BFD Formulas

⇒ Determination of Cost of Capital / Required Rate

$$\text{WACC} = \frac{Ke * E + Kd * D}{E+D}$$

Where Ke → is the cost of equity
E → is the Market Value of Equity
Kd → is the cost of debt (post tax)
D → is the Market Value of Debt

⇒ Determination of Equity

- If listed

  Price per share x No. of shares = Market Value

  P / E ratio = Price / Earning

  Market Value = P / E x Earning (forecast)

  ↓

  (Historic P / E ratio)

⇒ Dividend Valuation Model

- Constant Dividend per annum

$$\text{Market Value (Equity)} = \frac{D}{Ke}$$

Where D → Dividend
Ke → Cost of Equity

⇒ The Market Value of a share is the PV of all its future cash dividends.

Assumptions:

- ❖ Stable Industry
- ❖ Fixed 100% payout policy (i.e. No Retention)

⇒ Dividend Growth Model

$$E = \frac{D_o\,(1+g)}{Ke-g}$$

This Ke calculated will be Keg if it is a geared company.

Where	E	→ Market Value of Equity
	Do	→ Dividend Just Paid
	Ke	→ Cost of Equity
	g	→ Growth rate (Gordon's Growth Model)

If D_1 is given then Do (1+g) would be replaced with D_1

Gordon's Growth Model

g% = r x b

Where	r	→ Return earned by retained profit
	b	→ % profits retained per annum

- Concept of cum dividend (Inclusive of dividend)
- Concept of ex dividend (Exclusive of dividend)

⇒ For dividend growth model ex dividend price is used.

⇒ The dividend growth model is applicable as long as your growth rate is less than Ke.

⇒ For Redeemable debt if MV is given then it should be taken in WACC formula, if MV not given then discounts the future outflows of debt using Kd.

⇒ Ke will be post tax Ke
Because dividend comes from post tax profits therefore Ke always come post tax.

RATIOS

I. Financial Gearing / Debt Equity Ratio

- $$\frac{Debt}{SHs\ Equity\ (including\ reserves) + Debt}$$

II. Operational Gearing

- $$\frac{Contribution\ Margin}{PBIT}$$ (Sales – Variable Cost of Sales)

III. Earnings per Share

- $$\frac{Profit\ After\ Tax}{No.of\ Shares}$$

IV. Interest Cover

- $$\frac{PBIT}{Debt\ Interest}$$

V. P / E Ratio

- $$\frac{Price}{EPS}$$

⇒ Determination of Debt and Cost of Debt

- FACE VALUE: it is the reference value which is used for calculation of coupon interest amount. Face value is specified at the time of issuance of debt.
- COUPON RATE: it is the rate at which interest is actually paid by the borrower to the holder of the security. Coupon rate is applied to face value to calculate coupon interest amount. This is also fixed / determined at the time of issuance of debt.
- REDEMPTION VALUE: it is the amount at which the "Principal amount" of debt is to be settled / repaid (except in case of "zero coupon bonds"). It may or may not be equal to the face value.
- MARKET VALUE OF DEBT: it is the amount at which the debt security can be easily purchased / sold in the market today.

  Arithmetically: where all the future cash flows of the debt are discounted using current market rate (Kd) of the debt, we arrive at the debt's Market Value denoted by D.

  Market Rate: it is the rate currently offered by securities of similar credit rating and similar tenure to maturity.

Relationship between Market Rate and Market Value

- There is an inverse relationship between the market rate and market value of a fixed income security. A decrease in the market rate will mean an increase in the market value of fixed income securities.

⇒ <u>M.V. of Debt</u>

- Irredeemable (Perpetual Debt i.e. principal never redeem)

  - **<u>Without taxes</u>** $D = \frac{I}{Kd}$

    Where D → Market Value of Debt
    I → Interest Expense per annum
    Kd → Market rate of debt

  - **<u>With taxes</u>** $D = \frac{I\,(1-t)}{Kd\ (post\ tax)}$

    Where D → Market Value of Debt
    I → Interest Expense per annum
    T → Rate of tax
    Kd → Market Value of Debt (post tax)

- Redeemable Debt
  - Calculating MV of debt using post tax market rate by discounting future cash outflows from today till redemption.
  - **<u>If</u>** Kd is not known then we will calculate it using IRR.

<u>First Step:</u>

- <u>Simple Annualized Return</u>

	p.a.
Interest (Say) (net of tax)	5.6
Redemption gain	<u>3.0</u>
(100-85)=15/5	<u>8.6</u> / 85

Redemption Value Current Market Value

Annualized Rate ≅ 10%

<u>Second Step</u>

Calculate NPV using 10% & another rate for hit and trial method.
Then for both NPVs use IRR formula

$$r_1 + \frac{NPV_1}{NPV_1 - NPV_2}\,(r_2 - r_1)$$

Where **r** = Rate
NPV = Net Present Value of cash flows (both inflows and outflows)

⇒ If Interest payment is half yearly then Kd used should be calculated as follows

- $(1 + r) = (1 + er)^2$ → for half year
  If quarterly payment then 4 should be used

  r = Rate per annum
  er = Equivalent Rate

- Post tax Kd = Pre tax (1 – t)

⇒ Convertible Loan Stock

- Is conversion better than holding / Redeeming Security?
- At what share price / growth etc conversion will be feasible?

A) Is Conversion Option better or Not

Conversion Option at Maturity

- Higher of the two
  - Redemption proceeds
  - Conversion proceeds

E.g.: FV = 100 Redemption Proceeds = 110
OR
Convert into 20 Ordinary Shares
each valuing Rs 6

6 * 20 = 120

Compare 110 with 120

Redemption proceed   Conversion proceeds

At Maturity
Select the higher

Conversion before Maturity

At the time of conversion option higher of the two

- Conversion Proceeds
- PV of future CFs of debt till maturity

E.g.: Debt Instrument – Maturity after 5 years. After 3 years conversion option

0 1 2 3 4 5

option   IRR

- conversion proceeds
- PV of these cash flows

- Compare both at the time of conversion option and select the higher one.

⇒ Till the time the convertible security is converted into equity shares, until that time it would be called a debt security and Kd would be used as its discount rate.

⇒ Present and Future Value Formulas

- Brings present value of future Rentals

  ➢ $P = \quad R\left[\frac{1-(1+i)^{-n}}{i}\right]$

- Brings future value of Rentals

  ➢ $F = \quad R\left[\frac{(1+i)^{n}-1}{i}\right]$

- Brings future value of compound Instrument

  ➢ $S = \quad P(1+i)^{n}$

- For calculating growth rate if a value is desired in future and its current value is known

  ➢ $S = \quad P(1+g)^{n}$

⇒ Alternative way (Short Cut) to calculate WACC
(When these assumptions are applicable)

- Earnings p.a. are stable
- All earnings are paid out as dividends
- Debt is irredeemable

- **Without Taxes**

➢ Ke = $\frac{\text{PBT}}{\text{E}}$

➢ WACC = $\frac{\text{PBIT}}{(\text{Total MV ie E+D})}$

Where	PBT	Profit before Tax
	PBIT	Profit before Interest and Tax
	E	Market Value of Equity
	D	Market Value of Debt

- **With Taxes**

➢ Ke = $\frac{\text{D}}{\text{E}}$

Where	D	Dividend
	E	Market Value of Equity

➢ WACC = $\frac{\text{PBIT }(1-\text{t})}{\text{Total MV E+D}}$

Where	PBIT	Profit before Interest and Tax
	t	Rate of tax
	E	Market Value of Equity
	D	Market Value of Debt

⇒ WACC as discount rate for new projects:

- we can use WACC as a discount rate when and only when

WACC = MCC

WACC before the project = WACC after the project

Following would affect WACC → Ke, Kd, D/E ratio

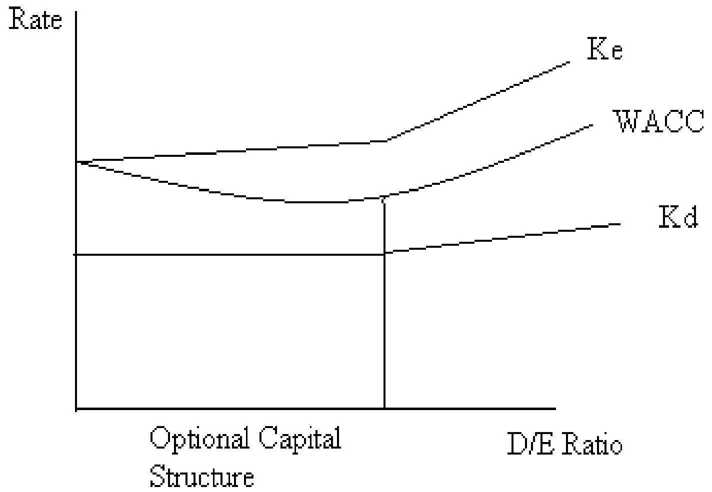
  - D/E ratio measures the financial risk
  - Ke → Business Risk, Financial Risk (D/E Ratio)
  - Kd → Creates Financial Risk

- WACC can be used as a DR for a project which does not materially affect the company's
  - Business Risk and
  - Financial Risk (D/E)

⇒ Effect of changes in financial risk (D/E) ratio on Company's Cost of Capital and Market Value

- Traditional theory
- Modigliani and Miller theory (MM theory)

⇒ <u>Traditional Theory</u>



- Initially a company is 100% equity financed, when debt is introduced into company's capital structure then
  - Initially Ke ↑ ⇒ WACC ↓ MV ↑

    Marginal Increase

- This process continuous till a certain D/E ratio
  - Subsequently if more debt is introduced

    Ke ↑ Kd ↑ WACC ↑ MV ↓

- Subsequently Ke increases significantly due to increase in Financial Risk as more debt is introduced in the capital structure of the company.

  With changes in capital structure (FR or D/E)

WACC changes
So
Existence WACC cannot be used as a discount rate

⇒ MM Theory → Without Taxes (Net Operating Income Approach)

MM theory without taxes assumes that WACC has nothing to do with the capital structure i.e. your D/E ratio

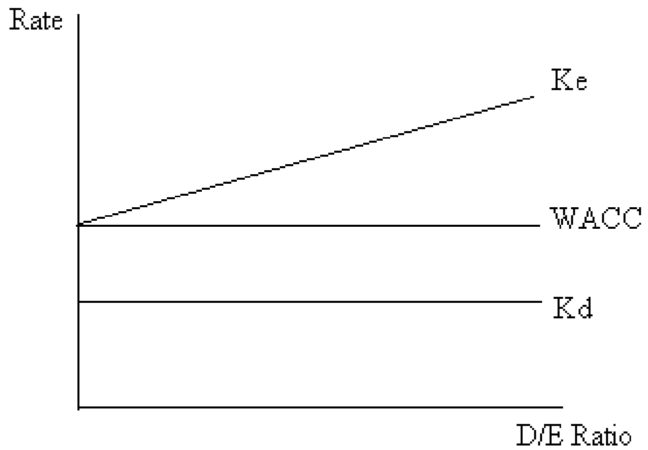
Fundamental assumption of this theory:

MM theory assumes that debt capital is easily available to all type of borrowers at all the level of gearing at the same rate. Till the time you can borrow you can get it at the same rate.

$$\text{WACC} = \frac{\text{PBIT}}{\text{Total MV (E+D)}}$$

Where PBIT → Profit before Interest and Tax
E → Equity's Market Value
D → Debt's Market Value

- Ke will continue to reprise itself; further the WACC introduced in the beginning will remain the same.



- All companies in the same industry having same business risk should have same WACC (irrespective of their capital structure)

Example:

A	B	C
	(Same Business Risk)	
E = 100%	E = 50%	E = 20%
	D = 50%	D = 80%

$$WACC_A = WACC_B = WACC_C$$

$$Ke\ A < Ke\ B < Ke\ C$$

WACC must remain same therefore MVs (E + D) must be in proportion to PBIT

- Even if FR (D/E ratio) changes but business risk remains the same then
  - WACC remains the same

    ↓

    WACC can be used as a discount rate for project appraisal

  - If Business Risk remains the same then

    WACCu = WACCg   U = Un geared
    g = Geared

  But Keu will not be equal to Keg, we will then calculate Keg by the following equation:

$$Keg = Keu + \underbrace{(Keu - Kd) \times D/E}_{\text{Keg > Keu by Financial Risk Premium}}$$

  - If there is an un geared company then

$$WACCu = Keu$$

- When WACC is same then MV should be in same proportion to PBIT

$$MV_B = \frac{PBIT_B}{PBIT_A} \times MV_A$$

Where MV → Market Value
PBIT → Profit before Interest and Tax

⇒ Arbitrage Gain

	G	U
	Rs in '000'	
PBIT	3,500	1,750
Interest	(1,200)	-
	2,300	1,750
MV → E	15m	10m
→ D	10m	-
	25m	10m

$$\mathrm{WACC_g} = \mathrm{WACC_u}$$

$$\frac{\mathrm{PBIT_g}}{\mathrm{MV_g}} = \frac{\mathrm{PBIT_u}}{\mathrm{MV_u}}$$

"S" own 10% equity of G Ltd.

Current income level → 10% of 2.3m = Rs 230 k
Current investment level → 10% of 15m = Rs 15m

Divest from G Ltd → Own E →	1.5m	60%
Personally borrow D →	1m	40%
Investment in U Ltd	2.5m	

This personal borrowing is important so as to keep the same D/E ratio and not to change the risk profile.

Revised income level 2.5/10 x 1.75m	= 437.5 k
Interest on borrowing @ 12% (1200/10,000)	= (120) k
Net Income	= 317.5 k

Current Income	317.5
Previous Income	(230)
Arbitrage gain	87.5 k

⇒ At a certain level prices of the two companies will start to change, G Ltd's price would decrease and U Ltd's would increase which will ultimately bring the prices of these two shares in accordance with MM theory. Then there would be no arbitrage gain as market values will be in equilibrium.

⇒ MM Theory With Taxes

If PBITs are same

MVg > MVu by (D x t) → P.V of tax saving on interest of debt.

So MVg = MVu + (D x t)

MVg = First in proportion to MVu + D x t
(Based on PBIT)

- In a world with taxes a company should try to maximize debt in its capital structure

D ↑ D x t ↑ MVg ↑

- If a company has a debt for a certain period of time and it is again rolling it over for another term such that the debt seems to be irredeemable then we will assume that the debt would not be payable (irredeemable) thus discounting the tax saving till perpetuity.

MVg = MVu + (D x t) Assumption: debt is irredeemable
Discount rate is pretax Kd.

⇒ Measurement of Risk

→ MM theory without taxes

FR = D/E

→ MM theory with taxes

FR = D (1 – t) /E

⇒ Calculation of Keg in MM theory with taxes

$$\text{Keg} = \text{Keu} + \underbrace{(\text{Keu} - \underset{\text{Pretax Kd}}{\underset{\downarrow}{\text{Kd}}}) \times \frac{D\,(1-t)}{E}}_{\text{Financial Risk Premium}}$$

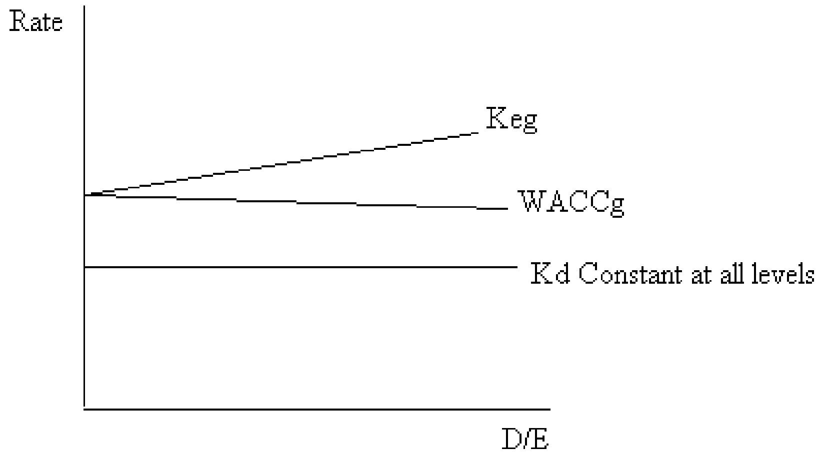
WACC with MM theory with taxes

$$\text{WACC} = \text{Keu} \times \left[1 - \frac{D \times T}{E+D}\right]$$

In a world with taxes:

D ↑ (D x t) ↑ WACC ↓ MVg ↑

MM theory with taxes



⇒ <u>MM theory with taxes Arbitrage Gain</u>

MM theory with taxes takes into account the corporate taxes but ignores the personal taxation shareholders. It assumes a 0% tax on shareholders.

	U	G
	Rs m	
PBIT	20	20
Interest	-	(4)
PBT	20	16
Tax @ 30%	(6)	(4.8)
	14	11.2
MVs → E	70	60m
→ D	-	40m
	70m	100m

<u>MVg = MVu + D x t:</u> if MVu is in Equilibrium ⇒ = 70 + (40 x 30%)

MVg = 82

If MVg is in Equilibrium ⇒ 100 = MVu + (40 x 30%)

MVu = 88m

→ Mr. S owns 10% equity of G Ltd

Current Income level (11.2m @ 10%) = 1.12m

Current Value of Investment (60m @ 10%) = 6m

→ Divest from G Ltd E = 6m E

Mr. S should borrow D = 2.8m D (1 – t) to keep the FR same

8.8m

	G	Personal borrowing
FR	D (1 – t) : E	D (1 – t) : E
	40 (1- 30%) : 60	2.8 (1 – 0%) : 6
	28 : 60	2.8 : 6

Revised Income (8.8 / 70 x 14)	1.76
Interest (2.8m @ 10%)	(0.28) m
	1.48 m
Current Earning	1.12 m
Arbitrage Gain – MM theory with taxes	0.36 m

⇒ Risk Return Theories
- o Portfolio theory
- o CAPM

⇒ Portfolio Theory for Single Asset / Portfolio of Asset
- o Expected Return
- o Risk

Portfolio: Two different things combined together is a portfolio.

➢ Single Asset

Expected Return: The return expected by an investor from an asset is the weighted average of all probable returns offered by that asset.

Standard Deviation $$\sigma_A = \sqrt{\sum P\ (R_A - \overline{R_A})^2}$$

Where σ_A → Standard deviation or Risk
P → Probability
R_A → Different probable return
$\overline{R_A}$ → Expected return

P	R_A	$\overline{R_A}$	$(R_A - \overline{R_A})$	$(R_A - \overline{R_A})^2$	$P\ (R_A - \overline{R_A})^2$	
30%	14%	4.2	-2	4	1.2	
40%	16%	6.4	0	0	-	
30%	18%	5.4	2	4	1.2	
		16%			2.4	$\sum P\ (R_A - \overline{R_A})^2$

$$\sigma_A = \sqrt{\sum P\ (R_A - \overline{R_A})^2}$$

$$\sigma_A = \sqrt{2.4}$$

$$\sigma_A = 1.55\%$$

Fixed Return Security

Risk = $\sigma \cong 0$

- <u>Two Asset Portfolio</u>

Expected Return

S. No	Asset	Amount Invested	Weight age	Expected Return	Return in Amount
A	X	5	33.33%	15%	0.75m
B	Y	10	66.67%	20%	2.00m
		15			2.75m

$$\% \text{ expected return of portfolio} = \frac{2.75}{15m} = 18.33\%$$

- Equation of two asset portfolio <u>Return</u>

$R_P = \overline{R_A}\, x_A + \overline{R_B}\, x_B$

Where $\overline{R_A}$ & $\overline{R_B}$ → Expected return of Assets
x_A & x_B → Weightage of assets in the portfolio

$R_P = 15\% \times 33.33\% + 20\% \times 66.67\%$
$R_P = 18.33\%$

- Equation of two asset portfolio <u>Risk</u>

$$\sigma_P = \sqrt{\sigma_A^2\, x_A^2 + \sigma_B^2\, x_B^2 + 2\, S_{AB}\, \sigma_A\, \sigma_B\, x_A\, x_B}$$

Where σ_P → Risk of portfolio
σ_A, σ_B → Standard deviation (Risk) of Individual Asset
x_A, x_B → Weightage in the portfolio
S_{AB} → Correlation coefficient of return of assets A & B

Range of coefficient from -1 to +1

If → SAB	+ve	Direct / Positive Relationship
	-ve	Inverse / Negative Relationship
	0	No Relationship

- Risk is nullify at -1 (because 1 will increase and another will decrease)

<u>Comparative Analysis</u>

Once risk is increased and returns as well then we will further not consider the quantifying factor rather we will consider the qualitative factor.

- Relationship between the relatives of two assets can be quantifies as:
  - Correlation coefficient → S_{AB} (+ve, 0, -ve) (-1 to +1)
  - Covariance

    $Co\ V_{AB} = S_{AB}\ \sigma_A\ \sigma_B$

    (+ve, 0, -ve)

    Covariance can be any number +ve & -ve

$$\sigma_P = \sqrt{\sigma_A^2\, x_A^2 + \sigma_B^2\, x_B^2 + 2\, \underbrace{S_{AB}\, \sigma_A\, \sigma_B}_{CoV_{AB}\, x_A\, x_B}\, x_A\, x_B}$$

$$CoV_{AB} = \sum P\, (R_A - \overline{R_A})\, (R_B - \overline{R_B})$$

- <u>Three Asset Portfolio</u>

$$\sigma_P = \sqrt{\sigma_A^2 x_A^2 + \sigma_B^2 x_B^2 + \sigma_C^2 x_C^2 + 2S_{AB}\sigma_A\sigma_B x_A x_B + 2S_{AC}\sigma_A\sigma_C x_A x_C + 2S_{BC}\sigma_B\sigma_C x_B x_C}$$

Where:

$\sigma_A, \sigma_B, \sigma_C$ → is the risk of individual security

x_A, x_B, x_C → is the Weightage of security in the portfolio

S_{AB}, S_{AC}, S_{BC} → is the correlation coefficient

$R_P = R_A\, X_A + R_B\, X_B + R_C\, X_C$

Where

R_A, R_B, R_C → is the return from individual security

X_A, X_B, X_C → is the Weightage of security in the portfolio

⇒ <u>Capital Asset Pricing Model</u> (CAPM)

Characteristics of CAPM

- Equity Securities Model
- Fair / Equilibrium return from a security (fair valuation of security)
- An alternative to dividend valuation for estimation of Ke
- Absolute investment decision
- Helps in calculating MCC with MM theory

Assumptions of CAPM

- It assumes a linear relationship (i.e. a straight line) exist between:
  A → Systematic risk and return of a security
  B → Return of security and return from market as a whole

Return required by an investor =

Return / Compensation for giving Money + Premium for systematic risk

↓

2% + 4%

↓

Risk free Security's return

↓

Rf

➢ When one invests in risky securities then apart from taking a risk free return, the person will also demand a premium for risk borne.

σ ⇒ Total risk

Risk

Systematic Risk	Unsystematic Risk
Market Risk	Industry / Security specific
↓	↓
Cannot be reduced via diversification	Eliminate via diversification

Ex:

KSE → All Shares → Market portfolio

σ_m = 6% Systematic risk (no unsystematic risk due to completely diversified portfolio)

$\sigma_m = \sigma_{sys\ m}$

Where

σ_m → Total Market Risk

$\sigma_{sys\ m}$ → Total systematic risk of Market

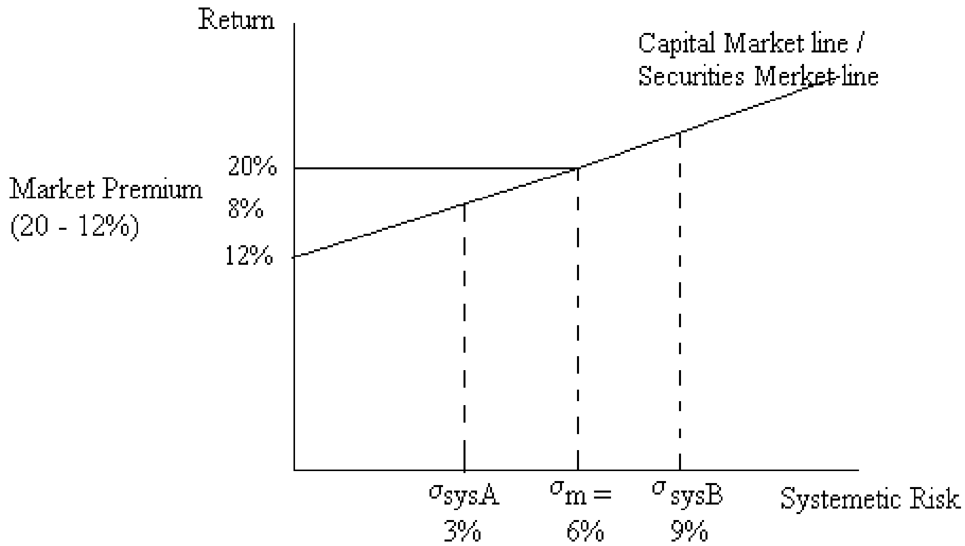
2010 → Rm = 20% Rf = 12%

Premium of 8% (Rm – Rf)

Rm = Market Return

Rf = Risk free Return

A	B	C
σsys A = 3%	σsys B = 9%	σsys C = 7%
RA = Rf + Premium	RB = Rf + Premium	RC = Rf + Premium
= 12% + 8%/6% x 3%	= 12% + 8%/6% x 9%	= 12% + 8%/6% x 7%
= 12% + 4%	= 12% + 12%	= 12% + 9.3%
= 16%	= 24%	= 21.3%



$$\sigma_A = \sqrt{\Sigma P\,(R_A - \overline{R_A})^2}$$

Systematic Risk → CAPM

Unsystematic Risk → we are not paying premium for unsystematic risk

CAPM

CAPM Return

$$R_A = Rf + \text{Premium}$$

$$R_A = Rf + \frac{(Rm - Rf)}{\sigma m} \text{ x } \sigma sys\ A$$

$$R_A = Rf + (Rm - Rf) \text{ x } \boxed{\frac{\sigma sys\ A}{\sigma m}} \rightarrow \beta_A$$

$$\boxed{R_A = Rf + \underbrace{(Rm - Rf) \text{ x } \beta_A}_{\text{Premium for systematic risk of a security}}}$$

$$\beta_A = \frac{\sigma sys\ A}{\sigma m}$$

Where

- Rf → Risk free Return
- Rm → Market Return
- β_A → Equity Beta of Security
- $\sigma sys\ A$ → Systematic Risk of a Security
- σm → Market Risk

$\beta_A > 1 \rightarrow \sigma sys\ A > \sigma m \rightarrow R_A > Rm$
$\beta_A < 1 \rightarrow \sigma sys\ A < \sigma m \rightarrow R_A < Rm$
$\beta_A = 1 \rightarrow \sigma sys\ A = \sigma m \rightarrow R_A = Rm$

- <u>Characteristics of Beta</u>
  i. It is the ratio of systematic risk of a security with market risk

  $$\beta_A = \sigma sys\ A / \sigma m$$

  ii. It represents the expected change in the return of a security resulting from unit change (1% change) in the return of market portfolio.

  <u>Ex:</u>

  $A \rightarrow \beta_A = 1.8$
  $Rm = 16\%$
  $Rf = 10\%$

  CAPM Return $\Rightarrow R_A = 10 + (16 - 10) \times 1.8$
  $R_A = 20.8$

Rm ↑ 1% (unit change in Rm)	Rm ↓ 1% (unit change in Rm)
RA = 10 + (17 – 10) x 1.8	RA = 10 + (15 – 10) x 1.8
RA = 22.6% ↑ 1.8%	RA = 19% ↓ 1.8%

- <u>Ways of writing β_A</u>
  i. $\beta_A = \boxed{\sigma sys\ A / \sigma m}$

  ii. $\beta_A = \boxed{\frac{S_{AM} \times \sigma_A}{\sigma_m}} \times \frac{\sigma_m}{\sigma_m}$

  $$\beta_A = \frac{S_{AM} \times \sigma_A \times \sigma_m}{\sigma_m^2}$$

  $S_{AM} \times \sigma_A \times \sigma_m \longrightarrow$ CoV_{AM} (Covariance of security with Market)

  $\sigma_m^2 \longrightarrow$ Market Variance

  iii. $\beta_A = \boxed{CoV_{AM} / \sigma_m^2}$

  Where

  $S_{AM} \rightarrow$ Correlation Coefficient of security with market
  $\sigma A \rightarrow$ St. Deviation of security
  $\sigma m \rightarrow$ St. deviation of market
  $CoV_{AM} \rightarrow$ Covariance of security with market

⇒ Whether to invest or not?

Alpha → α = Actual Return – CAPM Return

→ If α (Alpha) is positive then we should invest

→ If α (Alpha) is negative then we should not invest

→ If α (Alpha) is zero then we can invest

Calculating Covariance of Security with Market

→ $CoV_{A,M} = \Sigma P\ (R_m - \overline{R_m})(R_A - \overline{R_A})$ OR

→ $CoV_{A,M} = S_{AM}\ \sigma_A\ \sigma m$

Calculating Market Variance

→ $\sigma_m^2 = \Sigma P\ (R_m - \overline{R_m})^2$

Where

CoV_{AM}	Covariance of Market with Security
Rm	Market Return
$\overline{R_m}$	Average Market Return
R_A	Security Return
$\overline{R_A}$	Average Security Return
S_{AM}	Correlation Coefficient of Security with Market
σA	Risk / St. deviation of A
σm	St. deviation / Risk of Market

Investment Decision Tree

Actual Price $<$ CAPM Price	Actual Price = CAPM Price	Actual Price $>$ CAPM Price
Under Valued	Actual Return = CAPM Return	Over Valued
Actual Return $>$ CAPM Return	$\alpha = 0$	Actual Return $<$ CAPM Return
α = +ve Decision: Yes = Should Invest	Fair Valued Valued at par	α = -ve Decision: No Should not invest
Already Invested $\rightarrow$ Hold	Can Invest	Already Invested $\rightarrow$ Sell / Divest

$\Rightarrow$ Every positive α security is giving you a risk free return

α = Michael Jensen's

(Abnormal gain / loss)

- Differential Return
- Jensen's Index
- Jensen's Ratio

$\Rightarrow$ Reward to Risk Ratio

- Treynor Index / Ratio (%)
  - For any Security / Portfolio

$$\text{Treynor Index} = \frac{\text{Actual Return} - \text{Rf}}{\beta_A}$$

- Premium (Reward) offered by a Security per unit of Beta
- If all the securities are in equilibrium (as per CAPM Model), their Treynor Index (T.I) should be equal to market premium (Rm – Rf)

Securities in Equilibrium = Actual Return = CAPM Return, $\alpha = 0$

⇒ For Every Security

α = +ve ⇒ TI > (Rm – Rf) → Yes Invest

α = 0 ⇒ TI = (Rm – Rf) → Can Invest

α = -ve ⇒ TI < (Rm – Rf) → No Divest

α and T.I helps in absolute decision making
T.I. ⇒ Better model for prioritizing undervalued (α +ve) securities.

Important Note: For –ve β securities CAPM is not right model for calculating return.

⇒ Sharpe Index / Ratio (Nos)

$$\frac{\text{Actual Return} - \text{Rf}\,\%}{\sigma_A\,\%} \quad \begin{array}{l} \rightarrow \text{Risk Premium} \\ \rightarrow \text{Total Risk} \end{array}$$

→ Prioritize on the basis of Sharpe Index.

⇒ Portfolio Beta

Portfolio beta is the weighted average of individual security betas

$$\beta_P = \beta_A\, x_A + \beta_B\, x_B + \beta_C\, x_C + \beta_D\, x_D$$

CAPM $\quad R_P = Rf + (Rm - Rf) \times \beta_P$

Where

β_P	Portfolio beta
β_A	Individual security beta
x_A	Weightage in portfolio
R_P	Return on portfolio

⇒ CAPM and MM Theory

$$\beta a = \beta e \times \frac{E}{E + D\,(1 - t)}$$

Where

βe	Equity beta of the Company
βa	Asset beta of the Company
E	Market Value of Equity
D	Market Value of Debt
t	Rate of tax

βe → Equity Beta
Geared Beta
Company Beta
βa → Asset Beta
Ungeared beta
Project Beta
Company's portfolio beta

βe → Systematic risk of Equity holder

- Systematic Financial Risk
- Systematic Business Risk

βa → Business Risk only

- All companies in the same industry having same business risks should have same βa.

A		B		C
50% E		30% D		100% E
50% D		70% E		
βa A	=	βa B	=	βa C
βe A	>	βe B	>	βe C

- For any geared company

βeg > βag

βe → changes
BR changes, FR changes, Both changes

βa → change only due to change in Business Risk

⇒ Risk Adjusted WACC

Ex:

Sugar Mill → Now starting IT company

- BR changes and as a result WACC changes
- Existing WACC cannot be used as Discount rate for appraising projects
- The industry to which project relates
  - BR of IT industry identifies the βa
  - Identify project Financial Risk D/E
  - Then calculate βe of the project from this formula

Industry βa

$$\underbrace{\beta a = \beta e}_{\boxed{\text{Project Specific (Risk Adjusted } \beta e)}} \times \underbrace{\frac{E}{E+D\,(1-t)}}_{\boxed{\text{Project FR}}}$$

  - Then we will calculate Ke from βe

Project Specific Risk Adjusted Ke

Ke = Rf + (Rm – Rf) x βe → $\boxed{\text{Project Specific (Risk Adjusted } \beta e) \text{ calculated from above}}$

  - Then we will plot Ke in WACC formula for calculating risk adjusted WACC

Project Specific Risk Adjusted WACC = Marginal Cost of Capital ↓ $\boxed{\text{Appropriate Discount Rate for appraising new project}}$

$$WACCg = \frac{Ke \times E + Kd\,(1-t) \times D}{D + E}$$

- In the absence of any project specific D/E ratio we would assume that the project will be financed by company's existing D/E ratio.

⇒ Risk Adjusted WACC – Points to Ponder

- Business Risk of the project → βa
- Financial Risk of the project → D/E
- Risk Adjusted βe → $\beta a = \beta e \times \frac{E}{E+D\,(1-t)}$
- Risk Adjusted Ke → Ke = Rf + (Rm – Rf) x βe
- Risk Adjusted WACC → Ke, Kd (Post tax), D/E
- Discount project cash flows using risk adjusted WACC

⇒ If a project is 100% debt finance

- APV (Superior technique)
- National, Assume E = 0.01%
- Post project company's D/E ratio

Adjusted Present Value (APV)

It is the NPV but calculated in a different way using the assumption of MM theory with taxes.

Base Case NPV	xxx	(Cash flows discounting using Keu)
+ Adjustments		
PV of debt related tax benefit	xxx	
APV	xxx	

Base Case NPV	xxx	
Financing Adjustments		
→ PV of tax savings on interest of debt	xxx	PV of calculated by discounting using pre tax Kd / Rf.
→ PV of issue cost	(xxx)	
→ PV of tax saving on issue cost	xxx	
→ PV of interest saving on subsidized debt	xxx	
	xxx	
APV	xxx	

FOREX

- ❖ Exchange Rates
- ❖ Foreign Exchange risks and its hedging
- ❖ Interest rate risks and its hedging

⇒ Foreign Exchange Rate / Parity

- The rate at which one currency can be traded with another
- The word buying and selling is always used from the perspective of foreign currency
- The rate at which the dealer buys → Buying Rate
- The rate at which the dealer sells → Selling Rate

Example:

	Rs / USD	Rs / €URO
Buying Rate	87	122
Selling Rate	87.4	122.8

- An importer has to pay 100,000 USD to its supplier
- Exporter has received 50,000 Euros from a German customer

- Calculate the amount to be paid and received in PKR
  - Importer pays USD, he needs to buy USD from bank, Bank will sell USD to Importer ∴ Selling Rate of the bank will be used.
  - Exporter receives EURO, he needs to sell EURO to a bank to get PKR, bank will buy EURO from Exporter ∴ Buying Rate of the bank will be used.

    Importer → 100,000 x 87.4 = 8,740,000
    Exporter → 50,000 x 122 = 6,100,000

- The bank would always require its customer to
  - Pay more and
  - Receive less
- Bank will always get an advantage.

⇒ <u>DIRECT QUOTE / INDIRECT QUOTE</u>

- DIRECT QUOTE ⇒ LC / FC

→ Rs 84.8 ----- Rs 85.2 / USD
→ Rs 120 ------ Rs 120.5 / EURO
→ Rs 22.6 ----- Rs 22.8 / Saudi Riyal

→ Indirect quote buying rate is always lower than selling rate.

- INDIRECT QUOTE ⇒ FC / LC

→ $ 0.0118 ----- $ 0.0117 / PKR
→ € 0.00833 ---- € 0.00830 / PKR
→ SR 0.0442 --- SR 0.0438 / PKR

→ Buying Rate higher → Selling Rate lower

<u>Ex:</u> A US company has received 10m Japanese Yen. How much will it get in $ if the exchange parity is as follows:

92 ----- 92.7 / $ → indirect quote: BR higher, SR lower

$$\frac{10,000,000}{92.7} = 107,875 \text{ USD}$$

<u>Ex:</u> Mr. Ahmed is maintaining a US $ account with Barclays bank in Karachi. He withdrew Rs 500,000 for his family shopping. By how much amount the bank debit his account if the exchange rates quoted by the bank on the day are

Rs 88 ----- Rs 88.3 / USD → Direct Quote: SR higher, BR lower

$$\frac{500,000}{88} = 5681.8 \text{ USD}$$

⇒ Foreign Exchange Risk: Risk of adverse movement in the foreign exchange rates.

- FC denominated
  - Asset / Expected Receipt
  - Liability / Expected Payment

  } Exposes us to foreign exchange risk
- Asset – Risks are
  - Risk of appreciation of local currency
  - Risk of depreciation of foreign currency
- Liability – Risks are
  - Risk of depreciation of local currency
  - Risk of appreciation of foreign currency

⇒ Hedging of Foreign Exchange Risk

- Natural Hedging: can be done by creating assets and liabilities in the same foreign currency, consideration should be given to the period of realization of assets and payment of liabilities.

  Invoicing in local currency also reduces the risk, another type of natural hedging

  Assets in FC – Liabilities in FC = Net Exposure

  Gain / Loss would be calculated w.r.t. fluctuation in rate or net exposure.

- Financial Instruments for Hedging
  - Forward Contracts: is a contract to buy or sell specific quantity of foreign currency at a rate agreed today for settlement at a specific time in future.

Ex: A football exporter expects to receive 1m riyal in 1 month time. How much amount will he receive in PKR if he obtains forward cover in the following rates?

Spot	→ Rs 22.8 ------ Rs 23 / SR
1 month forward	→ Rs 23 ------ Rs 23.3 / SR

1m x 23 = Rs 23m

Close out of Forward Contracts

→ After 1 month the exporter realizes that receipt of 1m SR will not materialize.

1/7/2011 → Contracted to sell 1m SR @ Rs 23 / SR and receive	Rs 23m
1/8/2011 → Purchase 1m SR @ Rs 23.8 / SR and pay	Rs 23.8m
Net close out gain / (loss)	(0.8) loss

Close out: Opposite transaction at Spot / relevant forward rate.

⇒ Interest Rate Parity Theory

$$\text{Formula: } \frac{\text{f a/b}}{\text{S a/b}} = \frac{1 + \text{ra }\%}{1 + \text{rb }\%}$$

Where

a & b	Are two currencies
S a/b & f a/b	Are the spot and forward rates expressed as (a) / (b)
ra % & rb %	Are interest rates of the two currencies a and b respectively

ra %, rb %, f a/b correspond to same period
if interest rate is annual then the forward rate computed will be 1 year forward as well.

- A currency having higher interest rate and inflation rate will bound to depreciate against currency having a lower interest rate and inflation rate.
- For interest rate remember to carefully take into consideration no of days.
- The forward rate that we calculate using interest rate parity theory is the same that we will arrive at via money market hedge.

⇒ Money Market Hedge

- Hedging via actual borrowing / lending

- Future Receipts in Foreign Currency
    - Borrow in FC now such that:
      →Amount to be borrowed + Interest to be paid = Total expected receipt in future
    - Convert the amount of FC borrowed in LC at the spot rate and Invest the converted LC amount in a deposit till the FC receipt arrives
    - When FC receipt arrives, pay off the FC borrowing with the receipt
    - Actual receipt in the LC is the amount of LC deposited and the interest earned on it
    - Effective rate on this transaction can be calculated as:

$$\frac{(\text{LC amount converted at Spot rate} + \text{Interest received on LC amount})}{\text{FC receipt}}$$

- Future Payment in Foreign Currency
    - In order to make a FC payment in future, purchase FC now and deposit it, in such a way that:
      Amount of FC deposited now + Interest to be earned on that deposit = Total Expected payment in FC
    - In order to purchase and deposit FC now, borrow LC and convert it in FC at the spot rate
    - At the time of payment of FC, pay it via the FC deposit directly
    - Actual cost in LC is the amount of LC borrowed and interest paid on it
    - Effective rate on this transaction can be calculated as:

$$\frac{(\text{LC amount borrowed} + \text{Interest paid on borrowing})}{\text{FC payment}}$$

⇒ Discount and Premium

Spot →	87	------	87.5	Rs / $
6m Forward → Premium	1	------	0.8	Rs / $
6m Forward	88	------	88.3	Rs / $

- If Direct Quote
  Spot ⇒ Forward
  - Add premium
  - Less discount

- If Indirect Quote
  Spot ⇒ Forward
  - Add discount
  - Less premium

⇒ Cross Currency Rates

- Rs 78 ----- 79 / USD
- $ 1.75 ---- 1.85 / £

Find out Rs / £

1 £ Buy?? How much Rs we need to pay?

100 £ Buy: Cost in PKR
x To buy £ we need $

1 £ → 1.85 $ x 100 = 185 $

To buy $ 185 → (SR)

185 x 79 = 14,615/100 = 146.15 Rs / £

78 x 1.75 = 136.5 £ Sell receive
78 x 1.85 = 144.3
79 x 1.75 = 138.25
79 x 1.85 = 146.15 £ buy pay

⇒ Hedging Via Future Contract

Stock futures: Futures contracts are standard sized, traded hedging instruments. The aim of a future contract is to fix a rate at some future date.

→ A company intends to buy 57,100 shares of O Ltd on 25th September 2011. It is currently 1st July 2011 and following rates are being quoted in the market.

Spot	= Rs 132 / Share
Sept future	= Rs 135 / Share
Oct future	= Rs 136 / Share

The future contracts are of standard denomination equal to 10,000 shares. The company decides to hedge against the possible rise in the value of O Ltd's shares via futures contract.

Required: Calculate the net hedge outcome and hedge efficiency ratio. If on 25th September 2011 the share prices are

a) Spot price = Rs 138 / share Sept future = Rs 139 / share
b) Spot price = Rs 128 / share Sept future = Rs 128.5 / share

Answer (a)

Hedge Setup date = 1st July 2011
Transaction date = 25th Sept 2011

- Buy / Sell → Buy
- Which Contract → Sept future
- No. of Contracts → $\frac{\text{Actual Quantity}}{\text{St.futures Quantity}} = \frac{57{,}100}{10{,}000} = 5.7 \cong 6 \text{ contracts}$

By purchasing 6 September futures contracts of O Ltd @ Rs 135 / share hedge is setup.

Hedge Outcome:

$$\underbrace{\text{Spot Rs 138 / share} \rightarrow \text{Sept future Rs 139 / share}}$$

Spot Market			Future Market	
Actual:	57,100		Buy 60,000 x	135
@	138		Sell 60,000 x	139
	7,879,800		Gain 60,000	4
Target	(7,537,200)	(57,100 x 132)		
Spot loss	342,600		60,000 x 4 = 240,000	

Net loss on hedge = 102,600

Spot Cost	7,879,800	
Less: future gain	(240,000)	
Actual outcome	7,639,800	→ Cash
Target	(7,537,200)	
Net loss	102,600	

$$\text{Hedge Efficiency Ratio} = \frac{\text{Gain or loss on futures Market}}{\text{Gain or loss on Spot Market}}$$

$$= \frac{240{,}000}{342{,}600} = 70\%$$

(b)

Spot Rs 128 / share → Sept future Rs 128.5 / share

Spot Market		Future Market	
Actual	57,100	Buy @	135
@	128	Sell @	128.5
	7,308,800		(6.5) / share loss
Target	7,537,200		= 6.5 x 60,000
Gain	228,400		= 390,000 loss

Spot Cost =	7,308,800	Pay
Future loss =	390,000	
Actual final cost / outcome	7,698,800	Total Payment

Actual Outcome	7,698,800
Target Cost	7,537,200
Net Loss	(161,600)

$$\text{Hedge Efficiency Ratio} = \frac{\text{Gain or loss on futures Market}}{\text{Gain or loss on Spot Market}}$$

$$= \frac{390,000}{228,000} = 171\%$$

⇒ <u>Points to ponder in hedging via futures</u>

- Any futures contract having settlement date after the transaction date can be selected.
- Preference will be given to a contract having settlement date closer to transaction date.
- Futures contracts are of standard quantity and standard / fix maturity date.
- Futures contracts can be closed out any time before their maturity by entering into a transaction opposite to initial transaction in futures market.
- The price of futures contract ('future price') moves in line with spot price of underlying item (Stock / Commodity / Exchange Rate).
- Futures contract may not yield perfect hedge because of 2 reasons
    - The actual quantity to be bought / sold in spot may not be equal to standard quantity available in future market.
    - 'Basis Risk' (Risk of change in basis). This means movement in spot price may not be equal to movement in future price.
- Basis represents interest / financing cost
- Basis should reduce gradually as we move closer to futures' maturity / settlement date. Basis is zero at maturity date.

⇒ Currency Futures

A US company is expecting to pay £ 2.1m by mid of December 2011. The current spot rate is 1.58 ------ 1.6 $/£.

The company decides to hedge this transaction via futures market. Following future contracts are available along with their prices

Future contracts available:

Sept 2011	1.5552	$/£	
Dec 2011	1.5556	$/£	Standard Quantity
Mar 2012	1.5564	$/£	£ 62,500

Required:

a) How can the company setup the hedge?
b) What would be the final outcome and hedge efficiency ratio, if the exchange rates on the transaction dates are as follows:

Spot on transaction	1.612 ---- 1.620 $/£
Future	Dec 2011 - 1.610 $/£
	Mar 2012 - 1.615 $/£

Answer:

Hedge Setup £ buy 2.1m

Target Cost in US $ = 2.1 x 1.6 = $ 3,360,000

- Buy / Sell → £ buy £ futures buy
- Which Contract → December 2011 futures
- No. of contracts → $\frac{\text{Actual Quantity}}{\text{Standard Quantity}} = \frac{£\ 2{,}100{,}000}{62{,}500} = 33.6 \cong 34$

Standard Quantity = 34 x 62,500 = £ 2,125,000

By purchasing 34 December 2011 futures contracts @ 1.5556 $/£ hedge is setup.

Hedge Outcome

Spot Market

£ 2.1 buy @ 1.62 $/£ →		3,402,000	Pay

Futures Market

£ 2,125,000 buy @	1.5556			
£ 2,125,000 Sell @	1.6100			
Gain	0.0544	x 2,125,000 =	115,600	Receive
		Net outcome / Payment	3,286,400	$

Actual Cost =	$ 3,286,400
Target Cost =	$ 3,360,000
Gain	73,600

Spot

Actual =	3,402,000	Futures Gain = 115,600
Target =	3,360,000	
Loss	42,000	

$$\text{Hedge Efficiency Ratio} = \frac{115{,}600}{42{,}000} = 275\%$$

INDIRECT FUTURES: $10 buy after 3 months

No futures of US $ available

Rupees futures available $ buy ⇒ PKR sell

Indirect Hedge

Hedge setup $ buy ⇒ PKR sell ⇒ PKR futures sell

Buy $ ⇒ Sell Rs ⇒ Sell 610 Rs and buy 10 $ @ Rs 61/$

Indirect Future Outcome

Spot $\rightarrow$ \$ 10 buy @ 62 Rs 620

Future Market		
Already sold Rs 610 @ 61	\$ 10	Receive
Buy Rs 610 @ 62.8	(9.7)	Pay
Gain	\$ 0.3	

0.3 x 62	(18.6)
Net pay	601.4

OPTIONS

An option contract is an agreement giving its holder a right but not an obligation to buy or sell specific quantity of an item at a specific price within a stipulated / pre-defined time.

- An option to buy something is called "Call Option"
- An option to sell something is called "Put Option"

⇒ An option is said to be in the money when it is feasible to exercise the option.
⇒ An option is said to be out of the money when it is not feasible to exercise that option.
⇒ Option is effectively a financial insurance.

Options

Holder (buyer) Writer (seller)

Call option buy Put option buy

⇒ Choosing call options and put options when alternative strike prices.

- Call option (lowest cost i.e. Exercise price + premium)
  - Cost ceiling / Maximum cost guarantee
- Put option (highest net receipt i.e. Exercise price – premium)
  - Receipt floor / Minimum receipt guarantee

Example:

A company is planning to purchase 15,200 shares of Z Ltd by mid of November 2011. The company is concerned about possible rise in the share price of Z Ltd by that time. Accordingly it decides to hedge via stock option. Following information is available.

Call options of Z Ltd (St Qty = 1,000 Shares)

Strike Price	Oct	Nov	Dec
81	0.8	1.3	1.8
82.5	0.3	0.5	0.7
84.5	0.1	0.25	0.5

Current Share price = Rs 80 / share

Required:

a) How can the company setup hedge via options?
b) What would be the outcome if mid November spot price moves to
   i. Rs 75 / share
   ii. Rs 89 / share

Answer:

Hedge Setup

- Call / Put → Call option
- Which Contracts → November
- Which exercise price → 81
- No. of Contracts $= \frac{\text{Actual Quantity}}{\text{St.Quantity}} = \frac{15,200}{1,000} = 15.2 \cong 15$

Exercise Price	+	Premium	=	Lowest Cost
81	+	1.3	=	82.3
82.5	+	0.5	=	83
84.5	+	0.25	=	84.75

Cost Ceiling / Maximum Cost Guarantee

By purchasing 15 November call options of Z Ltd with exercise price of Rs 81 / share hedge is setup.

Outcome	Out of the Money (i)	In the Money (ii)
Spot price	Rs 75	Rs 89
Exercise price	Rs 81	Rs 81
Exercise	N	Y
15,200 @ 75	1,140,000	
15,000 @ 81		1,215,000
200 @ 89		17,800
		1,232,800
Premium	19,500	19,500
	1,159,500	1,252,300

Indirect Hedge

Example:

A British company needs to hedge a receipt of $ 10m from an American customer expected to realize by 3rd week of June 2011.

Spot rate is currently 1.4461 ----- 1.4492 $/£

Following currency options are available

Exercise price $ / £	Cents / £ Calls & Puts June 2011		Contract size £ 31,250
1.4	5.74	7.89	
1.425	3.40	9.06	
1.45	1.94	11.52	

Required:

a) How the hedge can be setup?
b) What would be the result if spot rate at transaction date is
   i. 1.55 $ / £
   ii. 1.35 $ / £

<u>Available options in £</u>

- Call / Put → £ call option buy (£ buy → sell / pay $)
- June Contract
- Strike price → 1.4 $ / £
- No. of Contracts → $\frac{10M}{1.4} \Rightarrow \frac{7{,}142{,}857}{31{,}250} = 228.57 \cong 229$ Contracts

1.4 + 0.0574 = $\boxed{1.4574}$ → Cost Minimize
1.425 + 0.0340 = 1.459
1.45 + 0.0194 = 1.4694

By purchasing 229 £ Call options of June @ EP of $ 1.4 / £, hedge is setup.

229 x 31,250 = £ 7,156,250 buy US $ 1.4 / £

<u>Premium Cost:</u>

£ 7,156,250 @ 0.0574 / £
= $ 410,769 Buy → SR
Convert this premium cost in £ @ Spot rate

$$\frac{410{,}769}{1.4461} = £\ 7{,}407{,}407$$

	(i)	(ii)
→ Spot Price	1.55	1.35
→ EP	1.4	1.4
Exercise (Y/N)	Y	N
10M $ receipt		
Buy £	£ 7,156,250	£ 7,407,407
Balance 18750		
$ buy at spot rate	£ (12,097)	
Premium Cost	£ (284,053)	£ (284,653)
	6,860,100	7,123,354

If we exercise this option we will buy £ 7,156,250 @1.4 / £

& give $	10,018,750
Receipt	(10,000,000)
	18,750 @ Spot Rate ⇒ 12,097

⇒ European and American Style Options

- American Style options can be exercised on or anytime before Maturity / Expiry date. They are flexible in nature.
- European Style options can only be exercised at Maturity / Expiry date. No flexibility.
- In the absence of any information we will always assume that the option is American Style option / Free Style option.

⇒ Concept of Intrinsic Value & Time Value of Option

- Call option of Share A: option to buy 1 share @ Rs 40

Spot price = Rs 45	Spot price = Rs 37
Exercise price = Rs 40	Exercise price = Rs 40
In the Money option	Out of the Money option
Intrinsic Value = 45 – 40	Intrinsic Value NIL
= 5	

- Intrinsic Value is the value that you get by exercise the option
- For an in the Money option:
  - Intrinsic Value is the difference between Exercise price & Spot price
- For an out of the Money option:
  - Intrinsic Value = 0

Time Value of Option

Exercise price = 40 (Call option)

Spot = Rs 45
Intrinsic Value = Rs 5 / share
Premium = Rs 5.8 / share (2m to maturity)

Exercise	Sell the option
Benefit of Rs 5	Premium = 5.8
	Sell the option as it is better than exercise it.

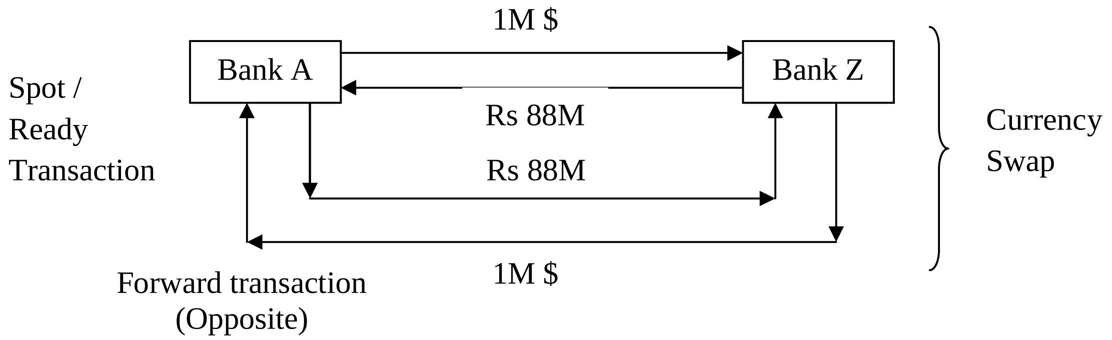
0.8 is the Time Value of option

Spot = Rs 37
Out of the Money option
Intrinsic Value = 0
Sell → Premium 0.01

If you can get any premium by reselling it, then go and get this.

Currency Swaps:

Swap means Exchange A currency Repo and Reverse Repo.



$$\text{Currency Swap} = \underbrace{\text{Ready transaction + Opposite forward transaction}}_{\text{With same counter party}}$$

- Separately plot foreign currency and local currency cash flows.
  (Project cash flows + Swap Cash flows)
- Convert FC CFs into LC CFs at respective exchange rates.
- Time Value of Money LC CFs (Discount PVs / Final FVs)

Interest Rate Risk

- Risk of adverse movement of Interest rates, whether upward or downward.

Lender's Risk

Actual lending / Deposit

Receive $\Rightarrow$ KIBOR – 0.5%

$\Rightarrow$ 10% - 0.5%

$\Rightarrow$ 9.5%

2 years lending, risk of decrease in KIBOR of potential lending

Borrower's Risk

Actual borrowing @ KIBOR + 3%

Pay $\Rightarrow$ 10% + 3%

$\Rightarrow$ 13%

KIBOR may move upward, risk of increase in KIBOR of potential borrowing.

Hedging Via

i. Forward Rate Agreements
ii. Interest Rate futures

⇒ Forward Rate Agreements:

3 - 9 ↓ No of Months between now and start of the transaction (borrowing / lending)

7% ↓ Customer's lending rate

8% → Customer's borrowing rate

Difference = 9 – 3 = 6m is the period of FRA (borrowing / lending)

3 – 9 FRA @ 8% for borrowing 100M
6m interest expense 100M x 8% x 6/12 = 4M

⇒ Interest Rate Futures:

Hedge Setup
- Buy / Sell
- Which Contract
- No of Contracts

Hedge Outcome
- Spot
- Future Close

Price = 100 - Interest Rate
If Interest rate = 7% (future Market)
100 – 7% = 93%

FP = 93%   Interest Rate = 7%

Borrowing: 10M borrowing for 6 months after 4 months
Market rate = 11%   Future price = 89.2 (10.8%)

Risk by transaction date is increase in the interest rate.

To hedge: At date of hedge: Sell futures @ 89.2

When borrowing:
1^{st} Sell futures at the date of hedge
Then buy to close out at transaction date

Transaction date (after 4 Months)

Spot rate = 13% for 6m borrowing
Future price = 87.2 (12.8%)

Spot loss from target (13% - 11%) = 2% loss

Futures Gain

Sold @	89.2	
Buy @	87.2	
	2%	Gain

Lending: 1/1/2011 Planning to invest Rs 100M for 5m after 3 months

1/1 → Date of hedge
31/3 → Transaction date

Date of hedge → risk of decrease in the interest rate
Spot → 8% p.a. for 5m lending
Futures price → 91.8 (8.2%)

Buy futures @ 91.8 at date of hedge

31/3 Transaction date
Spot → 6%
Futures price → 93.7 (6.3%)

Spot loss	8%	Receipt on hedge date / Target
	6%	Receipt Actual
	2%	Loss

Futures

Buy @	91.8
Sell @	93.7
Gain	1.9

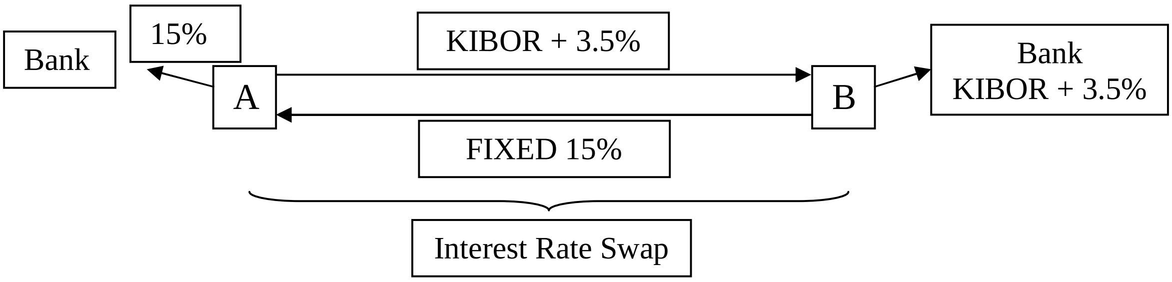
→ 1st buy futures
→ Sell at transaction date

Hedging via Interest Rate futures	
Borrowing	Lending
1st Sell (Date of hedge) Then buy (on transaction date to close out)	1st Buy (Date of hedge) Then sell (on transaction date to close out)

Interest Rate Swaps:

A	5 years loan	B
Rs 100M		Rs 100M
15%		KIBOR + 3.5%

A wants a KIBOR based loan and B wants a fixed rate loan.



Why Interest Rate Swaps

- Genuine need to convert from variable to fixed rate and vice versa
- Comparative Cost Advantage (to lower down interest cost)

	A (Small Co.)		B (Big Co.)	
Requirement	Variable rate loan		Fixed rate loan	
Rate offered	KIBOR + 4%	+	12% = KIBOR + 16%	
	Fixed Rate = 14%	+	KIBOR + 1% = KIBOR + 15%	
	Swap Interest Rate Liabilities			
Saving	-0.5%		-0.5%	1% Saving
	Cost: KIBOR + 3.5%		11.5%	0.5% A, 0.5% B

	A	**B**
Borrow opposite to their requirement	14%	KIBOR + 1%
Swap	KIBOR	(KIBOR)
Bal fig	(10.5%)	10.5%
Net Result	KIBOR + 3.5%	11.5%
	KIBOR Pay ↔ 10.5% Receive	KIBOR Receive ↔ 10.5% pay

⇒ Prerequisite

- Opposite Requirement
- Cost benefit should go in opposite to their requirement.

Example:

S Ltd plan to borrow € 300M for 5 years at a floating rate. It can get loan @ LIBOR + 0.75% S Ltd knows it can issue fixed rate securities @ 9% p.a. The company's bankers have suggested a swap agreement with a German company that needs a fixed rate interest loan. The German company can borrow @ 10.5% p.a. It can get floating rate debt @ LIBOR + 1.5% p.a. The banker would charge 0.1% from each party per annum.

Required:

How would the swap work for both parties (Assume equal sharing of benefit).

	S		G	
Requirement	LIBOR + 0.75%	+	10.5%	LIBOR + 11.25%
Opposite transaction	9%	+	LIBOR + 1.5%	LIBOR + 10.5%

Savings of	.75%
Bank's fee	.20%
	.55%

$\underbrace{0.275 \quad 0.275}_{.55\%}$

0.275	0.275
S	G

	S	G
Borrow opposite to their requirement	9%	LIBOR + 1.5%
Swap	LIBOR (P)	(LIBOR) R
Bal fig	(8.625)	8.625
Net Result	LIBOR + .475%	10.225%

Foreign Investment Appraisal / International Investment Appraisal

- Separately plot FC CFs and LC CFs of the project.
- Convert FC CFs into LC at appropriate exchange rate.
- Discount total LC CFs with Company's appropriate discount rate.
- Intercompany transactions between project and head office
    - We will not eliminate intra company transactions, outflow and inflow will be shown in relevant currency CFs
- Tax effects
    - Full double tax treaty
    - Higher of the two

Foreign Operations		Foreign Operation 25%
Tax rate = 40%	Already given higher of the two	Pak 35%
Pak = 35%		10% incremental tax will be paid, and that payment will be shown.
		Differential 10% in PKR tax on PBT of foreign currency.

- Company's required rate of return in Taka (FC) is 15%
  Plot FC CF and discount with FC rate of return.

Share Valuation Techniques / Methods

It is used for:
- Valuing (Purchasing / Selling) shares of Unquoted / Unlisted Companies.
- Initial public offering.
- Controlling interest transaction of even listed company.
- Reporting of Unquoted / Pvt. Investments.

1) Net Asset based Valuation (Book Values)

Financial Statements	Assets	xxx	
	Liabilities	(xxx)	
	Net Assets / Equity	xxx	/ No of shares xxx

Value per share xxx (Break up value per share)

→ Deduct goodwill and other fictitious assets like deferred tax from Assets.

Merits:
- Easy to use method
- Based on Audited information
- Natural method, business's worth is based on its Net Assets

Demerits:
- Values of B/S are not fair values
- There can be multiple values of one company based on different accounting policies which are acceptable
- Some liabilities are not even recorded in balance sheet and are only disclosed in notes
- Potential investors look at cash flow potential, customer base and earnings not at the assets. Seller sells the goodwill of the business rather than just assets, it does not account for the goodwill of the business.

2) Net Asset Based Valuation (Market Values Based)

Assets (MV)	xxx
Liabilities (MV)	(xxx)
Net Equity	xxx / No of shares xxx
Per Share Value	xxx → Price floor / Min floor

→ Exclude goodwill and fictitious assets like deferred tax asset from assets.

Merits:

- Based on fair values
- Consider it as a minimum price for your business

Demerits:

- Individual assets would not be sold at their Market values; rather it would be sold at Forced Sale Values (FSV).
- Market values are not always fair values although a better approximation than historical cost
- Goodwill is not reflected in this method neither the cash generating capacity of business

3) P/E Ratio Based Valuation

$$\text{P / E ratio} = \frac{\text{Price}}{\text{Earnings}}$$

OR

Price (MV) = P/E x Earning → Forecast EPS

Listed Co (Historic P/E)	Unlisted Co / Unquoted Co

Normal P/E ratio = 6 – 10
High P/E ratio (eg Siemens) = More than 12
Small Companies = 2 – 5

Unlisted Companies:

- Similar listed Company P/E and apply factor 2/3
- Discount down for liquidity issue

Listed Co P/E = 8 Unlisted 8 x 2/3 = 5.33 P/E

Merits:

- Simple and easy to use method
- Based on Market Bench mark which is market P/E ratio
- Earning potential / Goodwill is incorporated

Demerits:

- Subjectivity is involved, past does not always serves as a good guide for future
- Forecasting EPS is subjective as it involves certain A/c assumptions
- The value of a listed company is more than an unlisted company. Downgrading the listed company's P/E is subjective
- Market bench mark, P/E is not always fair value

4) Dividend Valuation Model

- Constant dividend $E = \frac{D_O}{K_e}$

- Dividend Growth Model $E = \frac{D_O\ (1+g)}{K_e - g}$

- Others: individually plot cash dividends and discount via Ke.

Merits:
- A cash method, subjectivity of profits is eliminated
- Time value of money is also there along with earning potential
- Suitable for small share holders whose objective for investment is regular stream of cash dividends

Demerits:
- Can't value those companies who does not give cash dividends
- Not for large share holders as they themselves makes the dividend policy
- Forecasting dividends brings subjectivity

Dividend Yield Method (Constant dividend Model)

$$DY = \frac{D}{MV}$$

Listed	Unlisted
Historic DY D = 5 DY = 10% MV = 5/10% = 50M	Similar listed company 10% Increase DY by 3/2 factor to increase the risk premium associated due to unlisted company.

5) Earning Yield Method

- MV = $\frac{\text{Earning}}{\text{Ke}}$ (Constant) EY = $\frac{\text{Earnings}}{\text{MV}}$

- MV = $\frac{E_O\ (1+g)}{K_e - g}$ (Growing)

- Discount all future earnings by appropriate discount rate

Merits:

- Suitable for controlling interest transaction
- Incorporates earning potential, goodwill and time value of money.

Demerits:

- The biggest flaw in this method is that it discounts profits. Time value of money concept is used for discounting future cash flows not for discounting profits.
- Earnings are subjective, based on accounting estimates and profits.

6) ROCE / ARR Method

ROCE (for SHs) = $\frac{\text{PAT}}{\text{Average Capital Employed}}$

Historic / Average ROCE and forecast PAT (average)

Equity = $\frac{\text{PAT}}{\text{ROCE}}$

Merits:

- Easy to use
- Historic ROCE available, measures company's value in terms of its earnings

Demerits:

- Profits are subjective, investment can't be based on PAT
- Assumes that a company will earn PAT till perpetuity

7) Super Profits Based Method

Net Assets (based on MVs)	xxx
Add: Goodwill (on the basis of super profits)	xxx
Value	xxx

Actual Average PAT of company	xxx	
Earnings of the company using avg. industry ROCE	(xxx)	
Super profits	xxx	x No of years this is expected to continue = Goodwill to be added above

Net Assets = xxx
Avg. Industry ROCE = xx%
Profit using Industry ROCE $\rightarrow$ xxx

Merits:

- Assets and Earnings both are incorporated, a hybrid model.
- It gives an easy and simple way of estimating goodwill of the company as comparative to industry average

Demerits:

- MVs of assets are not always fair values
- Controversial method of calculating goodwill
- Subjectivity in estimating the number of years CF is expected