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**VIRTUAL COACHING CLASSES  
ORGANIZED BY BOS, ICAI**

**INTERMEDIATE LEVEL  
PAPER 8A : FINANCIAL MANAGEMENT**

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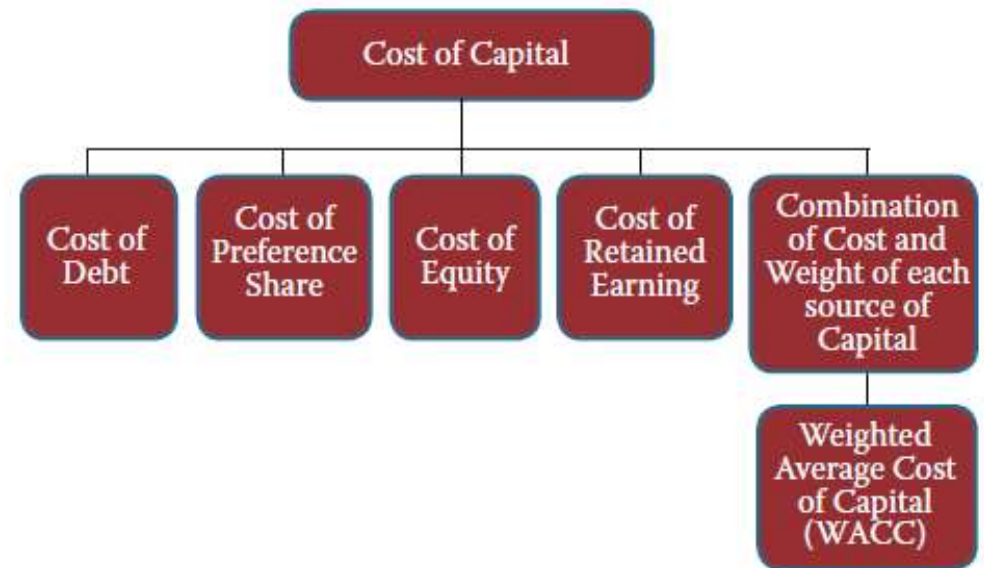
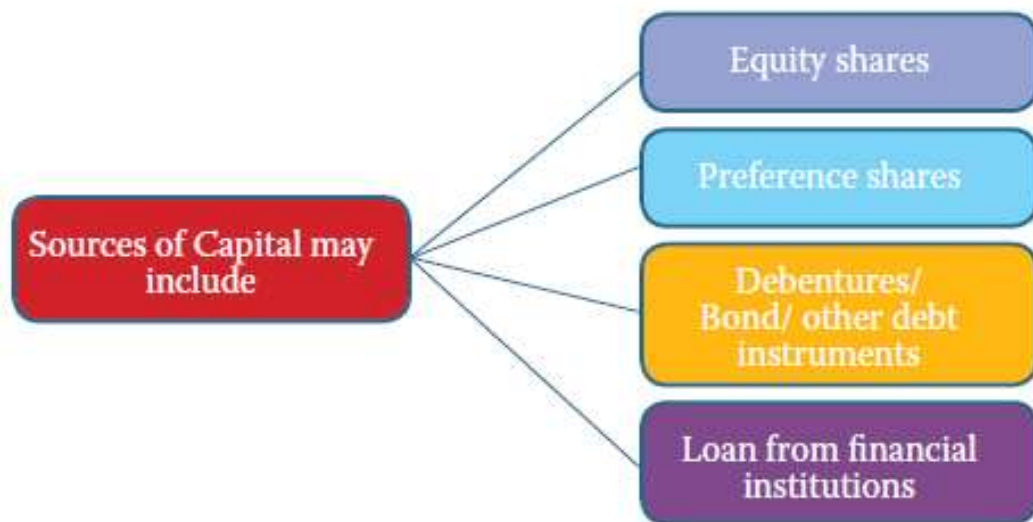
# Cost of Capital



- Return expected by the providers of capital (i.e. shareholders, lenders and the debt-holders) to the business as a compensation for their contribution to the total capital
- Also known as cut – off rate, hurdle rate or minimum rate of return or opportunity cost (it is used to discount/compound stream of cashflows)
- Finance manager is required to select such a capital structure in which expectation of investors is minimum and shareholders' wealth is maximum.
- Useful in Evaluation of Investment Options, Financing Decisions (lowest cost) and Designing optimum credit policy (credit term for customers)
- Determination - Its not the amount which the company plans to pay or actually pays, rather than it is the expectation of stakeholders. Factors to be considered are initial amount received, outflows of interest/dividend/maturity and any related tax benefits.



# Cost of Capital





# Long Term Debt

## Features of Debentures / Bonds

- Agreement / Indenture – terms & conditions
- Face Value – mentioned on the bond / indenture
- Coupon Rate – rate of interest payment
- Maturity Period - duration
- Redemption Value – price at which it shall be paid off
- **Tax Shield – tax benefit of interest**





# Cost of Long Term Debt

**Cost of Irredeemable Debentures** – that are not redeemable during company's lifetime

$$K(d) = I (1-t) / NP$$

K(d) = cost of debt after tax

I = Annual Interest Payment

NP = Net Proceeds (new issue) or Current Market Price (existing debt)

t = applicable tax rate

**Illustration** - Five years ago, Chandi Limited issued 12% irredeemable debentures at ₹ 103, at ₹ 3 premium to their par value of ₹ 100. The current market price of these debentures is ₹ 95. If the company pays corporate tax at a rate of 35 per cent CALCULATE its current cost of debenture capital?

**Solution** –  $K(d) = 12 (1 - 0.35) / 95 = 0.0821$  or 8.21%



# Cost of Long Term Debt

**Cost of Redeemable Debentures (using Approximation method)** – that can be redeemed either at a maturity date or earlier

## Where only Interest is Tax Deductible

$$K(d) = \frac{I(1-t) + (RV-NP)/n}{(RV+NP)/2}$$

I = Annual Interest Payment

NP = Net Proceeds (new issue) or Current Market Price (existing debt)

RV = Redemption Value of Debentures

n = Remaining life of debentures

t = applicable tax rate

## Where Discount / Premium is also Tax Deductible

$$K(d) = \frac{I + (RV-NP)/n}{(RV+NP)/2} \times (1-t)$$

**Illustration** - A company issued 10,000, 10% debentures of ₹ 100 each at par on 1.4.2012 to be matured on 1.4.2022. The company wants to know the cost of its existing debt on 1.4.2017 when the market price of the debentures is ₹ 80. COMPUTE the cost of existing debentures assuming 35% tax rate.

**Solution** – It is a case of existing debt

I = 10, NP (Mkt Value) = 80, RV = 100, t = 0.35, n = 5

$$K(d) = \frac{10(1-0.35) + (100-80)/5}{(100+80)/2} = \frac{10.50}{90} = 11.67\%$$



# Cost of Long Term Debt

**Cost of Redeemable Debentures using YTM** – can also be calculated by discounting the relevant cash flows using Internal rate of return. Yield to Maturity (YTM) is the internal rate of return at which current price of a debt equals to the present value of all cash-flows. The relevant cash flows are :

Year	Cash flows
0	Net proceeds in case of new issue/ Current market price in case of existing debt (NP or $P_0$ )
1 to n	Interest net of tax $[I(1-t)]$
n	Redemption value (RV)

**Steps to calculate relevant cash flows:**

Step-1: Identify the cash flows

Step-2: Calculate NPVs of cash flows as identified above using two discount rates (guessing)

Step-3: Calculate IRR



# Cost of Long Term Debt

**Question:** A company issued 10,000, 10% debentures of ₹ 100 each on 1.4.2013 to be matured on 1.4.2018. The company wants to know the current cost of its existing debt and the market price of the debentures is ₹ 80. Compute the cost of existing debentures assuming 35% tax rate.

**Solution:**

Step 1: Identification of relevant cash flows – Curr Mkt Price: 80, RV = 100, I (1-t) = 6.5

Step 2: Calculation of NPVs at two discount rates

Step 3: Calculation of IRR

$$\text{IRR} = L + \frac{\text{NPV}_L}{\text{NPV}_L - \text{NPV}_H} (H - L)$$





# Cost of Long Term Debt

Year	Cash Flows	Discounting		Discounting	
		Factor @ 10%	Present Value	Factor @ 15%	Present Value
0	80	1	-80.00	1	-80.00
1 to 5	-6.5	3.791	24.64	3.352	21.79
5	-100	0.621	62.10	0.497	49.70
<b>NPV</b>			<b>6.74</b>	<b>-8.51</b>	

  
$$\text{IRR} = L + \frac{\text{NPV}_L}{\text{NPV}_L - \text{NPV}_H} (H - L) = 12.21$$

IRR: PV of CASH IF = PV of CASH OF



# Cost of Long Term Debt

**Value of a Bond that's Amortized or Repaid in Instalments** – Outstanding Principal will be reduced as the annual payments are made and interest will be computed on the outstanding amount. Hence, the cash flows of the bonds will be uneven.

$$V_B = \frac{C_1}{(1+K_d)^1} + \frac{C_2}{(1+K_d)^2} + \dots + \frac{C_n}{(1+K_d)^n}$$

$$V_B = \sum_{t=1}^n \frac{C_t}{(1+K_d)^t}$$

where C = Outflow every year

**Illustration** - MNM is proposing to sell a 5-year bond of ₹ 5,000 at 8 per cent rate of interest per annum. The bond amount will be amortised equally over its life. CALCULATE the bond's present value for an investor if he expects a minimum rate of return of 6 per cent?



# Cost of Long Term Debt

Year	Opening			Discounting		
	Outstanding	Interest @ 8%	Principle	Total O/F	Factor @ 6%	Present Value
1	5,000.00	400.00	1,000.00	1,400.00	0.9434	1,320.75
2	4,000.00	320.00	1,000.00	1,320.00	0.8900	1,174.80
3	3,000.00	240.00	1,000.00	1,240.00	0.8396	1,041.13
4	2,000.00	160.00	1,000.00	1,160.00	0.7921	918.83
5	1,000.00	80.00	1,000.00	1,080.00	0.7473	807.04
<b>Value of Bond</b>						<b>5,262.55</b>



# Cost of Long Term Debt

**Cost of Convertible\* Debentures** – Holders have **option** to either get debentures redeemed into cash or get specified number of shares in lieu of cash. Very similar to cost of redeemable debentures with assumption that all holders will choose the **option** with higher value. Thus, redemption value shall be the value of the shares at the time of redemption. Accordingly the redemption value is decided.

**Illustration** - A company issued 10,000, 15% Convertible debentures of ₹100 each with a maturity period of 5 years. At maturity the debenture holders will have the option to convert the debentures into equity shares of the company in the ratio of 1:10 (10 shares for each debenture). The current market price of the equity shares is ₹12 each and historically the growth rate of the shares are 5% per annum. Compute the cost of debentures assuming 35% tax rate.



# Cost of Long Term Debt

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**Solution** - Redemption Value =  $10 \times 12 (1+0.05)^5 = 153.12$  (which is > 100, hence all holders will opt)

$$K_d = \frac{I(1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}} = \frac{15(1-0.35) + \frac{(153.12-100)}{5}}{\frac{(153.12+100)}{2}} = \frac{9.75+10.62}{126.53} = 16.09\%$$



# Cost of Preference Shares

**Preference Shares** – Dividend paid at a % of face value which is not mandatory but get priority over equity shareholders. Since, its an appropriation of profits, hence not tax deductible.

**Cost of Redeemable Preference Shares** (similar to debentures, but not

$$K(p) = \frac{PD + (RV-NP)/n}{(RV+NP)/2}$$

PD = Annual Preference Dividend

NP = Net Proceeds (new issue) or Current Market Price (existing shares)

RV = Redemption Value of Preference Shares

n = Remaining life of preference shares

**Illustration** - Zenith Ltd. issues 1,000 10% preference shares of ₹ 100 each at ₹ 96 each. The company proposes to redeem the preference shares at the end of 10th year from the date of issue. CALCULATE the cost of preference share?

$$K(p) = \frac{10 + (100-96)/10}{(100+96)/2} = 10.61\%$$

Net proceeds mean issue price less issue expenses. If issue price is not given then assume it to be equal to current market price. If issue expenses are not given simply assume it equal to zero.



# Cost of Preference Shares

**Cost of Irredeemable Preference Shares** (similar to calculation of perpetuity, cost is calculated by dividing the preference dividend with the current market price or net proceeds from the issue )

$$K(p) = PD / P_0$$

PD = Annual Preference Dividend

$P_0$  = Net Proceeds in issue of preference shares (i.e. after reducing floatation costs, if any)

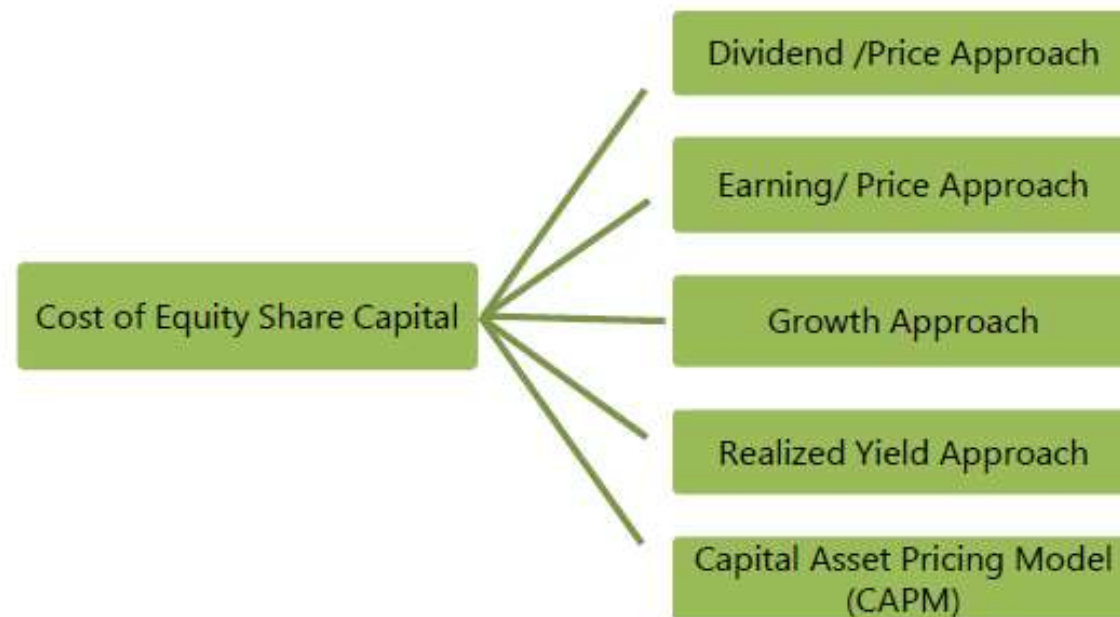
**Illustration** - If Synergy Inc is issuing preferred stock at ₹100 per share, with a stated dividend of 12%, and a floatation cost of 2% then, CALCULATE the cost of preference share.

$$K(p) = 12 / 98 = 12.24\%$$



# Cost of Equity Share Capital

**Cost of Equity Share Capital** – It is the expectation of the equity shareholders in terms of returns on their investment. There are alternative methods to calculate the same that depends on factor like dividend, growth etc. (Dividends to ESH are not tax deductible)







# Cost of Equity Share Capital

**Dividend Price Approach / Dividend Valuation Model** – It assumes that dividend per share is expected to remain constant forever.

**Cost of Equity (Ke)** =  $D / P_0$  where D = expected dividend,  $P_0$  = Market Price (Ex- Dividend)

- Not common as DPS would not be constant

**Earnings Price Approach** – Based on the premise that investor expects a certain amount of earnings, whether distributed or not. It assumes that earning per share will remain constant forever.

Similar to the dividend price approach; seeks to nullify the effect of changes in the dividend policy.

**Cost of Equity (Ke)** =  $E / P$  where E = Current EPS, P = Market Share Price or Net Proceeds



# Cost of Equity Share Capital

## Question on Earnings Price Approach

A firm is considering an expenditure of Rs.60 lakhs for expanding its operations. The relevant information is as follows:

- Number of existing equity shares= 10 lakhs
- Market value of existing share= Rs.60
- Net earnings = Rs.90 lakhs

Compute the cost of existing equity share capital and of new equity capital assuming that new shares will be issued at a price of Rs.52 per share and the cost of issue will be Rs.2 per share.

$$\text{EPS} = \frac{\text{Income attributable to ESH}}{\text{Number of Equity Shares}}$$

$$= 90 / 10 = 9$$

### Cost of Existing Equity

$$\begin{aligned} K_e &= \text{EPS} / \text{Market Price} = 9 / 60 \\ &= 15\% \end{aligned}$$

### Cost of New Equity

$$\begin{aligned} K_e &= \text{EPS} / \text{Net Proceeds} = 9 / 50 \\ &= 18\% \end{aligned}$$



# Cost of Equity Share Capital

**Growth Approach or Gordon's Model** – It assumes that dividend growth remains constant and earnings, dividend and equity share price all grow at same rate.

$$K_e = D_1 / P_0 + G$$

Where,  $D_1$  = next expected dividend i.e.  $D_1 = D_0 (1 + g)$

$P_0$  = Current Market price (for newly issued shares, net of any floatation costs)

$G$  = Constant growth rate of dividend

**Illustration** - A company has paid dividend of ₹ 10 per share (of face value of ₹ 100 each) last year and it is expected to grow @ 10% next year. CALCULATE the cost of equity if the market price of share is ₹ 220

**Solution** :  $K_e = 10 (1+0.10) / 220 + .10 = 0.15$  or 15%



# Cost of Equity Share Capital

## Growth Approach or Gordon's Model – How to Estimate "G" i.e. growth rate

### A. Average Method

$$\text{Current Dividend (D}_0\text{)} = D_n(1+g)^n$$

or

$$\text{Growth rate} = \sqrt[n]{\frac{D_0}{D_n}} - 1$$

Where,  $D_0$  is the current dividend and

$D_n$  is the dividend n years ago

Growth rate can also be found as follows:

**Step-I:** Divide  $D_0$  by  $D_n$ , find out the result, then refer the FVIF table,

**Step-II:** Find out the result found at Step-I in corresponding year's row

**Step-III:** See the interest rate for the corresponding column. This is the growth rate.



Example –  $D_0 = ₹ 15.39$  and dividend 5 years ago was ₹10. Then,  $D_0/D_n = 1.539$  which reflects compounding factor @ 9% for 5 years.



# Cost of Equity Share Capital

## Growth Approach or Gordon's Model – How to Estimate "G" i.e. growth rate

**B. Gordon's Growth Model** - Future growth rate is determined. With some of the earnings retained, increase in the level of investment will give rise to an increase in future dividends.

$G = b \times r$                       where  $b$  = Earnings retention ratio and  $r$  = rate of return on funds invested

**Realized Yield Approach** – Expected return is based on average rate of return realized in past. Since earnings doesn't remain stable, this is impractical approach.



**Unrealistic Assumptions** : Risks faced by the company remain same; the shareholders continue to expect the same rate of return; and the reinvestment opportunity cost (rate) of the shareholders is same as the realised yield.



# Cost of Equity Share Capital

## Question on Realized Yield Approach

*CALCULATE the cost of equity from the following data using realized yield approach:*

<b>Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<i>Dividend per share</i>	1.00	1.00	1.20	1.25	1.15
<i>Price per share (at the beginning)</i>	9.00	9.75	11.50	11.00	10.60

**Note** – First Step is to calculate yield for last 4 years which shall be (Dividend + Ending Price) / Beginning Price

$$\text{Year 1} - (1+9.75) / 9 = 1.1944$$

$$\text{Year 2} - (1+11.50) / 9.75 = 1.2821$$

$$\text{Year 3} - (1.2+11) / 11.5 = 1.0609$$

$$\text{Year 4} - (1.25+10.60) / 11 = 1.0772$$

Ke is now geometric mean (1/4) power of product of all these 4 yields =  $1.15 - 1 = 15\%$



# Cost of Equity Share Capital

## Capital Asset Pricing Model [CAPM]

There are 2 types of risks to which any security is exposed:

- Unsystematic or Diversifiable – company specific risk
- Systematic or Non-Diversifiable – market specific risk that impacts all firms (inflation, govt policies etc)

**CAPM uses systematic risk factor** – Higher the Risk, Higher the returns, an investor shall expect

$$K_e = R_F + \beta (R_M - R_F)$$

$R_F$  = Risk free rate of return ,  $R_M$  = Rate of return on Market Portfolio

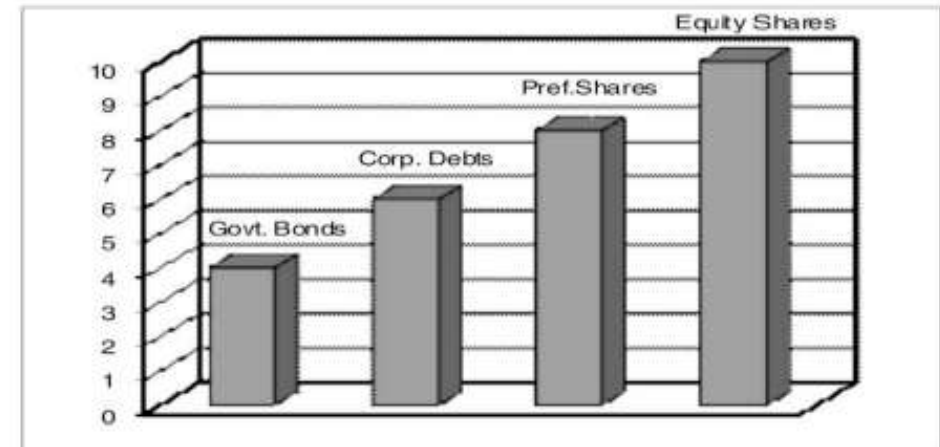
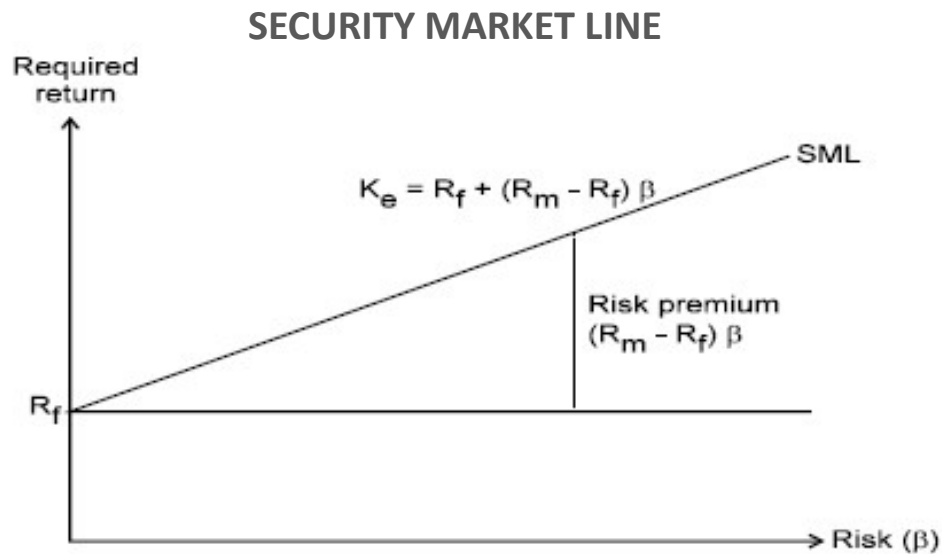
$\beta$  = Beta coefficient representing systematic risk ,  $(R_M - R_F)$  = Market Risk Premium

**Illustration** - Compute the cost of equity capital of IHG Ltd., whose risk free rate of return equals 8%. The firm's beta equals 1.50 and the return on the market portfolio equals to 12%.

**Solution:**  $K_e = R_F + \beta (R_M - R_F) = 0.08 + 1.50 (0.12 - 0.08) = 0.14$  or 14%



# Cost of Equity Share Capital



**Risk Return relationship of various securities**

\* Students please note if the Question already gives you Risk Premium then it means  $(R_M - R_F)$  is already given. Larger risk premium indicates higher risk in that particular market





# Cost of Retained Earnings

**Kr** – It's the opportunity cost of the dividends foregone by shareholders. Its similar to Ke with respect to computational formulae

\* **In case of a new equity**, Ke would be higher than Kr since for Ke, the denominator P shall be the the net proceeds whereas for Kr, P shall be the current market value

**A. Where there are no taxes & floatation costs,  $K_r = K_e$  (except for new equity as mentioned above)**

**B. Where there are taxes & floatation costs,  $K_r = K_e (1-t) (1-f)$  , where t = rate of personal tax on dividend and f = floatation costs**

**Illustration** - Face value of equity shares of a company is Rs.10 while current market price is Rs.200. Company is going to start a new project, and is planning to finance it partially by new issue and partially by retained earnings. You are required to compute cost of equity shares as well as cost of retained earnings if issue price will be Rs.190 per share and floatation cost will be Rs.5 per share. Dividend at the end of first year is expected to be Rs.10 and growth rate will be 5%.



# Cost of Retained Earnings

## Solution

$$K_e = D_1 / \text{Net Proceeds} + G = 10 / (190-5) + 0.05 = 0.1041 \text{ or } 10.41\%$$

$$K_r = D_1 / \text{Market Value} + G = 10/200 + 0.05 = 0.10 \text{ or } 10\%$$

Note that dividend of Rs.10 is already given at the end of the year i.e.  $D_0 (1+g)$

**Illustration** - Cost of equity of a company is 20%. Rate of floatation cost is 5%. Rate of personal income tax is 30%. Calculate cost of retained earnings.

**Solution:**  $K_r = K_e (1-t_p)(1-f) = 20\% \times (1-0.30) \times (1-0.05) = 13.3\%$

**Question** – Calculate the cost of retained earnings in following scenarios :-

a)  $D_0 = 5$     $P_0 = 50$     $g = 5\%$                       and                      b)  $RF = 6\%$     $\beta = 1.30$     $RM = 10\%$

**Answer:** a)  $K_r = K_e = D_1/P_0 + g = 5(1.05)/50 + 0.05 = 15.5\%$

b)  $K_r = K_e = RF + \beta(RM - RF) = 0.06 + 1.30 ( 0.10 - 0.06 ) = 11.20\%$



# Questions

**Q1. Given risk free rate of return as 6%, Market rate of return as 12% and cost of equity as 18%, the value of beta shall be**

- a) 1.9
- b) 1.8
- c) 1.5
- d) 2

**Q2. Which of the following source of funds relates to reinvestment or implicit capital ?**

- a) Equity Share Capital
- b) Retained Earnings
- c) Preference Share Capital
- d) Debentures



# Questions

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**Q3. Which of the following statements are false ?**

- a) Retained earnings do not involve any cost
- b) Weightage average cost is the sum total of cost of capital from various sources
- c) Tax shield on preference dividends reduces the cost of capital
- d) All of the above

**Q4. Interest on government bonds is also known as**

- a) Risk Free Rate of Return
- b) Beta of the stock
- c) Risk Premium
- d) Market Rate of Return



# Weighted Average Cost of Capital

- Overall Cost of Capital from all sources of capital i.e. debt, preference shares & equity shares
- Weights are applied to each component based on its proportion to the total capital and then multiplied by its individual cost component

**Thus, WACC =  $(W(d) \times K_d) + (W(p) \times K_p) + (W(e) \times K_e) + (W(r) \times K_r)$  , where W represents ind. Weights**

**Note:** Weights can be based on – book value of individual components or based on Market Value (wherein for RE, Market Value of Equity can be proportioned basis Book values of paid up equity & RE)

\* Although there is no separate market for RE implying Market Value of Equity includes both paid up capital and RE, however cost of capital for RE and Equity may not be same (due to floatation costs), thus for market value weights, the market value of equity shall be apportioned in ratio of book values of paid up capital & book value of RE.



# Weighted Average Cost of Capital

## Sample Illustration –

*Cost of equity of a company is 10.41% while cost of retained earnings is 10%. There are 50,000 equity shares of ₹10 each and retained earnings of ₹15,00,000. Market price per equity share is ₹50. Calculate WACC using market value weights if there are no other sources of finance.*

Source of capital	Market Value	Weights	Cost of capital	WACC (K <sub>o</sub> )
	(₹)	(a)	(b)	(c) = (a) × (b)
Equity shares	6,25,000	0.25	0.1041	0.0260
Retained earnings	18,75,000	0.75	0.1000	0.0750
	25,00,000	1.000		0.1010

\* refer working in class



# Weighted Average Cost of Capital

**Illustration** – Calculate WACC using a) Book Value and b) Market Value as weights.

The capital structure of a company consists of ₹ 5,00,000 Debentures (100/-) with MP 105/- , ₹ 5,00,000 Preference shares (100/-) with MP 110/- and Equity Shares of Rs. 10,00,000 (10/-) with MP 24/-

Additional information:

- (1) ₹ 100 per debenture redeemable at par, 10% coupon rate, 4% floatation costs, 10 year maturity.
- (2) ₹ 100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost and 10 year maturity
- (3) Equity shares has ₹ 4/- floatation cost and market price ₹ 24 per share.

The next year expected dividend is ₹ 1 with annual growth of 5%. The firm has practice of paying all earnings in the form of dividend. Corporate tax rate is 30%. Use YTM method to calculate cost of debentures & preference shares.



# Weighted Average Cost of Capital

Solution –  $K_e = 1/(24-4) + 0.05 = 10\%$

$K_d$  using YTM = 6.90 %

Year	Cash Flows	Discounting		Discounting	
		Factor @ 5%	Present Value	Factor @ 7%	Present Value
0	100.8	1.0000	-100.80	1.0000	-100.80
1 to 10	-7	7.7217	54.05	7.0236	49.17
10	-100	0.6139	61.39	0.5083	50.83
<b>NPV</b>			<b>14.64</b>		<b>-0.80</b>

$IRR = L + \frac{NPV_L}{NPV_L - NPV_H} (H - L)$	IRR : PV of CASH IF = PV of CASH OF
IRR	6.90





# Weighted Average Cost of Capital

Kp using YTM is 4.09%

Year	Cash Flows	Discounting		Discounting	
		Factor @ 5%	Present Value	Factor @ 3%	Present Value
0	107.8	1.0000	-107.80	1.0000	-107.80
1 to 10	-5	7.7217	38.61	8.5302	42.65
10	-100	0.6139	61.39	0.7441	74.41
<b>NPV</b>			<b>-7.80</b>		<b>9.26</b>

$IRR = L + \frac{NPV_L}{NPV_L - NPV_H} (H - L)$	$IRR : PV \text{ of CASH IF} = PV \text{ of CASH OF}$
IRR	4.09

**WACC, using Book Values as weight, = (5/20 x 6.90) + (5/20 x 4.09) + (10/20 x 10) = 7.75 %**

**WACC, using Market Values as weight, = (5.25/34.75 x 6.90) + (5.5/34.75 x 4.09) + (24/34.75 x 10) = 8.57%**

\* Market Values > Debt = 5.25 L, Preference Shares = 5.50 L and Equity = 24 L, thus total = 34.75



# Marginal Cost of Capital

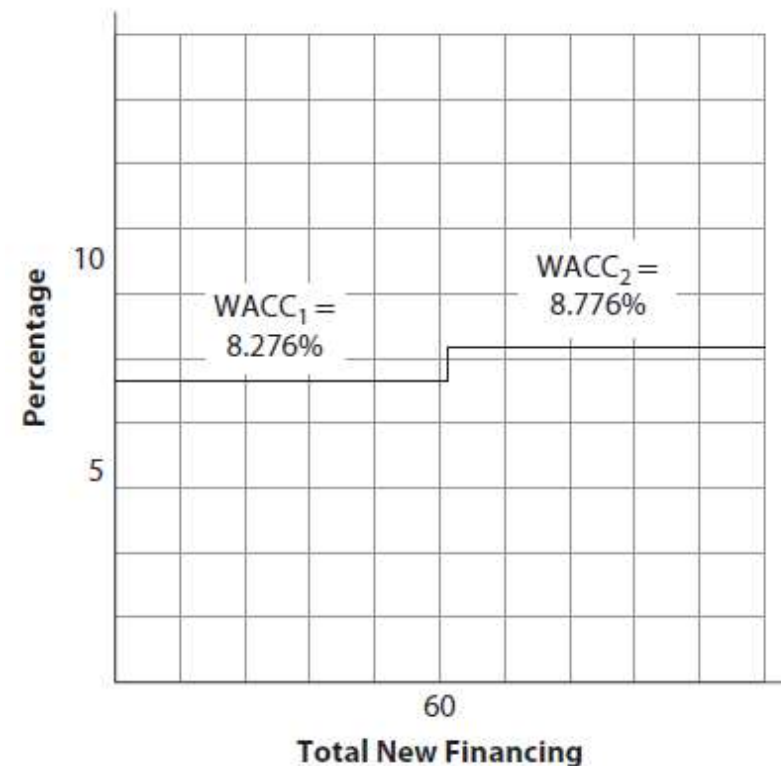
- Marginal cost of capital is the cost of raising an additional rupee of capital
- To calculate the marginal cost of capital, the **intended financing proportion** should be applied as weights to marginal component costs.
- When a firm raises funds in proportional manner and the component's cost remains unchanged, there will be no difference between average cost of capital (of the total funds) and the marginal cost of capital.
- The component costs may remain constant **up to certain level** of funds raised and then start increasing with amount of funds raised



## Comprehensive Question



Question





# Marginal Cost of Capital

A. (i)  $K_d = I(1-t) / MP = 16(1-0.50) / 96 = 8.33\%$

(ii)  $K_p = PD / MP = 1.10 / 9.20 = 11.96$  or 12%

(iii)  $K_e = D_1 / P_0 + G = 1.18 / 23.60 + 0.10 = 15\%$  [D1 is 50% of 2.36 and G can be seen from table of EPS]

B. Marginal Cost (when no new shares are issued) will be same as WACC

$= 8.33 \times 3/20 + 12 \times 1/20 + 15 \times 16/20 = 13.85\%$  [Weights based on given capital structure]

C. Before additional issue is required, the maximum amount that can be spent for capital investment, shall be as per the current capital mix i.e. 3:1:16 (D:P:E). Retained Earnings are part of equity.

Thus, RE for 2017 =  $2.36 \times 10,000 \times 50\% = 11,800$  which has to be 80% (16/20) of total capital.

Hence, Capital Investment before issuing Equity is  $11,800 / 0.80 = 14,750$

D. For additional capital in excess of 14,750 new shares have to be issued

New  $K_e = 1.18 / 20 + 0.10 = 15.9\%$  and

the new Marginal COC =  $8.33 \times 3/20 + 12 \times 1/20 + 15.9 \times 16/20 = 14.57\%$



# Weighted Average Cost of Capital

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*A Company wants to raise additional finance of ₹ 5 crore in the next year. The company expects to retain ₹ 1 crore earning next year. Further details are as follows:*

- (i) The amount will be raised by equity and debt in the ratio of 3: 1.*
- (ii) The additional issue of equity shares will result in price per share being fixed at ₹ 25.*
- (iii) The debt capital raised by way of term loan will cost 10% for the first ₹ 75 lakh and 12% for the next ₹ 50 lakh.*
- (iv) The net expected dividend on equity shares is ₹ 2.00 per share. The dividend is expected to grow at the rate of 5%.*
- (v) Income tax rate is 25%.*

**You are required:**

- (a) To determine the amount of equity and debt for raising additional finance.*
- (b) To determine the post-tax average cost of additional debt.*
- (c) To determine the cost of retained earnings and cost of equity.*
- (d) To compute the overall weighted average cost of additional finance after tax.*



# Weighted Average Cost of Capital

## Amount of Equity & Debt for Additional Finance of ₹ 5 Crore:

Equity =  $\frac{3}{4}$  = ₹ 3.75 Cr i.e. RE of 1 Cr and balance 2.75 Cr of Equity Capital

Debt =  $\frac{1}{4}$  = ₹ 1.25 Cr i.e. 75L @ 10% and 50L @ 12%

## Weighted Average After Tax Cost of Debt

$K_d = (75L \times 7.5\%) + (50L \times 9\%) / 125L = 8.10\%$

## Cost of Equity / Retained Earnings using Dividend Growth Model

$K_e = D_1/P_0 + G = 2(1.05) / 25 + 0.05 = 13.4\%$

Computation of overall weighted average after tax cost of additional finance

Particular	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity (including retained earnings)	3,75,00,000	3/4	13.4%	10.05
Debt	1,25,00,000	1/4	8.1%	2.025
WACC	5,00,00,000			<b>12.075</b>



# Questions

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**Q1. Which of the following cost of capital require to adjust tax?**

- a) Cost of Equity Shares,
- b) Cost of Preference Shares,
- c) Cost of Debentures,
- d) Cost of Retained Earnings.

**Q2. The following details are provided by the Pentamid Limited:**

Equity Share Capital - ₹ 50,00,000

12% Preference Share Capital - ₹ 15,00,000

15% Irredeemable Debentures - ₹ 35,00,000

The cost of equity capital for the company is 16% and Income Tax rate for the company is 30%.

You are required to calculate the Weighted Average Cost of Capital (WACC) of the company.



# Answers

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## A1. c) Cost of Debentures

A2.  $K_e$  given is 16 %                       $K_p = 12 %$                        $K_d = 15 (1-0.30) = 10.50%$

Weights are 50 : 15 : 35 i.e. total 100.

Thus, WACC is  $(16 \times 0.50) + (12 \times 0.15) + (10.50 \times 0.35) = 13.48 %$



# Questions

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**Q3. Which of the following is an implicit cost of increasing proportion of debt of a company**

- a) PE Ratio of the company would increase
- b) Tax shield in interest would be less
- c) Equity shareholders would demand more return
- d) Return on Assets may decrease

**Q4. Preference dividend per share is ₹ 18 and the share currently sells for ₹ 122 with a floatation costs of ₹ 4. The cost of Preferred Share would be**

- a) 18%
- b) 15.25%
- c) 14.75%
- d) 14%





# Question

ABC Limited has the following book value capital structure:

Equity Share Capital (1 crore shares @ Rs.10 each)	Rs.1,000 lakh
Reserves and Surplus	Rs.2,250 lakh
9% Preference Share Capital (5 lakh shares @ Rs.100 each)	Rs.500 lakh
8.5% Debentures (1.5 lakh debentures @ Rs.1,000 each)	Rs.1,500 lakh
12% Term Loans from Financial Institutions	Rs.500 lakh

- The debentures of ABC Limited are redeemable at par after five years and are quoting at Rs.985 per debenture.
- The current market price per equity share is Rs.60. The prevailing default-risk free interest rate on 10-year GOI Treasury Bonds is 5.5%. The average market risk premium is 7%. The beta of the company is 1.85
- The preference shares of the company are redeemable at 10% premium after 5 years is currently selling at Rs.102 per share.

The applicable income tax rate for the company is 35%.

## Required:

CALCULATE weighted average cost of capital of the company using market value weights.



# Answers

$$K_d = \frac{85(1-0.35) + (1000-985)/5}{(1000+985)/2} = 58.25 / 992.50 = 5.87\%$$

$$K \text{ (term loans similar to debt)} = 12(1 - 0.35) = 7.80\%$$

$$K_p = \frac{9 + (110 - 102)/5}{(110+102)/2} = 10.60 / 106 = 10\%$$

$$K_e \text{ (using CAPM)} = 5.50 + 1.85(7) = 18.45\%$$

Source	Mkt Value (Lakh)	Weight (%)	Cost of Capital	WACC
Equity (60 x 100)	6,000.00	70.70	18.45	13.04
Preference (102 x 5)	510.00	6.00	10.00	0.60
Debentures (985 x 1.5)	1477.50	17.41	5.87	1.02
Term Loans (same)	500.00	5.89	7.80	0.46
	<b>8,487.50</b>	<b>100.00</b>		<b>15.12</b>



# Question

Mogambo Limited wishes to raise additional finance of ₹ 10 lakhs for meeting its investment plans. It has ₹ 2,10,000 in the form of retained earnings available for investment purposes. Further details are as following:

- 1) Debt-Equity Mix : 30/70
- 2) Cost of Debt (before tax) : Up to ₹ 1,80,000 - 10% & beyond 1,80,000 – 16%
- 3) EPS : ₹ 4
- 4) Dividend Pay-out : 50%
- 5) Expected Growth in Dividend : 10%
- 6) Current Market Price per share : ₹ 44
- 7) Tax Rate : 50%

You are required:-

- a) To determine the pattern for raising additional finance
- b) To determine the post tax average cost of additional debt, cost of equity & cost of retained earnings
- c) To compute the overall weighted average after tax cost of additional finance



# Answer

## a) Pattern for raising additional finance

Total Investment is ₹ 10,00,000 and Debt-Equity Mix is 30:70 , hence Equity is ₹ 7,00,000 which includes RE of ₹ 2,10,000 , hence share capital worth ₹ 4,90,000. Debt will be ₹ 3,00,000 comprising of 10% Debt of ₹ 1,80,000 and 16% debt of ₹ 1,20,000

## b) Post tax **AVERAGE** Cost of additional debt

10% Debt after tax cost =  $10(1-0.50) = 5\%$  and 16% Debt after tax cost =  $16(1-0.50) = 8\%$

Thus, average cost of additional debt shall be weighted average of above two :  $(5 \times 0.60) + (8 \times 0.40) = 6.20\%$

### Cost of Equity (and also the Cost of RE) using Dividend Growth Model

$K_e = D_1/P_0 + G = 2.20 / 44 + 0.10 = 0.15$  or 15%

## c) Overall Weighted Average Cost of Capital

Weight for Equity & Debt is 70:30 , hence WACC =  $(15 \times 0.70) + (6.20 \times 0.30) = 12.36\%$



# Question

M/s. Navya Corporation has a capital structure of 40% debt and 60% equity. The company is presently considering several alternative investment proposals costing less than ₹ 20 lakhs. The corporation always raises the required funds without disturbing its present debt equity ratio.

The cost of raising the debt and equity are as under:

Project cost	Cost of debt	Cost of equity
Upto ₹ 2 lakhs	10%	12%
Above ₹ 2 lakhs & upto to ₹ 5 lakhs	11%	13%
Above ₹ 5 lakhs & upto ₹10 lakhs	12%	14%
Above ₹10 lakhs & upto ₹ 20 lakhs	13%	14.5%

Assuming the tax rate at 50%, CALCULATE:

- (i) Cost of capital of two projects X and Y whose fund requirements are ₹ 6.5 lakhs and ₹ 14 lakhs respectively.
- (ii) If a project is expected to give after tax return of 10%, DETERMINE under what conditions it would be acceptable?



# Answer

Project Cost (₹)	Kd (after tax)	Ke	WACC (D: E = 4:6)
0 – 2,00,000	$10 (1-0.50) = 5$	12	$(5.00 \times 0.40) + (12 \times 0.60) = 9.20 \%$
2,00,001 – 5,00,000	$11 (1-0.50) = 5.50$	13	$(5.50 \times 0.40) + (13 \times 0.60) = 10.00\%$
5,00,001 – 10,00,000	$12 (1-0.50) = 6.00$	14	$(6.00 \times 0.40) + (14 \times 0.60) = 10.80\%$
10,00,001 – 20,00,000	$13 (1-0.50) = 6.50$	14.50	$(6.50 \times 0.40) + (14.50 \times 0.60) = 11.30\%$

a) Project X of ₹ 6.50 Lakh – Cost of Capital = 10.80% (3<sup>rd</sup> range)

b) Project Y of ₹ 14 Lakh – Cost of Capital = 11.30% (4<sup>th</sup> range)

For a project with after tax return of 10%, it would be accepted if its cost is in either 1<sup>st</sup> or 2<sup>nd</sup> range i.e. its cost should be below ₹ 5 Lakh. In other words the after tax return should be more than or equal to WACC.



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**THANK YOU**