \frac{\sigma_m^2 \sum (R_i - R_f) \beta_i}{1 + \sigma_m^2 \sum \frac{\beta_i^2}{\sigma_e^2}} \]

Step 2: Determine the relative Z; investment of each stock in the selected portfolio

\[ Z = \frac{\beta_i}{\sigma_e^2} \left( \frac{R_i - R_f}{\beta_i} - C^* \right) \]

Step 3: Find out the weight of each stock in the selected portfolio

\[ X_i^0 = \frac{Z_i}{\sum Z_i} \]

-CA Mayank Kothari
CA Final SFM | CA Inter FM ECO
Fixed Income Portfolio

- Arithmetic Average Rate of Return
  \[ \text{AARR} = \frac{\sum R_i}{N} \]
  \( R_i \) = Returns of respective period;
  \( N \) = No. of periods.

- Time Weighted Rate of Return
  \[ \text{TWRR} = [1(1+R_1)(1+R_2)\ldots(1+R_n)] - 1 \]

- Money Weighted Rate of Return
  \[ \text{MWRR (IRR)} = \text{PV of CIF of COF} \]

- Annualised Return
  \[ \text{ARR} = (1+R)^\frac{365}{\text{No. of days}} \]
  \( R \) = Entire return for holding period.

---

-CA Mayank Kothari

CA Final SFM | CA Inter FM ECO
Mutual Funds

**NAV**
- **NAV** represents the market value of the net assets of the fund.
- Assets & liabilities should be calculated at market value or net realisable value.
- **NAV** changes daily.

\[
\text{NAV} = \frac{\text{Total Assets - Total Liabilities}}{\text{No. of units}}
\]

**Returns**

**HOLDING PERIOD RETURN**

\[
\text{HPR} = \frac{(\text{NAV}_1 - \text{NAV}_0) + \text{CG}_1}{\text{NAV}_0}
\]

Where,
- **HPR** = Holding Period Return
- \(\text{NAV}_0\) = Net asset value at beginning.
- \(\text{NAV}_1\) = Net asset value at closing.
- \(\text{CG}_1\) = Capital Gains Distribution
- \(\text{CG}_1\) = Interest or Dividend Received.

Return in case the dividends and capital gains are reinvested:

\[
\text{HPR} = \frac{(N_1 \times \text{NAV}_1) - (N_0 \times \text{NAV}_0)}{(N_0 \times \text{NAV}_0)}
\]

- \(N_1\) = No of units at the end of period
- \(N_0\) = No of units at the beginning of period.
- \(\text{NAV}_1\) = Ending price.
- \(\text{NAV}_0\) = Beginning Price.

**\(r_s\)** = Return desired by investor

\[
\text{\(r_s\)} = \frac{1}{1 - \text{initial exp.}} \times \text{\(r_1\)} + \text{recurring exp.}
\]
Derivatives Analysis & Valuation

Fair Value of Forwards/Futures:

<table>
<thead>
<tr>
<th>BASIS</th>
<th>Time Value of Money</th>
<th>Derivatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>$A = P \left(1 + \frac{r}{n}\right)^t$</td>
<td>$F = S \left(1 + \frac{r}{n}\right)^t$</td>
</tr>
<tr>
<td>Multiple</td>
<td>$A = P \left(1 + \frac{r}{n}\right)^{nt}$</td>
<td>$F = S \left(1 + \frac{r}{n}\right)^{nt}$</td>
</tr>
<tr>
<td>Continuous</td>
<td>$A = Pe^{rt}$</td>
<td>$F = Se^{rt}$</td>
</tr>
</tbody>
</table>

Adjusting for dividends and costs:

Present value of Dividend income (i) will be reduced from the spot price above and present value of cost C will be added to the spot price.

If given in % the same should be adjusted in rate of interest r.

-CA Mayank Kothari
CA Final SFM | CA Inter FM ECO
Hedging with Futures

\[ N = \frac{\text{Value to be hedged}}{\text{Futures contract value} \times \text{Risk to be reduced}} \]

- \( N \) = no. of contracts of futures to be traded to hedge the spot market position.
- Risk to be reduced = multiply by beta only to the extent we have to reduce the risk.
- If we have to reduce the whole risk, then multiply by entire beta.
- Futures Contract Value = Futures Price x Lot size.

Intrinsic Value (IV) & Time Value (TV)

Option Premium has two parts IV & TV.

**Option Premium = Intrinsic Value + Time Value**

- IV is the difference between the spot price & the strike price of the share to the extent the option is in the money.
- Means at ATM and OTM the intrinsic value of the option is simply zero. This represents that intrinsic value can never be negative.

Call Option, \( IV = \text{Max}[S-K,0] \)
Put option \( IV = \text{Max}[K-S,0] \)
**Binomial Model**

**Option Value**

\[ O_u \times p + O_d \times (1-p) \]

\[ \frac{(1+r)}{(1+r)} \]

Where,

- \( p \) = the probability of price moving upwards,
- \( r \) = rate of interest for time \( t \),
- \( O_u \) = the options value at upper level,
- \( O_d \) = the options value at lower level.

**Calculation of Probability (p)**

**Volatility Approach**

\[ p = \frac{(1+r)-d}{u-d} \]

\[ u = \frac{\text{Stock price at upper level}}{\text{spot price}} \]

\[ d = \frac{\text{Stock price at lower level}}{\text{spot price}} \]

\[ \sigma_u = \text{volatility of price moving upwards} \]

\[ \sigma_d = \text{volatility of price moving downwards} \]

**Risk Neutral Approach**

**Spot Price**

\[ S_{\text{price}} = \frac{S_u \times p + S_d (1-p)}{(1+r)} \]

Where,

- \( S_u \) = Stock price at upper level
- \( S_d \) = Stock price at lower level.
**Black Scholes Model**

**Value of Call Option**

\[ C_0 = S \times N(d_1) - K e^{-rt} \times N(d_2) \]

**Value of Put Option**

\[ P_0 = K e^{-rt} \times [1 - N(d_2)] - S \times [1 - N(d_1)] \]

Where,

\[ d_1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)t}{\sigma \sqrt{t}} \]

\[ d_2 = d_1 - \sigma \sqrt{t} \]

- **S**: Current stock price
- **K**: Strike price of the option
- **t**: Time remaining until expiration
- **r**: Current continuously compounded risk-free interest rate
- **\( \sigma \)**: Standard deviation of continuously compounded annual return
- **ln**: Natural logarithm
- **N**: Std-normal cumulative distribution function

**Adjusting for Dividends**:

In case of dividend yield (\( y = \) dividend yield/current value of the asset).

**Call option**:

\[ C_0 = S e^{-yt} \times N(d_1) - K e^{-rt} \times N(d_2) \]

**Put option**:

\[ P_0 = K e^{-rt} \times [1 - N(d_2)] - S e^{-yt} \times [1 - N(d_1)] \]

Where,

\[ d_1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r - y + \frac{\sigma^2}{2}\right)t}{\sigma \sqrt{t}} \]

\[ d_2 = d_1 - \sigma \sqrt{t} \]
**Put Call Parity Theory**

\[ S + P_0 = C_0 + \text{PV of } K \]

Where,
- \( S \) = Spot price of the underlying asset
- \( K \) = Exercise Price of the stock
- \( P_0 \) = Price (Premium) of the put option
- \( C_0 \) = Price (Premium) of the call option

---

**Option Payoff**

<table>
<thead>
<tr>
<th>BASIS</th>
<th>OPTION</th>
<th>PAYOFF</th>
<th>EFFECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long (Holder of the</td>
<td>CALL</td>
<td>Payoff = ( \max(0, \text{Spot price} - \text{Strike price}) )</td>
<td>Limited Loss,</td>
</tr>
<tr>
<td>option)</td>
<td>PUT</td>
<td>Payoff = ( \max(0, \text{Strike price} - \text{Spot price}) )</td>
<td>Unlimited profit</td>
</tr>
<tr>
<td>Short (Writer of the</td>
<td>CALL</td>
<td>Payoff = ( \min(0, \text{Strike price} - \text{Spot price}) )</td>
<td>Limited profit,</td>
</tr>
<tr>
<td>option)</td>
<td>PUT</td>
<td>Payoff = ( \min(0, \text{Spot price} - \text{Strike price}) )</td>
<td>Unlimited loss</td>
</tr>
</tbody>
</table>

-CA Mayank Kothari

CA Final SFM | CA Inter FM ECO
# Options Greeks

<table>
<thead>
<tr>
<th>GREEKS</th>
<th>SYMBOL</th>
<th>REPRESENTS</th>
<th>FORMULA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta</td>
<td>$\delta$</td>
<td>Delta represents the change in the option value with $\pm 1$ change in the Stock price.</td>
<td>$\Delta V_\delta = \frac{\Delta V_0}{\Delta S_0}$</td>
</tr>
<tr>
<td>Gamma</td>
<td>$\gamma$</td>
<td>Gamma represents the change in the options Delta with $\pm 1$ change in the Stock price.</td>
<td>$\Delta \gamma = \frac{\Delta V_0}{\Delta S_0}$</td>
</tr>
<tr>
<td>Rho</td>
<td>$\rho$</td>
<td>Rho represents the change in the options value with 1 day change in the time to expiry.</td>
<td>$\Delta \rho = \frac{\Delta V_0}{\Delta \tau}$</td>
</tr>
<tr>
<td>Theta</td>
<td>$\theta$</td>
<td>Theta represents the change in the options value with 1 day change in the time to expiry.</td>
<td>$\Delta \theta = \frac{\Delta V_0}{\Delta \tau}$</td>
</tr>
<tr>
<td>Vega</td>
<td>$\nu$</td>
<td>Vega represents the change in the options value with 1% change in the volatility of the stock.</td>
<td>$\Delta \nu = \frac{\Delta V_0}{\Delta \delta}$</td>
</tr>
</tbody>
</table>

---

-CA Mayank Kothari

CA Final SFM | CA Inter FM ECO
Interest Rate Risk Management

1. A positive or asset sensitive Gap means that an increase in market interest rates could cause an increase in Net Interest Income (NII).

2. Conversely, a negative or liability sensitive Gap implies that the banks' NII could decline as a result of increase in market interest rates.

3. Positive or Negative Gap is multiplied by the assumed interest rate changes to derive the Earnings at Risk (EaR). The EaR method facilitates to estimate how much the earnings might be impacted by an adverse movement in interest rates.

FORWARD RATE AGREEMENT

\[
\text{Settlement} = \frac{(N)(RR-\text{FR})(\frac{dtm}{Dy}) \times 100}{[1+RR(\frac{dtm}{Dy})]}
\]
Corporate Valuation

**Asset Based**

\[ \text{Book Value} = \text{Total Assets} - \text{Long Term Debt} \]

\[ \text{Total Assets} = \text{Fixed Assets} + \text{Intangible Assets} + \text{Capital Assets} - \text{Current Liabilities} \]

**Earnings Based**

\[ \text{Value of the Equity} = \frac{\text{EAT}}{\text{Ke}} \]

\[ \text{Value of the Company} = \frac{\text{EBITDA}}{\text{Ko}} \]

**Enterprise Value Based**

\[ \text{Enterprise Value} = \text{Market Value of Equity} + \text{Market Value of Preference} + \text{Market Value of Debt} + \text{Minority Interest} - \text{Cash & Cash Equivalents} \]

-CA Mayank Kothari

CA Final SFM | CA Inter FM ECO
Corporate Valuation

Other Methods

Economic Value Added

\[ EVA = NOPAT - \left( \text{Invested Capital} \right) \times WACC \]

OR

\[ EVA = NOPAT - \text{Capital Charge} \]

Market Value Added

\[ MVA = \text{Market Value} - \text{Book Value} \]
# Foreign Exchange & Risk Management

## Direct & Indirect Quote

Direct Quote = \(1 / \text{Indirect Quote}\)

\[
\text{Bid(DQ)} = \frac{1}{\text{Ask(DQ)}}
\]

\[
\text{Ask(DQ)} = \frac{1}{\text{Bid(DQ)}}
\]

## Cross Rates

\[
\frac{A}{C} = \frac{A}{B} \times \frac{B}{C} \quad \frac{\text{INR}}{\text{GBP}} = \frac{\text{INR}}{\text{USD}} \times \frac{\text{USD}}{\text{GBP}}
\]

\[
\text{Bid (INR/GBP)} = \text{Bid (INR/USD)} \times \text{Bid (USD/GBP)}
\]

\[
\text{Ask (INR/GBP)} = \text{Ask (INR/USD)} \times \text{Ask (USD/GBP)}
\]

## Premium and Discount

<table>
<thead>
<tr>
<th>Premium/(Discount) in Base Currency</th>
<th>Premium/(Discount) in Counter Currency</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\frac{F - G}{S}) or (\frac{F}{S} - 1)</td>
<td>(\frac{S - F}{F}) or (\frac{S}{F} - 1)</td>
</tr>
</tbody>
</table>

\(F = \text{Forward Rate}, S = \text{Spot Rate}\)

## Merchant Rates & Interbank Rates

Interbank Rates + Margin = Merchant Rates.
Interest Rate Parity Theory.

**When Exchange Rates Are In Direct Quote**

\[
\frac{1 + i_d}{1 + i_f} = \frac{F}{S}
\]

Where, \( i_d, i_f \) = Interest Rates of Domestic and Foreign Country.
\( F \) = Forward Rate
\( S \) = Spot Rate.

**When Exchange Rates Are In Indirect Quote**

\[
\frac{1 + i_f}{1 + i_d} = \frac{F}{S}
\]

Purchasing Power Parity Theory.

**When Exchange Rates Are In Direct Quote**

\[
\frac{1 + i_d}{1 + i_f} = \frac{F}{S}
\]

Where, \( i_d, i_f \) = Inflation Rates of Domestic and Foreign Country,
\( F \) = Forward Rate,
\( S \) = Spot Rate.

**When Exchange Rates Are In Indirect Quote**

\[
\frac{1 + i_f}{1 + i_d} = \frac{F}{S}
\]