STRATEGIC FINANCIAL MANAGEMENT

For CA Final

FORMULA

for quick revision

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An exclusive hand written booklet covering most formulas.

“Begin your journey from amateur to analyst”
MU TUA L F UN D S

1. NAV = Market Value of + Receivables + Accrued - Accrued - Outside all investments (Including cash) Income Expense liabilities

   + (Sub units x NAV) - (Redeem units x NAV)

Opening units + units subscribe - units redeem

2. Loads:
   - Sale Price = NAV x (1 + Entry load x)

   - Repurchase Price = NAV x (1 - Exit load x)

3. Returns:
   - Holding Period Return (HPR) = NAVₐ - NAVₖ + D + Gₗ x 100

   where; D = Income received during the investment period (In form of dividend or interest)
   Gₗ = It is the gains received by trading the shares

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Simple Annualised Return (SAR) = HPR x 12 / n

Compound Annualised Growth Return (CAGR)

\[ PV \times (1 + r)^t = FV \]

4. Close Ended Funds

\% Discount/Premium Price = \frac{\text{Exchange price} - \text{NAV}}{\text{NAV}} \times 100

5. Expense Ratio = \frac{\text{Expenses}}{\text{Average Portfolio/Average NAV}}

6. Returns = \frac{\text{Ending Value} - \text{Beginning Value}}{\text{Beginning Value}} \times 100.
1. **Returns** \( \frac{(P - P_0) + I}{P_0} \times 100 \)

   where: 
   - \( P_0 \): Price at the beginning of investment period
   - \( P \): Price at the end of investment period
   - \( I \): Income earned during investment period

2. **Average Return (Mean)**
   \[ \bar{x} = \frac{\sum x_i}{N} \]

3. **Average Risk (Standard Deviation)**
   \[ \sigma X = \sqrt{\frac{\sum (x - \bar{x})^2}{N}} \]

4. **Covariance**
   \[ \text{Cov}(x, y) = \frac{\sum (x - \bar{x})(y - \bar{y})}{N} \]

5. **Covariance**
   \[ \text{Cov}(x, y) = \frac{\text{Cov}_{xy}}{\sigma_x \times \sigma_y} \]

   \[ \therefore \text{Cov}_{xy} = \text{Cov}(x, y) \times \sigma_x \times \sigma_y \]
6. Portfolio Return (Rp) = \( w_a \times r_a + w_b \times r_b + \ldots \ldots \ldots + w_n \times r_n \)

\[ \text{Combination of variance calculation} = \frac{n(n-1)}{2} \]

7. Portfolio Risk (\( \sigma_p \)) = \( \sqrt{w_a^2 \times \sigma_a^2 + w_b^2 \times \sigma_b^2 + 2w_a w_b \times \text{Cov}_{ab}} \)

8. Properties of Portfolio Risk
   - When \( x = -1 \) : \( \sigma_p = a - b \)
   - \( x > 1 \) : \( \sigma_p = a + b \)
   - \( x = 0 \) : \( \sigma_p = \sqrt{a^2 + b^2} \)

9. Minimum Variance Portfolio (MVP)
   \[ w_a = \frac{s_b - \text{Cov}_{ab}}{-\sigma_a^2 + s_b^2 - 2 \text{Cov}_{ab}} \]

- When \( x = -1 \) : \( \sigma_p = 0 \rightarrow +ve\) weights
- When \( x > 1 \) : \( \sigma_p = 0 \rightarrow -ve\) weights (Short selling)

10. Theory of Dominance
    - Rule 1: Same Return : Risk ↑
    - Rule 2: Same Risk : Return ↑
    - Rule 3: Different Return and Risk : Coefficient of \( \frac{\text{variation}}{\text{slower the better}} \)
11. As per Capital Asset Pricing Model (CAPM):

\[ \text{E}(R) = R_f + (R_m - R_f) \times \beta \]

where:
- \( \text{E}(R) \) = Expected return by investors.
- \( R_f \) = Risk-free rate of return for the investor.
- \( R_m \) = Market return.
- \( R_m - R_f \) = Market Risk Premium.
- \( \beta \) = Beta.

12. As per Security Characteristic Line (SCL)/Sharpe-Index Model:

\[ \text{E}(R) = R_f + R_m \times \beta \]

13. As per Arbitrage Pricing Theory (APT)/Multifactor Model:

\[ \text{E}(R) = R_f + \left( \sum_{p=1}^{n} R_{p} \times \beta_p \right) \]

where:
- \( \beta_p \) = Sensitivity of factors on stock (1, 2, 3, ...... n)
- \( R_{p} \) = Risk Premium, i.e., Actual returns - Expected Returns.

14. As per Capital Market Line (CML), No Beta:

\[ \text{E}(R) = R_f + \left( \frac{R_m - R_f}{\sigma_m} \right) \times \sigma_l \]

where:
- \( \sigma_l \) = Risk of stock/portfolio.
- \( \sigma_m \) = Total market risk.
- \( R_m - R_f \) = Sharpe Ratio of Market/Risk Return trade off.
- \( \sigma_m \) = Slope of CML.
Ways of Calculating Portfolio Risk:

15. Markowitz Model: \[ \sigma_p = \sqrt{\sum w_i^2 \sigma_i^2 + \sum \sum w_i w_j \text{cov}_{i,j}} \]

16. Sharpe Model: \[ \sigma_p = \text{Systematic Risk} + \text{Unsystematic Risk} \]
\[ = \beta_p \sigma_m + \left[ \sigma_e^2 \text{var} + \sigma_{e_i} \sigma_{e_j} \text{cov}_{i,j} \right] \]

where: \( e = \text{Standard Error/Residual Error/Unsystematic Risk} \)

Beta Calculation:

17. \[ \beta = \frac{\text{Covar}}{\sigma_m^2} \]
\[ \beta = \frac{\text{Covar} \times \text{Var} \times \text{Var}}{\sigma_m^2} = \frac{\text{Covar} \times \text{Var}}{\sigma_m^2} \]

where: \( i = \text{Stock} \)
\( m = \text{Market} \)

18. Portfolio Beta (\( \beta_p \)) = \( \sum \beta_i w_i \) + \( \sum \sum \beta_i \beta_j w_i w_j \text{cov}_{i,j} + \ldots \ldots \ldots + \sum \sum \sum \beta_i \beta_j \beta_k w_i w_j w_k \text{cov}_{i,j,k} \)

Systematic & Unsystematic Risk - for Individual Security & Portfolio

19. Individual Security
\[ \text{SR} = \beta_i^2 \times \sigma_m^2 \]
\[ \text{USR} = \sigma_e^2 \]

20. Portfolio
\[ \text{SR} = \beta_p^2 \times \sigma_m^2 \]
\[ \text{USR} = \sum \sum \sum w_i \sigma_e^2 + w_j \sigma_e^2 + \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \]

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21. Covariance between 2 Securities using Beta
\[ \text{Cov}_{ab} = \beta_a \times \beta_b \times \sigma^2 \]

2) Performance Evaluation

1. Sharpe Ratio = \( \frac{R_p - R_f}{\sigma_p} \)

   Where: \( R_p \) = Return of portfolio/fund/security
   \( R_f \) = Risk-free return
   \( \sigma_p \) = Standard Deviation

2. Treynor Ratio = \( \frac{R_p - R_f}{\beta_p} \)

   Where: \( \beta_p \) = Systematic Risk of Portfolio

3. Jensen's Alpha (\( \alpha \)) = \( \alpha_p - E(\alpha) \)

   Where: \( E(\alpha) = R_f + (R_m - R_f) \times \beta_p \) As per CAPM

IV) Pricing

\[ P_o = \frac{D_0 (1+g)}{r_e - g} \quad \text{or} \quad P_o = \frac{D_1}{r_e - g} \]

Where: \( P_o \) = Intrinsic Value/Equilibrium Price/Ideal Price
\( D_0 \) = Current dividend/last year dividend/Dividend paid/Already given
\( D_1 \) = Expected dividend/Dividend in future/Dividend to be paid in next year
\( g \) = Growth in dividends/earnings/cashflows
\( q \) = Retention ratio \( (b) \times \) Return on Equity (ROE)
\( R_e \) = Cost of equity; Expected return by CAPM; Equity Capitalisation Rate
\( \alpha_p \) = As per CAPM; \( R_e = R_f + (R_m - R_f) \times \beta_p \)
SECURITY ANALYSIS

1. Single Stage Growth Model

As per Gordon's Growth Model: \( P_0 = \frac{D_0 (1+g)}{r_e - g} \), or \( P_0 = \frac{D_1}{r_e - g} \)

where: \( P_0 = \) Intrinsic Value / Equilibrium Price / Inland Price

\( D_0 = \) Current dividend / last year dividend / Dividend paid

Already given.

\( D_1 = \) Expected dividend / Dividend to be paid in next year.

\( g = \) Growth in dividends / earnings / cash flows.

\( \{ g = \text{retention ratio} \times \text{return on equity (ROE)} \} \)

\( r_e = \) Cost of equity; Expected return by EAP; Equity capitalisation rate

\( \{ r_e \text{ per CARM}; r_e = r_f + (r_m - r_f) \times \beta \} \)

2. Dual Stage Growth Model

\[ P_0 = \frac{D_0 (1+g_a)^t}{(1+r_e)^t} + \frac{D_t (1+g_a)}{(r_e-g_n)(1+r_e)^t} \]

where: \( t = \) terminal year

\( g_a = \) abnormal growth rate

\( g_n = \) normal growth rate.

\( r_e = \) cost of equity.

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3. Free Cash Flow to the Firm (FCFF)

\[ \text{FCFF} = \text{Net Income} + \text{Non-Cash} + \text{Interest} (1-T) - \text{FC Invest} - \text{AWC Invest} \]

\[ \text{FCFF} = \text{Net Income} + \text{Interest} (1-T) - \left[ \text{FC Invest} - \text{Dep}^n \right] - \text{AWC Invest} \]

\[ \text{FCFF} = \text{EBIT} (1-T) - \left[ \text{FC Invest} - \text{Dep}^n \right] - \text{AWC Invest} \]

\[ \text{FCFF} = \text{CFO} + \text{Int} (1-T) - \text{FC Invest} \]

\[ \text{EBIT} (1-T) \times (1-T) = \text{NI} \]
\[ \text{EBIT} (1-T) = \text{NI} + \text{Int} (1-T) \]

\[ \text{CFO} = \text{NI} + \text{Non-Cash} - \text{AWC Invest} \]

4. Free Cash Flow to Equity (FCFE)

\[ \text{FCFE} = \text{FCFF} - \text{Int} (1-T) + \text{NB} (\text{Net Borrowings}) \]

\[ \text{FCFE} = \text{NI} - \left[ \text{FC Invest} - \text{Dep}^n \right] - \text{AWC Invest} + \text{NB} \]

\[ \text{FCFE} = \text{NI} - \left[ \text{FC Invest} - \text{Dep}^n \right] - \text{AWC Invest} + D \times \left[ \text{FC Invest} - \text{Dep}^n \right] + D \times \text{AWC Invest} \]

\[ \text{FCFE} = \text{NI} - \left[ (1-D) \times (\text{FC Invest} - \text{Dep}^n) \right] - \left[ (1-D) \times \text{AWC Invest} \right] \]

\[ \text{FCFE} = \text{NI} - \left[ D \times (\text{FC Invest} - \text{Dep}^n) \right] - \left[ D \times \text{AWC Invest} \right] \]
5. Valuation of Firm (FCFF)

- Single Stage: \( \text{V}_{\text{firm}} = \frac{\text{FCFF} \times (1+g)}{\text{WACC} - q} \)

- Multi Stage: \( \text{V}_{\text{firm}} = \sum \text{FCFF} \times (1+g)^t \frac{1}{(\text{WACC} - g)^t} + \frac{(\text{FCFE} \times (1+g_n))}{(1+\text{WACC})^T} \)

where: \( \text{WACC} = \text{RD} \times \text{KD} + \text{WE} \times \text{KP} + \text{WE} \times \text{KE} \)

\( q = \text{Retention Ratio} \times \text{(b)} \times \text{Return on Capital Employed} \)

- \( \text{V}_{\text{firm}} = \text{Vd} + \text{Vp} + \text{Ve} - \text{Cash} \)

\( \therefore \text{Ve} = \text{V}_{\text{firm}} - \text{Vd} - \text{Vp} + \text{Cash} \)

- \( \text{P}_{0} = \frac{\text{Ve}}{\text{No of shares}} \)

6. Valuation of Equity (FCFE)

- Single Stage: \( \text{Ve} = \frac{\text{FCFE} \times (1+g)}{\text{Ke} - q} \)

- Multi Stage: \( \text{Ve} = \sum \text{FCFE} \times (1+g)^t \frac{1}{(1+\text{Ke})^T} + \frac{(\text{FCFE}_T \times (1+g_n))}{(\text{Ke} - g_n)(1+\text{Ke})^T} \)

where: \( \text{Ke} = \text{Cost of equity} \)

- \( \text{P}_{0} = \frac{\text{Ve}}{\text{No of shares}} \)
1. **Economic Value Added (EVA)**

\[
EVA = \text{Net Operating Profit} - \left[ \frac{\text{Total Invested Capital} \times \text{wACC}}{(1 - t)} \right]
\]

\[
EVA = \left[ \frac{\text{EBIT}(1 - t)}{(D + E)} \times \text{wACC} \right]
\]

where: TIC = Debt + Equity / FC invt + WC invt

2. **Convertible Preference Shares**

i) **Conversion Ratio** = No of equity shares : Preference shares.

ii) **Conversion Value** = Conversion Ratio \( \times \) CP of equity.

iii) **Conversion Premium** = \( \frac{\text{Market Price of Prefer. shares} - \text{Conversion Value}}{\text{Conversion Value}} \times 100 \)

3. **Right Issue & Valuation of Rights**

i) **Value of Right** = \( \frac{P_0 - (N_a \times X)}{N_a + N_x} \)

ii) **X-Right Price** = \( \frac{(P_0 \times N_a) + (N_x \times X)}{N_a + N_x} \)

where: \( P_0 \) = Current price of equity share.

\( N_a = \) No of equity shares

\( X = \) Right Price

\( N_x = \) No of rights

iii) **Cum Right Price - Value of Right** = \( X \times \text{Right Price} \)
SECURITY ANALYSIS - BOND VALUATION

1. Intrinsic Value of the bond \( P_0 \) = \[ C \times PVIFA(x, t) + RV \times PVIF(x, t) \]
   where:
   - \( C \): Coupon.
   - \( PVIFA \): Present Value Interest Factor Annuity.
   - \( x \): Yield to Maturity (YTM).
   - \( t \): time/period.
   - \( PVIF \): Present Value Interest Factor.
   - \( RV \): Redemption Value.

2. Approximate YTM = \[ \text{Interest} + \frac{RV - CMP}{(RV + CMP) \times t} x 100 \]
   where:
   - \( CMP \): Current Market Price.

3. Perpetual / Redeemable Bond:
   \( P_0 = \frac{\text{Coupon}}{\text{YTM}} \)

4. Current Yield = \[ \frac{\text{Coupon}}{\text{Price}} \times 100 \]

5. Duration = \[ t \times \text{wrt} \]
   where:
   - \( t \): time/period.
   - \( \text{wrt} \): weights.
6. Modified Duration = \[ \frac{\text{Duration}}{1 + \text{YTM}} \]

7. \(-\text{MD} = \frac{1}{\text{Yield}} \times \frac{\Delta \text{Price}}{\Delta \text{Yield}}\)

\[ \Delta \text{in Price} = \Delta \text{Yield} \times -\text{MD} \]

8. \[ D = \frac{\sum c_t}{(1+y)^t} + \frac{\sum RV_t x_t}{(1+y)^t} \]

\[ P_0 \]

\[ \text{where: } D = \text{Duration} \]
\[ y = \text{YTM} \]

9. Straight Value = \[ P_0 = \sum c_t \cdot \text{PVIF}(t, y, t) + \sum RV_t \cdot \text{PVIF}(t, y, t) \]

10. Option Value = Current Market Price of bond - Straight Value

11. Downside Risk = Option Value

12. \[ \% \text{ of Downside Risk} = \frac{\text{Straight Value} - \text{CMP}}{\text{CMP}} \times 100 \]

13. Converson Ratio = number of shares receivable on conversion of 1 convertible bond

14. Stock Value / Conversion Value = Conversion Ratio \times \text{CMP of stock/equity}
15. Conversion Parity Price = \( \frac{\text{CMP of bond}}{\text{Conversion Ratio}} \)

16. Conversion Premium = Conversion Parity Price - CMP of Equity

17. Conversion Premium \( \% \) = \( \frac{\text{Conversion Premium}}{\text{CMP of Equity}} \) \times 100

18. Favourable Income Difference/Share = \( \text{Coupon} - \left[ \frac{\text{Exchange ratio} \times \text{DPS}}{\text{Exchange ratio}} \right] \)

where; DPS = Dividend per share

19. Premium Payback Period = \( \frac{\text{Conversion Premium}}{\text{Favourable Income Diff/Share}} \)

20. Duration of Perpetual Bond = \( \frac{1 + \text{c}%}{\text{YTM}} \)
MERGER, ACQUISITION & CORPORATE RESTRUCTURING

1. Exchange Ratio = \( \frac{EPS_{T}}{EPS_{A}} \)
   
   where; EPS = Earning per Share
   MPS = Market Price per Share
   BVPS = Book Value per Share
   T = Target Company
   A = Acquiring Company

2. Promoters holding after acquisition = sh in any co + (ER x sh in target co)

3. % Promoters Holding = \( \frac{Promoters\ Share}{\text{Total number of shares}} \) x 100

4. Free float market capitalisation = (Total shares - Promoters sh) x MPS
   = Mkt Cap x Public Holding

5. MPS = EPS x PE
   where; PE = Price earning Ratio

6. Post merger (Mkt cap) = No of shares x MPS

7. Market capitalisation = Free float market cap
   Free float (%)

9. Gross NPA (\%) = \frac{\text{Gross NPA}}{\text{Total Advances}} \times 100

10. Capital Adequacy Ratio (CAR) = \frac{\text{Total Capital}}{\text{Risk-Weighted Assets}} \times 100

11. Swap Ratio = \left( \frac{\text{BVPS}}{\text{BVPS}} \times w \right) + \left( \frac{\text{MPS}}{\text{MPS}} \times w \right) + \left( \frac{\text{CAR}}{\text{CAR}} \times w \right) + \left( \frac{\text{Gross NPA}}{\text{Gross NPA}} \times w \right)

   where: BVPS = Book Value per Share
   MPS = Market Price per Share
   CAR = Capital Adequacy Ratio
   Gross NPA = Gross Non-Performing Asset
   w = Weights

12. \text{Asset} = w_d \times \text{pd} + w_e \times \text{pe}

   where: \( d = \text{debt} \)
   \( e = \text{equity} \)

13. Asset \( p \) with no taxation

   \text{Asset} = \frac{D}{D+E} \times \text{pd} + \frac{E}{D+E} \times \text{pe}

   \{ \text{If nothing given} \rightarrow pd = 0 \}

14. Asset \( p \) with taxation

   \text{Asset} = \frac{D(1-t)}{D(1-t)+E} \times \text{pd} + \frac{E}{D(1-t)+E} \times \text{pe}
15. \( p_d = 0 \) [Not Given]

\[ p_{asset} = w_e \times p_e \]

16. If only equity is issued.

\[ p_{asset} = p_e \]
FOREIGN EXCHANGE & DERIVATIVES

1. Spread = Ask rate - Bid rate.

2. Mid-Quote = Ask rate + Bid rate
   \[ \frac{2}{2} \]

3. Spread Margin (A) = \( \frac{\text{Spread}}{\text{Mid-Quote}} \times 100 \)

4. Bid rate = Mid-Quote - \( \frac{\text{Spread}}{2} \)

5. Ask rate = Mid-Quote + \( \frac{\text{Spread}}{2} \)

6. Annualised Forward Margin (AFM)
   \[ \text{AFM} = \frac{f - s}{s} \times 100 \times \frac{12}{n} \]
   
   where: 
   \( f = \) forward rate
   \( s = \) spot rate
   \( n = \) No. of months.

7. As per Interest Rate Parity (IRP): 
   \[ \text{Forward Rate}_{bc} = \text{Spot}_{bc} \times \frac{(1 + \text{Int}_{bc})}{(1 + \text{Int}_{vc})} \]
   
   where: 
   \( bc = \) base currency
   \( vc = \) variable currency

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\[ P_{HC} = P_{FC} \times FC \]

where, \( P_{HC} = \) Price of goods in home currency.
\( P_{FC} = \) Price of goods in foreign currency.
\( FC = \) Exchange rate in foreign currency.

9. As per Purchasing Power Parity (PPP):
Forward Rate = Spot rate \( \times \frac{(1 + \text{Inflation}_a)}{(1 + \text{Inflation}_b)} \)

where; \( a = \) variable currency
\( b = \) base currency.

10. As per Fisher's Effect:
\[ (1 + R) = (1 + R) \times (1 + D) \]

where; \( N = \) Nominal Interest Rate,
\( R = \) Real Interest Rate,
\( D = \) Inflation.

11. Theoretical / Ideal / Equilibrium Future Price (TFP):
\[ TFP = S + C - D \]

where; \( S = \) Spot Price
\( C = \) Cost of carrying
\( D = \) Dividend.

12. Cost of Carrying - Simple Annualized
\[ \text{Dividend (Absolute)} \]
\[ TFP = S + \left( \frac{S \times x \times t_2}{100} \right) - D \]
- **Dividend Yield**
  \[ TFP = S + (s \times \frac{x \times \frac{t}{12}}{12}) - (S \times d \times \frac{t}{12}) \]
  \[ \therefore TFP = S + \left[ s \times (x-d) \times \frac{t}{12} \right] \]

13. **Cost of Carrying - Compounded Annualised**
   - **Dividend (Pitsolute)**
     \[ TFP = S \times (1+x)^t - D \]
   - **Dividend Yield**
     \[ TFP = S \times \left[ 1 + (x-d) \right]^t \]

14. **Effective Rate of Interest**
   \[ EROS = \left[ 1 + \frac{x}{n} \right]^{t \times n} - 1 \]
   \[ \text{where:} \quad t = \text{No of years (time period)} \quad \text{of compounding} \]
   \[ n = \text{No of times compounding in a year} \]

15. **CAGR / Exponential**
   \[ FV = PV \times (1+x)^t \]
   \[ FV = PV \times e^{xt} \]
   \[ \text{where:} \quad x = \text{rate of interest} \]
   \[ t = \text{time to maturity} \]
   \[ e^{xt} = \text{the exponential function which is always in factor and will be provided in the question.} \]
16. **Cost of Carrying - CCF**
   - **Dividend (Absolute)**
     - If dividend is expected at end,
       \[ \text{CFP} = g \times e^{rt} - D \]
     - If dividend is received between/before maturity,
       **Method 1:** \[ \text{CFP} = g \times e^{rt} - D e^{rt} \]
       **Method 2:** \[ \text{CFP} = (g - D e^{rt}) \times e^{rt} \]
   - **Dividend Yield**
     \[ \text{CFP} = g \times e^{(r-d)t} \]

17. \[ \text{CFP} = (g + e) + \frac{Sc}{L} \]
   where, \( Sc/L = \text{Storage Cost} \)

18. **Contract Size** = \( \left( \frac{\beta_T - \beta_P}{VP} \right) \times \frac{FCG}{Quantity} \)
   where, \( \beta_T = \text{Target Beta} \)
   \( \beta_P = \text{Portfolio Beta} \)
   \( VP = \text{Value of Portfolio} \)
   \( FCG = \text{Future Contract Size} \)

19. **Margin Call** = Initial Margin - Balance in Margin Account

20. **BEP** = Initial Margin - Maintenance Margin
    \( \text{Lot size} \)

22. Contract Size (Hedging Portfolio with Options / Delta Hedging)

\[ CS = \frac{1}{\partial} \times \frac{VP}{OCS} \]

where:
- \( CS \) = Contract Size
- \( VP \) = Value of Portfolio
- \( OCS \) = Option Contract Size
- \( \partial \) = Delta = \( \% \) change in Option Premium = \( \% \) change in Underlying Asset

23. FRA Pay Off

\[ \text{FRA Pay Off} = \left( \text{Ref rate} - \text{FRA rate} \right) \times NF \times \frac{d^2}{360} \]

\[ \left[ 1 + \left( \frac{FB \times d}{360} \right) \right] \]

where:
- FRA rate / FRA = Libor rate of FRA, i.e., contracted rate
- Ref rate = Settlement rate as LIBOR on maturity
- \( d \) = Duration of the underlying
- NF = Notional Principal


\[ (S_u \times P_d) + (S_d \times P_u) = TFP \]

where:
- \( S_u \) = Price when the stock goes upwards
- \( S_d \) = Price when the stock goes downwards
- \( P_d \) = Probability of stock going upwards
- \( P_u \) = Probability of stock going downwards
- So = Price of stock today
- r = Risk-free rate
- t = Time of maturity
- \( P_d + P_u = 1 \)
25. **Put Call Parity**

\[ S_0 + P_0 = C_0 + X e^{-rt} \]

where:  
- \( S_0 \): Long in Stock
- \( P_0 \): Long Put
- \( C_0 \): Long Call
- \( X e^{-rt} \): Present value of the strike price also called as Investment in risk-free at present value of \( X \)

26. **Formulas of Black & Scholes**

- \( C_0 = S_0 N(d_1) - X e^{-rt} N(d_2) \)

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

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

where:
- \( C_0 \): Price of Call/Call Premium today
- \( S_0 \): Spot Price today
- \( X \): Strike Price
- \( X e^{-rt} \): Present Value of Strike
- \( r \): Risk-free rate (Annualised)
- \( \sigma \): Standard deviation (Annualised)
- \( t \): Time to maturity
- \( \ln \): Log Natural
- \( N(d_1) \): It is the probability of spot at maturity i.e. \( S_t \)
- \( N(d_2) \): It is the probability of exercising the option at \( X \)
3) INTERNATIONAL FINANCIAL MANAGEMENT

1. As per Interest Rate Parity:
   \[ \text{Forward}_{BC} = \frac{\text{Spot}_{BC} \times (1+\text{Int}_{VC})}{1+\text{Int}_{BC}} \]
   where; \( BC \) = base currency
   \( VC \) = variable currency

2. As per Purchasing Power Parity:
   \[ \text{Forward}_{BC} = \frac{\text{Spot}_{BC} \times (1+\text{Inflation}_{VC})}{1+\text{Inflation}_{BC}} \]

3. \( NCF = RCF \times (1 + \text{Inflation}) \)

4. \( RCF = \frac{NCF}{(1 + \text{Inflation})} \)

5. Modified Internal Rate of Return = \( \left( \frac{FV}{PV} \right)^{1/t} - 1 \)
Money Market

1. Discount Yield = \( \frac{FV - Price}{FV \times 100 \times \frac{365}{t}} \)
   
   where: \( FV = \) Face Value
   \( t = \) Period / time

2. Bond Equivalent Yield = \( \frac{FV - Price}{Price \times 100 \times \frac{365}{t}} \)

3. Effective Annualized Yield = \( \left[ 1 + \frac{r}{n} \right]^{tn} - 1 \)
   
   where: \( n = \) no of times compounded in a Year
   \( t = \) Period / time
CAPITAL BUDGETING DECISION

A) Basics

1. Cash flow after tax = Net profit after tax + Depreciation.

2. Payback Period = \( E + \frac{B}{C} \)

   where: \( E \) = Proceeding year to the year of recovery of initial investment.
   \( B \) = Balance amount to be recovered
   \( C \) = Total cash flow in the year of recovery.


4. Profitability Index (PI) = \( \frac{\text{Present Value of Cash Inflows}}{\text{Present Value of Cash Outflows}} \)

5. Annualised NPV/ Equivalent Annualised Cost (EAC)

   \[ \text{EAC} = \frac{\text{NPV}}{\text{PV of Net Cash Outflows}} \times \text{PVIFA}(x,t) \]

   where: \( \text{PVIFA} = \text{Present Value Interest Factor Annuity} \)
   \( x = \) Rate of Interest
   \( t = \) Time/Period.
3. Average Rate of Return (ARR)

\[ \text{ARR} = \frac{\text{Average NPAT}}{\text{Average Investment}} \times 100 \]

where; Average Investments = Opening + Closing invt

DB can be taken as closing invt

8. Inflation in Capital Budgeting

As per Fisher Effect; Nominal Rate = Inflation + Real Rate

\[ (1+N) = (1+\text{Inflation}) \times (1+R) \]

9. \( RCF \times (1+\text{Inflation}) = NCF \)

where; \( RCF = \) Real Cash Flow
\( NCF = \) Nominal Cash Flow

10. \( NCF \times \frac{1}{(1+\text{Inflation})} = RCF \)

\[ \text{(Risk Analysis)} \]

\[ \text{Coefficient of Variation} = \frac{\text{Risk}}{\text{Return}} = \frac{\sigma}{\bar{x}} \]

\[ \text{Particulars} \quad \text{without probability} \quad \text{with probability} \]

\[ \begin{array}{ll}
\text{\( \bar{x} \) (Return)} & \frac{\sigma^2}{N} \quad \sigma^2(\bar{x}\times p) \\
\text{\( \sigma \) (Risk)} & \sqrt{\frac{\sigma^2}{N}} \quad \sqrt{\sigma^2(\bar{x}\times p)}
\end{array} \]

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4. **Calculation of Risk of the Project**

i) **If cash flows are dependent**
   \[ \text{SNPV} = (\text{CF}_1 \times DF_1) + (\text{CF}_2 \times DF_2) + (\text{CF}_3 \times DF_3) \]

ii) **If cash flows are independent**
   \[ \text{SNPV} = \sqrt{(\text{CF}_1 \times DF_1)^2 + (\text{CF}_2 \times DF_2)^2 + (\text{CF}_3 \times DF_3)^2} \]

5. **Standard Normal Distribution Curve**
   \[ z = \text{Target Value} - \frac{\bar{x}}{\sigma} \]

6. **Leasing & Borrowing Decision**

1. **Calculation of Lease Rental (Break Even Lease)**
   \[ \text{PVCO} = \text{Lease Rental} \times (1 - \delta) \times PVIFA(\delta, t) \]
   where; \( \delta \) = required return by the lessor/COC of lease

2. **Calculation of EBI - Equated Annual Installment**

i) **If installments are on end of year**
   \[ \text{Loan Amount} = \text{EBI} \times PVIFA(\delta, t) \]

ii) **If installments are on beginning of year**
   \[ \text{Loan Amount} = \text{EBI} \times [1 + PVIFA(\delta, t-1)] \]
**Factoring**

1. **Debtors Turnover Ratio** = \( \frac{\text{Credit Sales}}{\text{Average Debtors/Accounts Receivable}} \)

2. **Debtors Velocity Ratio** = \( \frac{\text{Debtors Turnover Ratio}}{\text{Average Collection Period}} \)

   OR

   = \( \frac{12 \times \text{Avg. Debtors}}{\text{Credit Sales}} \)

3. **Average Debtors** = \( \frac{\text{Credit Sales} \times \text{Average Collection Period}}{12} \)

4. **Credit Sales** = \( \frac{\text{Receivables} \times 12}{\text{Rs.}} \)

5. **Effective rate of Factoring** = \( \frac{\text{Net annualised cost of factoring}}{\text{Actual advance granted}} \times 100 \)
DIVIDEND POLICY

1. Walter's Model

\[ P = D + \frac{(E - D)}{r_e} \times \frac{x}{r_e} \]

Where: \( P \) = Price of share / Intrinsic Value
\( D \) = Dividends (DPS)
\( E \) = Earnings (EPS)
\( x \) = Return on investment / Return on Equity or return on retained earnings / IRR
\( r_e \) = Cost of equity / Required return by equity shareholders / Equity Capitalisation rate

\[ r_e = 1 + PE ratio \]

2. Gordon's Growth

\[ P_0 = \frac{D_0}{r_e - g} \quad \text{or} \quad \frac{D_0}{r_e - g} \times \frac{(1 + g)}{r_e - g} \]

Where: \( P_0 \) = Intrinsic Value / Equilibrium Price / Ideal Price
\( D_0 \) = Current dividend / Last year dividend / Dividend paid / Already given
\( D_1 \) = Expected dividend / dividend in future / Div to be paid in next year
\( g \) = Growth \[ g = \frac{R \times 100}{100 - \text{retention ratio} \times \text{return on equity}} \]
\( r_e \) = Cost of equity \[ \text{As per CAPM}; \quad r_e = R_f + (R_m - R_f) \times \beta \]
3. Grahah & Dodd Model (Traditional Model)
\[ \text{Price} = \left( \frac{D + E}{2} \right) \times M \]
where; \( M \) = Multiplier

4.Lintner’s Model
\[ D_1 = D_0 \times c + \left( \frac{\text{Target P/E ratio} \times \text{EPS}}{1 - c} \right) \]
where; \( D_0 \) = Current dividend or last year’s dividend.
\( D_1 \) = Expected dividend or next year’s dividend.
\( c \) = Adjustment factor/weight.
\( \text{EPS} \) = Earnings per share

5. Modigliani & Miller
\[ P_0 = \frac{D_t + P}{(1 + R_E)} \]
where; \( P_0 \) = Current Price.
\( D_t \) = Expected Dividend.
\( P \) = Expected Price.
\( R_E \) = Cost of Equity.

* Dividend Irrelevance Theory of PPM
\[ nP_0 = P(m+n) - I + E \]
\[ \frac{1}{1 + R_E} \]
where; \( nP_0 \) = Total market value of firm.
\( P \) = Price of share/Intrinsic Value.
\( m \) = Old shares.
\( n \) = New shares.
\( I \) = Investment made.
\( E \) = Total earnings.
\( R_E \) = Cost of equity.

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Theoretical Buy-Back Price

Value of co before Buy-back = Value of co after buy-back

\[ (x \times P_0) = (x - b) \times P_i \]

\[ P_i = \frac{x \times P_0}{x - b} \]

where:
- \( x \) = No. of shares before buy-back
- \( b \) = Buy-back shares
- \( P_0 \) = Price of co before buy-back
- \( P_i \) = Price of co after buy-back / Buy-back price
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