

13. As financial Analyst of a large electronic company you are required to determine the WACC

a) Book Value weights and b) Market value weights
The flg info. is available for your perusal. The company's present book value & capital structure:

Debt (₹100/deb)	8,00,000
Pref. share (₹100/sh)	2,00,000
Eq. share (₹10/sh)	10,00,000

All these securities are traded in the capital market. Recent prices are:

Debt (₹110/deb)

Pref. share (₹120/sh)

Eq. share (₹22/sh)

Anticipated external financial opportunities are:

- ₹100/deb redeemable at par, 10-year maturity, 13% coupon rate, 4% flotation cost, sales price ₹100
- ₹100 P.S. redeemable at par, 10-year maturity, 14% Dividend rate, 5% flotation cost, sales price ₹100
- E.S. ₹22/sh flotation cost, Sales price ₹22

In addition dividend expected at end of year ₹2/sh. The anticipated growth rate is 7%. The firm has practice of paying all its earning in form of dividend. Corporate tax rate is 35%.

⇒ Working Notes:

$$\text{Cost of debt } (K_d) = \frac{I(1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}} = \frac{1,04,000(1-0.35) + \frac{(8,00,000 - 7,68,000)}{10}}{\frac{(8,00,000 + 7,68,000)}{2}} = \frac{67,600 + 3,200}{7,84,000} = 0.0903 \text{ (or) } 9.03\%$$

$$\text{Cost of Redeemable P.S. } (K_p) = \frac{PD + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}} = \frac{28,000 + \frac{(2,00,000 - 1,90,000)}{10}}{\frac{(2,00,000 + 1,90,000)}{2}} = \frac{29,000}{1,95,000} = 0.1487 \text{ (or) } 14.87\%$$

$$\text{Cost of equity } (K_e) = \frac{D_1}{P_0} + g = \frac{2}{22} + 0.07 = 0.17 \text{ (or) } 17\%$$

a) Book value weights.

Sources	Amt (₹)	Cost(x)	w	xw
Debtenture	8,00,000	9.03	40	361
Prerf. share	2,00,000	14.87	10	149
Eq. share	10,00,000	17	50	850
Total	20,00,000			1360

$$WACC = \frac{1360}{100} = 13.6\%$$

b) Market value weights

Sources	Amt (₹)	Cost(x)	w	xw
Debtenture	8,80,000	9.03	26.5	239.3
Prerf. share	2,40,000	14.87	7.23	107.3
Eq. share	22,00,000	17	66.27	1126.6
Total	33,20,000			1473.2

$$WACC = \frac{1473.2}{100} = 14.73\%$$

14. The fig info. has been extracted from the balance sheet of Fashions Ltd as on 31/12/2000.

Rs in Lakhs.

Eq. share capital	400
12% debentures	400
18% term loan	1,200
	2,000

- a) Determine the WACC of the co. It had been paying dividends at a consistent rate of 20% pa
- b) What difference will it make if the current price of ₹100 share is ₹160?
- c) Determine the effect of income tax of the cost of capital under both premises (40%)

⇒ a) WACC of the company.

Sources	Amt (₹)	Cost(x)	w	xw
Eq. share capital	4,00,00,000	20%	20	400
12% deb	4,00,00,000	12%	20	240
18% Term loan	12,00,00,000	18%	60	1080
Total	20,00,00,000			1720

$$K_e = \frac{D_1}{P_0} = \frac{20}{100} = 0.2 \text{ (or)} 20\%$$

$$WACC = \frac{1720}{100} = 17.2\%$$

b) When current price of ₹100 share is ₹160, then WACC :-

Sources	Amt (₹)	Cost(x)	w	xw
Eq. share capital	4,00,00,000	12.5	20	250
12% Deb	4,00,00,000	12%	20	240
18% Term loan	12,00,00,000	18%	60	1080
Total	20,00,00,000			1570

$$K_e = \frac{D_1}{P_0} = \frac{20}{160} = 0.125 \text{ (or)} 12.5\%$$

$$WACC = \frac{1570}{100} = 15.7\%$$

e) Determination of WACC if tax rate is 40% in both the premises of above (a)

Sources	Amt (₹ lakhs)	cost(x)	w	xw	cost(x)	w	xw
E.S.C	400	20	20	400	12.5	20	250
Deb	400	7.2	20	144	7.2	20	144
Term loan	1200	10.8	60	648	10.8	60	648
Total	2,000			1192			1042

$$K_d = \frac{I}{NP} (1-t) = \frac{48}{400} (1-0.4) = 0.072 (0.6) = 4.32\%$$

$$K_d = \frac{I}{NP} (1-t) = \frac{216}{1200} (1-0.4) = 0.108 (0.6) = 6.48\%$$

$$WACC = \frac{1192}{100} = 11.92\%$$

$$= \frac{1042}{100} = 10.42\%$$

15. An electric equipment manufacturing co. wishes to determine WACC for evaluating capital budgeting projects. You have been supplied with the following info.

Balance sheet

Liabilities	Amt (₹)	Assets	Amt (₹)
Eq. sh. capital	12,00,000	Fixed Assets	25,00,000
Pref. sh. capital	4,50,000	Current Assets	15,00,000
Retained Earnings	4,50,000		
Debentures	9,00,000		
Current liabilities	10,00,000		
	40,00,000		40,00,000

Additional info:-

i) 20 years 14% Debt of ₹ 2,500 face value, redeemable @ 5% premium can be sold at par 2% flotation cost.

ii) 15% p.s., Sale price ₹ 100/sh, 2% flotation cost

iii) Eq. share, sale price ₹ 115/sh, flotation cost of ₹ 5/sh

The co. tax rate is 55% & expected growth in Eq. dividend is 8% per year. The expected dividend at the end of current FY is ₹ 11/sh. Assume that the co. is satisfied with its present capital structure & intends to maintain it.

=> Working Notes

$$\text{Cost of debt } (K_d) = \frac{I + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}} (1-t) = \frac{1,26,000 + \frac{(9,45,000 - 9,26,100)}{20}}{\frac{(9,45,000 + 9,26,100)}{2}} (1-0.55)$$

$$= \frac{1,26,000 + 945}{9,35,550} \times 0.45 = 0.06106 (0.6106\%)$$

6.1060

$$K_p = \frac{PD + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}} = \frac{67,500 + \frac{(4,50,000 - 4,41,000)}{20}}{\frac{4,50,000 + 4,41,000}{2}} = \frac{67,500 + 450}{4,45,500} = 0.1525 \text{ (or)} 15.25\%$$

$$K_e = \frac{D_1}{P_0} + g = \frac{11}{110} + 0.08 = 0.18 \text{ (or)} 18\%$$

(115-5)

Calculation of WACC

Sources	Amt (£)	Cost (X)	W	XW
Eq. share capital	12,00,000	18	40	720
Retained Earnings	4,50,000	18	15	270
Pref. sh. capital	4,50,000	15.25	15	228.75
Debentures	9,00,000	6.1060	30	183.18
Total	30,00,000			1401.93

$$WACC = \frac{1401.93}{100} = 14.0193\%$$

16. A fast growing foreign company wants to expand its total assets by 50% by the end of current year. Given below are company's capital structure, which it considers to be optimal. There are no short term debts.

8% Debentures 4,00,000 40%

9% Pref. shares 1,00,000 10%

Eq. shares 5,00,000 50%

- New debenture would be sold at 14% coupon rate & will be sold at par.
- Pref. shares will have a 15% rate will be sold at par.
- Eq. share currently selling at ₹100 can be sold to net the company ₹95. The shareholder's required rate of return is 17% consisting of a dividend yield of 10% and an expected growth rate of 7%.
- Retained Earnings per year are estimated to be ₹50,000. The corporate tax rate is 35%.

You are required to calculate the following values.

- Assuming all asset expansion is included in the capital budget, what is the required amount of capital budget?
- How much of capital budget must be financed by the external equity (i.e., issue of new Eq. sh) to maintain the optimal capital structure.
- Calculate the cost of i) new issue of E.S
ii) Retained Earnings.
- Calculate the WACC using marginal weights.

⇒ a) Calculation of required amount of Capital Budget

Total Assets	=	10,00,000
Add:- 50% of increase	=	5,00,000
Total capital	=	15,00,000
less:- Existing equity	=	10,00,000
Required amount	=	5,00,000

b) Calculation of amount of Budget by external equity.

$$= \frac{5,00,000}{10,00,000} \times 100 = 50\%$$

Based on the equity ratio = $5,00,000 \times 50\% = 2,50,000$

Total Eq. capital = 2,50,000

less:- Retained Earnings = $\frac{50,000}{2,00,000 \text{ (new E.S.)}}$

c) Calculation of. i) cost of equity (k_e) = $\frac{D_1}{P_0} + g = \frac{10}{95} + 0.07 = 17.53\%$

ii) Retained Earnings (k_{re}) = $\frac{D_1}{P} + g = \frac{10}{100} + 0.07 = 17\%$

d) Calculation of WACC

Sources	amt (₹)	cost (x)	w	xw	cost of debt (k_d)
14% Debentures	2,00,000	9.1	40	364	$= \frac{I}{NP} (1-t)$
15% pref. shares	50,000	15	10	150	$= \frac{88,000}{2,00,000} (1-0.35)$
Eq. share	2,00,000	17.53	40	701.2	
Retained Earnings	50,000	17	10	170	$= 9.1\%$
Total	5,00,000			1385.2	

$$WACC = \frac{1385.2}{100} = 13.85\%$$

Past year Questions

1. The following info. pertain to CMC Ltd.

Number of E.S.	20,00,000
BV of 10% convertible Deb.	₹1,00,00,000
BV of 12% Bank term loan	₹25,00,000
MP of E.S.	₹55
MR of 10% convertible Deb	₹108
FV of E.S.	₹10
FV of 10% convertible Deb	₹100
Beta coefficient of E.S.	1.5
Risk free rate of return	4.5%
Equity risk premium	9%
Rate of taxation	30%

The co. expects that the share price will rise in future at an avg. rate of 6% p.a. The 10% convertible deb of 100 each will be converted in 6 yrs time into E.S. of the co. in the ratio of 1:4 (4 E.S. for each deb.)

The market value of 12% bank term loan is at par.

You are required to calculate:-

- Cost of E.S. by applying CAPM approach.
- Cost of convertible deb by using approximation method.
- Cost of Bank term loan
- WACC using market value weights

⇒ i) Calculation of cost of E.S. by using CAPM approach.

Given, $R_f = 4.5\%$, $R_m - R_f = 9\%$, $\beta = 1.5$

CAPM Approach, $K_e = R_f + \beta(R_m - R_f)$

$$\begin{aligned}
 &= 4.5\% + 1.5(9\%) \\
 &= 4.5\% + 13.5\% \\
 &= 18\%
 \end{aligned}$$

ii) Calculation of cost of convertible Debenture

Price of share after 6 yrs = $55(1+0.06)^6$, $RV = ₹78.0185 \times 4 = ₹312.074$
 $NP = 108$, $n = 6$

$$K_d = \frac{\text{Int.}(1-t) + \left(\frac{RV - NP}{n}\right)}{\frac{(RV + NP)}{2}} = \frac{10(1-0.3) + \left(\frac{312.074 - 108}{6}\right)}{\frac{(312.074 + 108)}{2}}$$

$$= \frac{7 + 34.012}{210.037} = 19.53\%$$

iii) Calcⁿ of cost of Bank term loan iv) Calcⁿ of WACC

$$K_d = I(1-t)$$

$$= 12\%(1-0.3)$$

$$= 8.4\%$$

Sources	Am't (₹)	cost(x)	w	xw
Eq. S.C	11,00,00,000	18	89.21	1605.78
10% Deb	1,08,00,000	19.53	8.76	171.08
12% BTL	25,00,000	8.4	2.03	17.05
Total	12,33,00,000		100	1793.91

$$WACC = \frac{1793.91}{100} = 17.94\%$$

2. Capital structure of T Ltd as on 1st April 2024 is as under.

R.S.C (₹ 10/sh)	50,00,000
10% Debentures (₹ 100 per deb)	40,00,000
12% pref. sh. capital (10,000 sh. of ₹ 100 each).	10,00,000

Additional Info:-

- The risk free rate of return is 10%. The Beta of T Ltd is 1.75 & the return on market portfolio is 12%. The E.S have a current MP of ₹ 70/sh.
- The debentures are trading at a MP of ₹ 80/deb. The debentures are to be redeemed after 5 years at par.
- Pref. shares are redeemable after 5 years at a premium of 5% presently selling at ₹ 104/sh.
- The co. pays tax at a rate of 30%.
- The cost of debts are to be calculated on Yield to maturity approach.
- The PV factors at 10% & 14% are.

Year	1	2	3	4	5
PVIF _{0.10,t}	0.909	0.826	0.751	0.683	0.621
PVIF _{0.14,t}	0.877	0.769	0.675	0.592	0.519

You are required to calculate WACC (after tax) of T Ltd using market value weight.

⇒ Cal^m of cost of E.S using CAPM Approach

$$\begin{aligned}
 K_e &= R_f + \beta(R_m - R_f) \\
 &= 10\% + 1.75(12 - 10) \\
 &= 10\% + 3.5\% \\
 &= 13.5\%
 \end{aligned}$$

Cal^m of cost of redeemable deb using YTM Approach

Step 1:- Identification of relevant cashflows.

Year	Cashflows
0	Current MP (P ₀) = ₹ 80
1 to 5	Interest net of tax $[I(1-t)] = 10(1-0.3) = 7$
5	RV = Face value i.e., ₹ 100

Step 2:- Cal^m of NPVs at two discounted rates

Year	Cashflows (₹)	DF @ 10%	PV (₹)	DF @ 14%	PV (₹)
0	80	1.000	(80.000)	1.000	(80.000)
1 to 5	7	3.79	26.53	3.432	24.024
5	100	0.621	62.1	0.519	51.9
NPV			8.63		-4.076

step 3:- Calcⁿ of cost of deb (k_d)

$$\begin{aligned}
 k_d &= L + \frac{NPV_L}{NPV_L - NPV_H} (H - L) = 10\% + \frac{8.63}{8.63 - (4.076)} (14\% - 10\%) \\
 &= 10\% + \frac{8.63}{12.706} (4\%) \\
 &= 10\% + 0.68(4\%) \\
 &= 12.72\%
 \end{aligned}$$

Cost of Redeemable P.S

Using approximation method = $k_p = \frac{PD + \frac{(RV - NP)}{n}}{\frac{(RV + NP)}{2}} = \frac{12 + \frac{(105 - 104)}{5}}{\frac{(105 + 104)}{2}} = \frac{12 + 0.2}{104.5} = 11.67\%$

Calculation of WACC using market Value weight.

Sources	Am ^t (₹)	Cost(x)	w	xw	WACC = $\frac{1341.455}{100}$ = 13.41%
Eq. sh. capital.	3,50,00,000	13.5	89.19	1204.065	
10% Deb	32,00,000	12.72	8.37	106.47	
12% pref. sh. capital	10,40,000	11.67	2.65	30.925	
Total	3,92,40,000			1341.455	