Corporate Finance and Risk Management
STRATEGIC LEVEL
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COST OF CAPITAL

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The cost of capital

Capital Employed	Cost of Capital
Ordinary /Common Stock	**Cost of Equity (Ke)**
Retained Earning	
Preference Stock	**Cost of preference shares (Kp)**
Bank Loan	**Cost of Debt (Kd)**
Debentures	

Capital Components

- Cap. components are sources of funding that come from investors.
- A/P, accruals, and deferred taxes are not sources of funding that come from investors, & not included in the calculation of the cost of capital.
- These items are adjusted for when calculating project cash flows, not when calculating the cost of capital.

Before-tax vs. After-tax Capital Costs

- Tax effects associated with financing can be incorporated either in capital budgeting cash flows or in cost of capital.
- Most firms incorporate tax effects in the cost of capital. Therefore, focus on after-tax costs.
- Only cost of debt is affected.

Cost of Equity

1. Compute Cost - Common Stock

The cost of ordinary share capital

New funds from equity shareholders are obtained either from **new issues of shares** or from **retained earnings**. Both of these sources of funds have a cost.

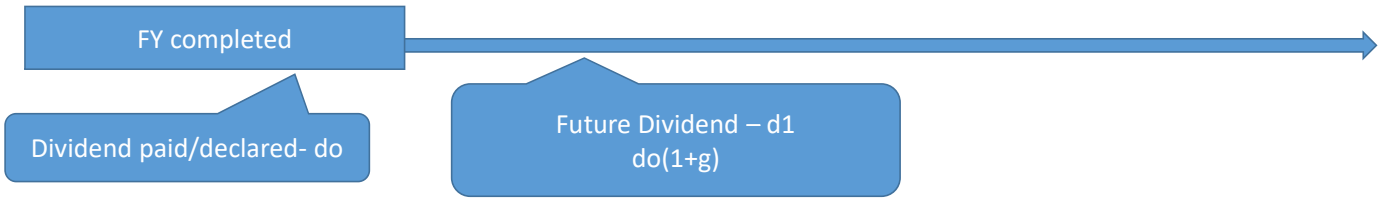
(a) Shareholders will **not** be prepared to **provide funds** for a **new issue** of **shares** unless the return on their investment is sufficiently attractive.

(b) Retained earnings also have a cost. This is an **opportunity cost**, the dividend forgone by shareholders.

Equity is a **high-risk investment**, as ordinary shareholders are the last to be paid in a liquidation. Equity is therefore the **most expensive** form of finance.

Why is there a cost for reinvested earnings?

- Earnings can be reinvested or paid out as dividends.
- Investors could buy other securities, earning a return.
- Thus, there is an opportunity cost if earnings are reinvested.
- Opportunity cost: The return stockholders could earn on alternative investments of equal risk.
- They could buy similar stocks and earn r_s, or company could repurchase its own stock and earn r_s. So, r_s, is cost of reinvested earnings and is cost of common equity.



The dividend valuation model

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Cost of ordinary (equity) share capital, paying an annual dividend d in perpetuity, and having a current ex div price P_0:

$$k_e = \frac{d}{P_0}$$

CW Co has a dividend cover ratio of 4.0 times and expects zero growth in dividends. The company has one million Rs. 1 ordinary shares in issue and the market capitalisation (value) of the company is Rs. 50 million. After-tax profits for next year are expected to be Rs. 20 million.

Required
Calculate the expected rate of return from the ordinary shares.

Solution

$$\text{Total dividends} = \frac{\text{Rs. 20 million}}{4} = \text{Rs. 5 million}$$

$$k_e = \frac{\text{Rs. 5 million}}{\text{Rs. 50 million}} = 10\%$$

The dividend growth model

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$$P_0 = \frac{d_0(1+g)}{(k_e - g)}$$

Re-arranging this, we get a formula for the ordinary shareholders' required return (i.e. the company's cost of capital).

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Cost of ordinary (equity) share capital, having a current ex div price, P_0, having just paid a dividend, d_0, with the dividend growing in perpetuity by a constant g% per annum:

$$k_e = \frac{d_0(1+g)}{P_0} + g \text{ or } k_e = \frac{d_1}{P_0} + g$$

Where d_1 is the dividend in year 1, so that:

$$d_1 = d_0(1+g)$$

QUESTION — Cost of equity

A share has a current market value of Rs. 96, and the last dividend was Rs. 12. If the expected annual growth rate of dividends is 4%, **calculate** the cost of equity capital.

ANSWER

$$\text{Cost of equity capital} = \frac{12(1+0.04)}{96} + 0.04$$

$$= 0.13 + 0.04$$

$$= 0.17$$

$$= 17\%$$

Estimating the growth rate

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$$g = \sqrt[n]{\frac{\text{dividend in year x}}{\text{dividend in year 1}}} - 1$$

Where: n is the number of years' growth
year x is the final year's dividend

QUESTION — Growth rate

The following figures have been extracted from the accounts of CH Co:

Year	*Dividends*	*Earnings*
	Rs.	Rs.
20X1	100,000	350,000
20X2	125,000	400,000
20X3	125,000	370,000
20X4	160,000	450,000
20X5	200,000	550,000

Required

You have been asked to **calculate** the cost of equity for the company. What growth rate would you use in the calculations?

Current re-investment level

Alternatively, the growth rate can be estimated using the **current re-investment level** (Gordon's growth approximation).
Retained profits will earn a certain rate of return and so growth will come from the yield on the retained funds. The rate of growth in dividends is expressed as:

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$g = bR$

Where: b is proportion of profits retained for reinvestment

g is the annual growth rate in dividends

R is yield on new investments (this is often taken to be the accounting rate of return)

So, if a company retains 65% of its earnings for capital investment projects it has identified, and these projects are expected to have an average return of 8%:

$g = bR = 65\% \times 8\% = 5.2\%$

The capital asset pricing model (CAPM)

Systematic risk and unsystematic risk

- Whenever an investor invests in some shares, or a company invests in a new project, there will be some **risk** involved.
- ***The actual return on the investment might be better or worse than that hoped for.***
- To some extent, risk is unavoidable (unless the investor settles for risk-free securities such as gilts).

Provided that the investor **diversifies** their investments in a suitably wide **portfolio**, the investments which perform well and those which perform badly should tend to cancel each other out, and much risk can be diversified away.
In the same way, a company which invests in a number of projects will find that some do well and some do badly, but taking the whole portfolio of investments, average returns should turn out much as expected.

Risks that can be diversified away are referred to as **unsystematic risk**. But there is another sort of risk too. Some investments are by their very nature more risky than others. This has nothing to do with chance variations up or down in actual returns compared with what an investor should expect. This **inherent risk –** the **systematic risk** or **market risk – cannot be diversified away**.

Market or **systematic risk** is risk that cannot be diversified away. **Nonsystematic** or **unsystematic risk** applies to a single investment or class of investments, and can be reduced or eliminated by diversification.

Systematic risk and unsystematic risk: implications for investments.

The implications of systematic risk and unsystematic risk are as follows.

(a) If an investor wants to **avoid risk** altogether, they must **invest entirely** in **risk-free securities**.

(b) If an investor **holds shares in just a few companies**, there will be **some unsystematic risk** as well as systematic risk in his portfolio, because the investor will not have spread their risk enough to diversify away the unsystematic risk. To eliminate unsystematic risk, they must build up a welldiversified portfolio of investments.

(c) If an investor holds a **balanced portfolio** of all the stocks and shares on the stock market, they will incur systematic risk which is exactly equal to the average systematic risk in the stock market as a whole.

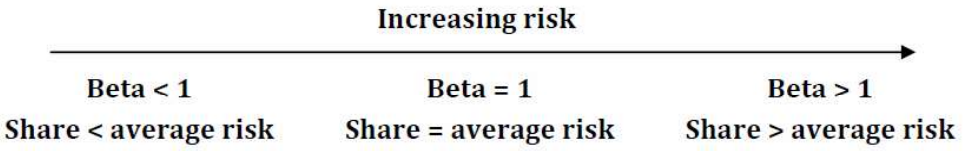
(d) **Shares in individual companies** will have **different systematic risk characteristics** to this market average. Some shares will be less risky and some will be more risky than the stock market average. Similarly, some investments will be more risky and some will be less risky than a company's 'average' investments.

The beta factor

The capital asset pricing model is mainly concerned with how systematic risk is measured, and how systematic risk affects required returns and share prices.

Systematic risk is measured using **beta factors**.

Beta factor is the measure of the systematic risk of a security relative to the market portfolio. If a share price were to rise or fall at double the market rate, it would have a beta factor of 2.0. Conversely, if the share price moved at half the market rate, the beta factor would be 0.5.



Risk and returns

Capital asset pricing model (CAPM) theory includes the following propositions.

(a) Investors in shares require a **return** in **excess of the risk-free rate**, to compensate them for systematic risk.
(b) Investors should **not require** a **premium** for **unsystematic risk**, because this can be diversified away by holding a wide portfolio of investments.
(c) Because systematic risk varies between companies, investors will require a **higher return** from shares in those companies where the systematic risk is bigger.

The same propositions can be applied to capital investments by companies.
(a) Companies will want a **return on a project** to **exceed** the **risk-free rate**, to compensate them for systematic risk.
(b) **Unsystematic risk** can be **diversified away**, and so a premium for unsystematic risk should not be required.
(c) Companies should want a **bigger return** on projects where **systematic risk is greater**.
A major **assumption in CAPM** is that there is a linear relationship between the return obtained from an individual security and the average return from all securities in the market.

Example: CAPM (1)

The following information is available about the performance of an individual company's shares and the stock market as a whole.

	Individual company	*Stock market as a whole*
Price at start of period	105.0	480.0
Price at end of period	110.0	490.0
Dividend during period	7.6	39.2

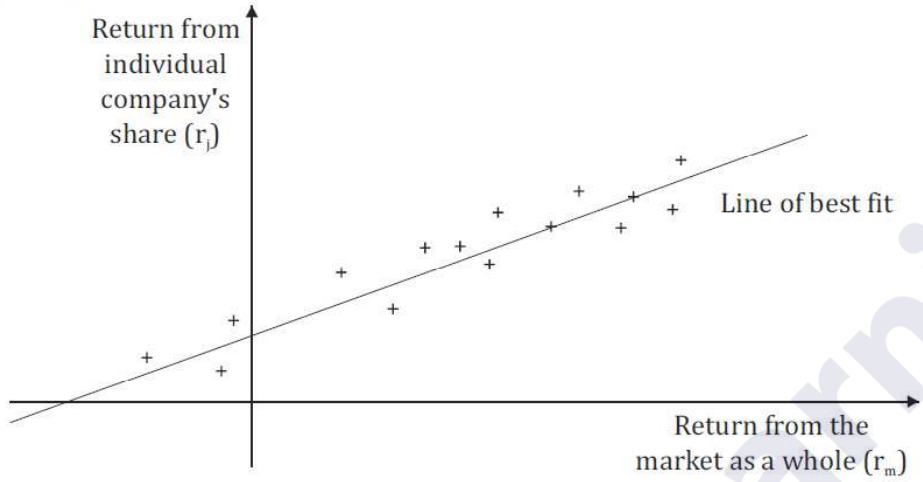
The expected return on the company's shares R_i and the expected return on the 'market portfolio' of shares R_m may be calculated as:

$$\frac{\text{Capital gain (or loss)} + \text{dividend}}{\text{Price at start of period}}$$

$$R_i = \frac{(110-105)+7.6}{105} = 0.12 \qquad R_m = \frac{(490-480)+39.2}{480} = 0.1025$$

A statistical analysis of 'historic' returns from a security and from the 'average' market may suggest that a **linear relationship** can be assumed to exist between them. A series of comparative figures could be prepared (month by month) of the return from a company's shares and the average return of the market as a whole. The results could be drawn on a scattergraph and a 'line of best fit' drawn (using linear regression techniques) as shown in the diagram below.

Figure 8.4



This analysis would show three things.

(a) The return from the security and the return from the market as a whole will tend to **rise or fall together**.
(b) The return from the security may be higher or lower than the market return. This is because the **systematic risk** of the individual security differs from that of the market as a whole.
(c) The scattergraph may not give a good line of best fit, unless a large number of data items are plotted, because actual returns are affected by unsystematic risk as well as by systematic risk.

Note that returns can be negative. A share price fall represents a capital loss, which is a negative return.

The conclusion from this analysis is that individual securities will be either more or less risky than the market average in a fairly predictable way. The measure of this relationship between market returns and an individual security's returns, reflecting differences in systematic risk characteristics, can be developed into a beta factor for the individual security.

The market risk premium

Market risk premium is the difference between the expected rate of return on a market portfolio and the risk-free rate of return over the same period. The market risk premium **($R_m - R_f$)** represents the excess of market returns over those associated with investing in risk-free assets.

The CAPM makes use of the principle that **returns on shares** in the **market as a whole** are expected to be higher than the returns on risk-free investments. The difference between market returns and risk-free returns is called an **excess return or market premium**. For example, if the return on government bonds is 9% and market returns are 13%, the excess return or market premium on the market's shares as a whole is 4%.

The difference between the risk-free return and the expected return on an individual security can be measured as the **excess return for the market as a whole multiplied by the security's beta factor**.

The CAPM formula

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$$k_e = R_f + ((R_m - R_f)\ \beta)$$

Where:

k_e	is the cost of equity capital
R_f	is the risk-free rate of return
R_m	is the return from the market as a whole
β	is the beta factor of the individual security

Example: CAPM
Shares in LD Co have a beta of 0.9. The expected returns to the market are 10% and the risk-free rate of return is 4%.

Required
Calculate the cost of equity capital for LD Co.

Ke = 4% + (10%-4%)0.9
Ke = 9.4%

Example: More CAPM
Investors have an expected rate of return of 8% from ordinary shares in A Co, which have a beta of 1.2. The expected returns to the market are 7%.
Required
Calculate the expected rate of return from ordinary shares in B Co, which have a beta of 1.8.

Solution

A Co: $k_e = R_f + (R_m - R_f)\,\beta$

$8 = R_f + ((7 - R_f) \times 1.2)$

$8 = R_f + 8.4 - 1.2\,R_f$

$0.2\,R_f = 0.4$

$R_f = 2$

B Co: $k_e = 2 + ((7 - 2)\,1.8)$

$= 11\%$

Alpha values

The **alpha value** can be seen as a measure of how wrong the CAPM is. Alpha values:

(a) Reflect only temporary, abnormal returns, if CAPM is a realistic model
(b) Can be positive or negative
(c) Over time, will tend towards zero for any individual share, and for a well-diversified portfolio taken as a whole will be 0
(d) May exist due to the inaccuracies and limitations of the CAPM

If the **alpha value** is **positive**, investors who do not hold shares will be tempted to buy them (to take advantage of the abnormal return), and investors who do hold shares will want to hold on to them so share prices will rise.
If the **alpha value** is **negative**, investors will not want to buy them, and current holders will want to sell them, so share prices will fall.

- Alpha represent the accuracy of the model
- If Alpha + (expect price increase)

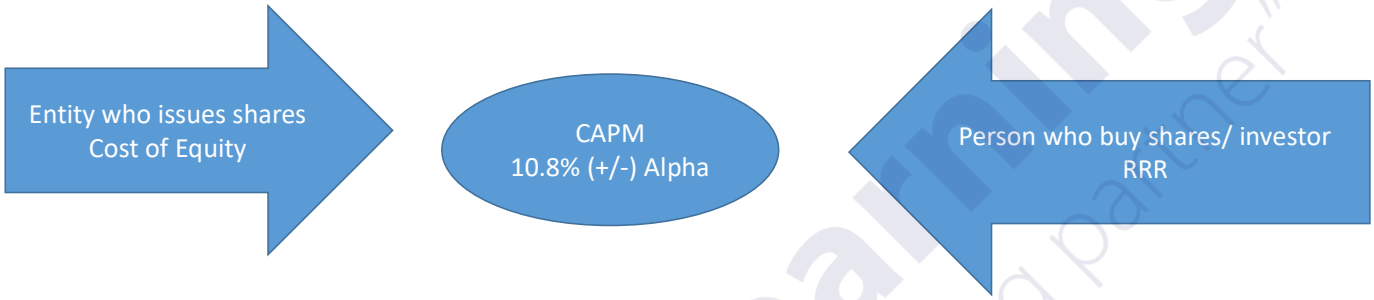
New investors – will buy shares

Current Investors – Will hold shares without selling them

- If Alpha – (expect price reduction)

New investors – will not buy

Current Investors – will sell shares



Example: Alpha values

ABC plc's shares have a beta value of 1.2 and an **alpha value of +2%.** The market return is 10% and the risk-free rate of return is 6%.

Required return 6% + (10% – 6%) × 1.2 = 10.8%

Current return = expected return ± alpha value = 10.8% + 2% = 12.8%

Problems with applying the CAPM in practice

(a) The need to **determine** the **excess return** (R_m – R_f). Expected, rather than historical, returns should be used, although historical returns are often used in practice.

(b) The need to **determine** the **risk-free rate**. A risk-free investment might be a government security. However, interest rates vary with the term of the lending.

(c) **Errors** in the **statistical analysis used** to calculate β values. Betas may also **change over** time.

(d) The CAPM is also unable to forecast accurately returns for companies with low price/earnings ratios and to take account of seasonal 'month-ofthe- year' effects and 'day-of-the-week' effects that appear to influence returns on shares.

Compute Cost of Common Equity - Summery

- ***Cost of Internal Common Stock Equity***
  - ***Dividend Model*** $k_S = \frac{D_1}{P_0}$
  - ***Dividend Growth Model*** $k_S = \frac{D_1}{P_0} + g$
  - ***CAPM*** $k_S = k_{RF} + \beta(k_M - k_{RF})$

- Cost of ***New*** Common Stock
  - Must adjust the Dividend Growth Model equation for floatation costs of the new common shares.

$$k_n = \frac{D_1}{P_0 - F} + g$$

Example:

If additional shares are issued floatation costs will be 12%. D_0 = \$3.00 and estimated growth is 10%, Price is \$60 as before.

$$k_n = \frac{3(1+0.10)}{52.80} + .10 = .1625 = 16.25\%$$

Note: SLFRS/IFRS 09 – Transaction cost will capitalized other than FVTPL instruments.
Companies Act – its require special resolution to reduce share capital.
What is the Practice in SL : debit transaction cost in to R/E

2. Compute Cost Preferred Stock (Para 16 of IAS 32)

For preference shares, the future cash flows are the dividend payments in perpetuity so that:

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$$k_{pref} = \frac{d}{P_0}$$

Where: P_0 is the current market price of preference share capital after payment of the current dividend

d is the dividend received

k_{pref} is the cost of preference share capital

Note. Don't forget that tax relief is **not given** for preference share dividends.

Similarly there is no growth for preference shares as the dividend is fixed. When calculating the weighted average cost of capital (see Section 5), the cost of preferred shares is a separate component and should not be combined with the cost of debt or the cost of equity.

3. The cost of debt (IRR of the Instrument)

The cost of debt capital

Debt finance offers a **higher degree of security** as interest has to be paid, there may be a security for the debt and it will be repaid ahead of equity in a liquidation. Interest also attracts **tax relief** so the cost of debt will be **lower** than the cost of equity.

Note. Remember that different types of debt have different costs. The cost of a bond will not be the same as the cost of a bank loan.

Irredeemable debt capital

Using the same logic as for preferred shares:

Cost of irredeemable debt capital (k_d), paying interest i in perpetuity, and having a current ex-div price P_0:

Matters shall consider when measuring cost of debt

- Income tax effect r(1-t)
- Maturity – whether finite or infinite/ redeemable or irredeemable
- Finite – holder will receive int. during specific period and capital at the end of that period
- Infinite – holder will receive int. for a foreseeable future (cash flows up to perpetuity: (PV = CF/DCF)

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$k_d = \frac{i}{P_0}$ (given in the exam as $P_O = \frac{i}{k_d}$)

4.2.1 Example: Cost of Irredeemable debt

LP Co has issued bonds of Rs. 100 nominal value with annual interest of 9% per year, based on the nominal value. The current market price of the bonds is Rs. 90.

Ignore tax.

Required

Calculate the cost of the bonds.

Solution

$k_d = {}^{9}/_{90} = 10\%$

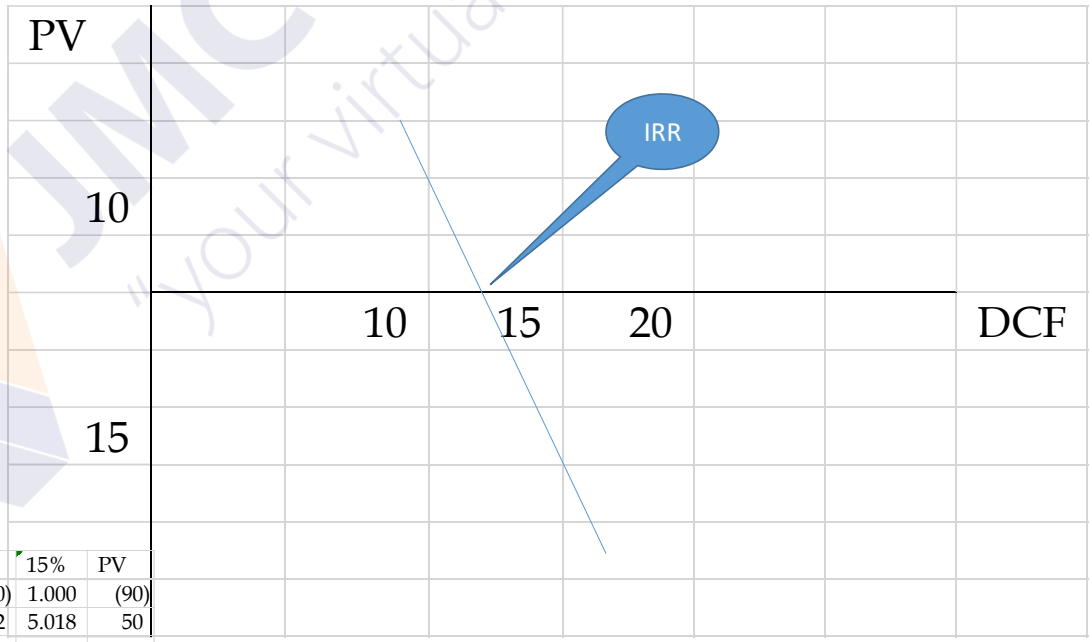
Redeemable debt capital

The above equation cannot be simplified, so 'r' will have to be calculated by trial and error, as an **internal rate of return (IRR)**.

Example: Cost of debt
OA Co has in issue 10% bonds of a nominal value of Rs. 100. The market price is Rs. 90 ex interest.

Required

Calculate the cost of this capital if the bond is:
(a) Irredeemable
(b) Redeemable at par after 10 years
Ignore taxation.



Year		10%	PV	15%	PV
0	(90)	1.000	(90)	1.000	(90)
1-10	10	6.150	62	5.018	50
10	100	0.386	39	0.247	25
			10		(15)
	IRR = 10% + (10 / (10+15))x5%				
	IRR = 12%				

Debt capital and taxation

The interest on debt capital is likely to be an allowable deduction for purposes of taxation and this **tax relief on interest** must be recognised in computations. The after-tax cost of irredeemable debt capital is:

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$$k_{d\,net} = \frac{i(1-t)}{P_0}$$

Where: $k_{d\,net}$ is the cost of debt capital

i is the annual interest payment

P_0 is the current market price of the debt capital ex interest (that is, after payment of the current interest)

t is the rate of corporation tax

Note that for irredeemable debt $K_d \times (1-t) = K_{d\,net}$

Cost of redeemable debt with tax

GD Co has Rs. 100 6% redeemable bonds in issue. Interest is paid annually on 31 December. The ex-interest market value of the bonds on 1 January 20X5 is Rs. 93 and the bonds are redeemable at a 10% premium on 31 December 20X9.

The effective rate of tax is 30%.

Required

Calculate the cost of debt.

Note. Make sure that you know the difference in methods for calculating the cost of irredeemable **and** redeemable debt, as this is often a weakness in exams.

Note also that the short cut of $K_d \times (1-t) = K_{d\,net}$ **cannot be used for redeemable debt** as this would imply tax relief on the capital redemption.

Year		5%	PV	8%	PV
0	(93)	1.000	(93)	1.000	(93)
1-5	4.2	4.330	18	3.993	17
5	110	0.784	86	0.681	75
			11		(1)
	IRR = 5% + (11 /(11+1))x3%				
	IRR = 7.75%				

Annuan interest = 6 (1 - 0.3) = 4.2

The cost of floating rate debt

If a firm has variable or **'floating rate' debt**, then the cost of an equivalent fixed interest debt should be substituted. 'Equivalent' usually means fixed interest debt with a similar term to maturity in a firm of similar standing, although if the cost of capital is to be used for project appraisal purposes, there is an argument for using debt of the same duration as the project under consideration.

The cost of short-term funds

The cost of short-term funds such as bank loans and overdrafts is the **current interest** being charged on such funds. R (1- T)

4.The weighted average cost of capital

A company's funds may be viewed as a **pool of resources**. Money is withdrawn from this pool of funds to invest in new projects and added to the pool as new finance is raised or profits are retained.

Weighted average cost of capital is the average cost of the company's finance (equity, debentures and bank loans) weighted according to the proportion each element bears to the total pool of capital. Weighting is usually based on market valuations, current yields and costs after tax.

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A general formula for the weighted average cost of capital (or k_0) is as follows.

$$WACC = k_e \left[\frac{V_E}{V_E + V_D}\right] + k_{d\,net} \left[\frac{V_D}{V_E + V_D}\right]$$

Where: k_e is the cost of equity

$k_{d\,net}$ is the post-tax cost of debt

V_E is the market value of issued shares (market capitalisation)

V_D is the market value of debt

Example: WACC with preference shares

An entity has the following information in its statement of financial position.

	Rs.
50,000 ordinary shares	2.500
8% preference shares of Rs. 100 each	1.500
12% unsecured bonds undated	1.000

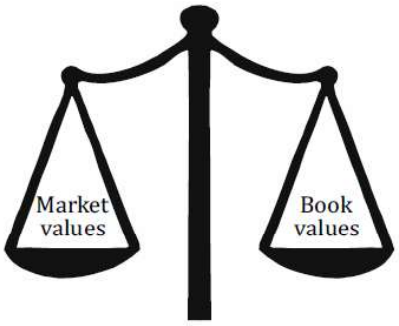
The ordinary shares are currently quoted at Rs. 130 each, the bonds are trading at Rs. 72 per Rs. 100 nominal and the preference shares at Rs. 52 each. The ordinary dividend of Rs. 15 has just been paid with an expected growth rate of 10%. Corporation tax is currently 30%.

Required

Calculate the weighted average cost of capital for this entity.

Weighting

Two methods of weighting could be used.



Although book values are often easier to obtain, they are of doubtful economic significance. It is, therefore, more **meaningful to use market values** when data are available. For unquoted companies, estimates of market values are likely to be extremely subjective, and consequently book values may be used. When using market values it is not possible to split the equity value between share capital and reserves, and only one cost of equity can be used. This removes the need to estimate a separate cost of retained earnings.

Note. Always use market values in an exam question unless you are told otherwise.

You may need to calculate the market value of equity using the capitalisation of earnings at the cost of capital.

Using the WACC in investment appraisal

The weighted average cost of capital can be used in investment appraisal if we make the following assumptions.

(a) New investments must be **financed** by **new sources of funds**: retained earnings, new share issues or new loans.

(b) The cost of capital to be applied to project evaluation must **reflect** the **marginal cost** of new capital.

(c) The weighted average cost of capital **reflects** the **company's long-term future capital structure**, and capital costs. If this were not so, the current weighted average cost would become irrelevant because eventually it would not relate to any actual cost of capital.

Arguments against using the WACC

The arguments against using the WACC as the cost of capital for investment appraisal (as follows) are based on criticisms of the assumptions that are used to justify use of the WACC.

(a) New investments undertaken by a company might have different **business risk** characteristics from the company's existing operations. As a consequence, the return required by investors might go up (or down) if the investments are undertaken, because their business risk is perceived to be higher (or lower).

(b) The finance that is raised to fund a new investment might substantially change the capital structure and the perceived **financial risk** of investing in the company. Depending on whether the project is financed by equity or by debt capital, the perceived financial risk of the entire company might change. This must be taken into account when appraising investments.

(c) Many companies raise **floating rate** debt capital as well as fixed interest debt capital. With floating rate debt capital, the interest rate is variable, and is altered every three or six months or so, in line with changes in current market interest rates. The cost of debt capital will therefore fluctuate as market conditions vary.

Floating rate debt is difficult to incorporate into a WACC computation, and the best that can be done is to substitute an 'equivalent' fixed interest debt capital cost in place of the floating rate debt cost.

5.Marginal cost of capital approach

The **marginal cost of capital** approach involves calculating a marginal cut-off rate for acceptable investment projects by:

(a) **Establishing rates of return** for each component of capital structure, except retained earnings, based on its value if it were to be raised under current market conditions

(b) **Relating dividends or interest** to these values to obtain a marginal cost for each component

(c) **Applying the marginal cost** to each component depending on its proportionate weight within the capital structure and adding the resultant costs to give a weighted average

It can be argued that the current weighted average cost of capital should be used to evaluate projects, where a company's capital structure changes **only very slowly** over time; then the marginal cost of new capital should be roughly equal to the weighted average cost of current capital.

Where gearing levels fluctuate significantly, or the finance for new project carries a significantly **different level of risks** to that of the existing company, there is good reason to seek an alternative marginal cost of capital.

Example: Marginal cost of capital

GB Co has the following capital structure.

Source	*After tax cost*	*Market value*	*After tax cost × Market value*
	%	Rs Mn	
Equity	12%	10	1.2
Preference	10%	2	0.2
Existing bonds	7.5%	8	0.6
New bonds		20	2.0

$$\text{Weighted average cost of capital} = \frac{2 \times 100\%}{20}$$

$$= 10\%$$

GB Co's directors have decided to embark on major capital expenditure, which will be financed by a major issue of funds. The estimated project cost is Rs. 3,000,000, 1/3 of which will be financed by equity, 2/3 of which will be financed by bonds. As a result of undertaking the project, the cost of equity (existing and new shares) will rise from 12% to 14%. The cost of preference shares and the cost of existing bonds will remain the same, while the after-tax cost of the new bonds will be 9%.

Required

Calculate the company's new weighted average cost of capital, and its marginal cost of capital.

Solution

New weighted average cost of capital

Source	*After tax cost*	*Market value*	*After tax cost × Market value*
	%	Rs Mn	
Equity	14.0%	11	1.54
Preference	10.0%	2	0.20
Existing bonds	7.5%	8	0.60
New bonds	9.0%	2	0.18
		23	2.52

$$\text{WACC} = \frac{2.52 \times 100\%}{23}$$

$$= 11.0\%$$

$$\text{Marginal cost of capital} = \frac{(2.52 - 2.0) \times 100\%}{23 - 20}$$

$$= 17.3\%$$