CHAPTER 11

Solved Problems

P.11.21 Mr *X* an investor, purchases an equity share of a growing company, *Y* for Rs 210. He expects the company to pay dividends of Rs 10.5, Rs 11.025 and Rs 11.575 in years 1, 2 and 3, respectively. He expects to sell the shares at a price of Rs 243.10 at the end of 3 years.

(i) Determine the growth rate in dividend.
(ii) Calculate the current dividend yield
(iii) What is the required rate of return of Mr *X* on his equity investments?

Solution

(i) Growth rate in dividend = $D_1(1 + r)^n = D_n$, that is, Rs $10.50(1 + r)^2 = 11.575 = (1 + r)^2 = 11.575 \div 10.50$ = 1.1024 Table A-1 (compounded sum of Re 1) suggests that Re 1 compounds to Rs 1.102 in 2 years at the compound rate of 5 per cent. Therefore, growth rate in dividend is 5 per cent.

(ii) Current dividend yield (D_y) = Expected dividend/Current price = Rs 10.50/210 = 5 per cent

(iii) Required rate of return (K_e) = (D_1/P_0) + g, i.e., Rs 10.50/210 + 0.05 = 10 per cent

P.11.22

(i) If current earning are Rs 2.76 a share, while 10 years earlier, they were Rs 2, what has been the rate of growth in earnings?
(ii) If a company is paying currently a dividend of Rs 6 per share, whereas 5 years before it was paying Rs 5 per share, what has been the rate of growth in dividends?
(iii) A company which is not subject to growth expects to pay dividend of Rs 12 per share for ever. Calculate the value of a share, assuming 10 per cent as the appropriate discount rate for such a company.

Solution

Case	*Growth (in years)*	*Compound factor*	*Rate of growth*
(i)	10	1.38*	Rs 1.344[1]
(ii)	5	1.20**	1.217[2]

*Rs 2.76/2; **Rs 6/5

[1]Nearest factor, 3 per cent; [2] Nearest factor, 4 per cent

The exact rates of growth would be 3.27 per cent and 3.71 per cent in case (i) and (ii) respectively.

(iii) $P = CI_i$ = Dividend cash flows/Appropriate discount rate = Rs 12/0.10 = Rs 120

P.11.23 A company is contemplating an issue of new equity shares. The firm's equity shares are currently selling at Rs 125 a share. The historical pattern of dividend payments per share, for the last 5 years is given below:

Year	*Dividend*
1	Rs 10.70
2	11.45
3	12.25
4	13.11
5	14.03

The flotation costs are expected to be 3 per cent of the current selling price of the shares. You are required to determine the following:

(a) growth rate in dividends;
(b) cost of equity capital, assuming growth rate determined under situation (i) continues for ever;
(c) cost of new equity shares.

Solution

(a) Growth rate in dividends = $D_0(1 + r)^n = D_n$ = Rs $10.70(1 + r)^4$ = Rs 14.03

$(1 + r)^4$ =

Table A-1 (Sum of Re 1) suggests that Re 1 compounds to Rs 1.311 in 4 years at the compound rate of 7 per cent. Therefore, growth rate in dividends is 7 per cent.

(b) Cost of equity shares

(c) Cost of new equity shares

P.11.24 The following is the capital structure of Simons company Ltd. as on 31st March, current year

Equity share: 10,000 shares (of Rs 100 each)	Rs 10,00,000
12% Preference shares (of Rs 100 each)	4,00,000
10% Debentures	6,00,000
	20,00,000

The market price of the company's share is Rs 110 and it is expected that a dividend of Rs 10 per share would be declared at the end of the current year. The dividend growth rate is 6 per cent.

(i) If the company is in the 35 per cent tax bracket, compute the weighted average cost of capital.

(iii) Assuming that in order to finance an expansion plan, the company intends to borrow a fund of Rs 10 lakh bearing 12 per cent rate of interest, what will be the company's revised weighted average cost of capital? This financing decision is expected to increase dividend from Rs 10 to Rs 12 per share. However, the market price of equity share is expected to decline from Rs 110 to Rs 105 per share.

Solution

(i) Statement showing determination of weighted average cost of capital, K_0 (market value weights)

Source	*Amount* (1)	*After tax cost (%)* (2)	*Total cost [1 × 2]* (3)
Equity	Rs 11,00,000	15.09%[1]	Rs 1,65,990
12% Preference share	4,00,000	12.00	48,000
10% Debentures	6,00,000	6.50[2]	39,000
	21,00,000		2,52,990

K_0 = Rs 2,52,990/Rs 21,00,000 = 12.05 per cent

Satement showing determination of K_0 (book-value weights)

Source	*Amount* (1)	*After-tax cost (%)* (2)	*Total cost [1 × 2]* (3)
Equity	Rs 10,00,000	15.09	Rs 1,50,900
Preference shares	4,00,000	12.00	48,000
Debentures	6,00,000	6.50	39,000
	20,00,000		2,37,900

K_0 = Rs 2,37,900/Rs 20,00,000 = 11.89 per cent

Note: Conceptually, market value weights are preferred.

(ii) Statement showing revised K_0 (book value as well as market value weights)

Source	*Amount*		*After-tax cost (%)*	*Total cost*	
	Book value	*Market value*		*Book value*	*Market value*
Equity	Rs 10,00,000	10,50,000	17.43[3]	Rs 1,74,300	1,83,015
12% Preference shares	4,00,000	4,00,000	12.00	48,000	48,000
10% Debentures	6,00,000	6,00,000	6.50	39,000	39,000
12% Loan	10,00,000	10,00,000	7.80[4]	78,000	78,000
	30,00,000	30,50,000		3,39,300	3,48,015

K_0 (market value weights) = Rs 3,48,015/Rs 30,50,000 = 11.41 per cent

K_0 (book value weights) = Rs 3,39,300/Rs 30,00,000 = 11.31 per cent

1. K_e = (Rs 10/Rs 110) + 6% = 15.09 per cent
2. K_d = 10%(1 – 0.35) = 6.5 per cent
3. K_e (revised) = (Rs 12/Rs 105) + 6% = 17.43 per cent
4. Cost of loan = 12% (1 – 0.35) = 7.8 per cent

It is assumed that the market values and book values of preference shares and debentures are equal.

P.11.25 XYZ company has debentures outstanding with 5 years left before maturity. The debentures are currently selling for Rs 90 (the face value is Rs 100). The debentures are to be redeemed at 5 per cent premium. The interest is paid annually at a rate of interest of 12 per cent. The firm's tax rate is 35 per cent. Calculate k_d, using both methods.

Solution

(i) k_d

(ii)

The value of k_d is to be determined by trial and error.

Determination of PV at 11% and 12% rates of interest

Year	*Cash outflows after taxes*	*PV factor at*		*Total PV at*	
		11%	*12%*	*11%*	*12%*
1-5	Rs 7.8	3.696	3.605	Rs 28.83	Rs 28.12
5	105	0.593	0.567	62.27	59.54
				91.10	87.66

By interpolation, the value of k_d would be 11% + (Rs 1.10/Rs 3.44 = 0.32) = 11.32 per cent

P.11.26 An investor is contemplating the purchase of equity shares of a company which had paid a dividend of Rs 5 per share last year. The dividends are expected to grow at 6 per cent for ever. The required rate of return on the shares of this company in the capital market is 12 per cent. What will be the maximum price you will recommend the investor to pay for an equity share of the company? Will your answer be different if he wants to hold the equity share for 3 years and 6 years?

Solution

The maximum price we shall recommend the investor to pay for an equity share of the company is Rs 88.33.

The value of the share is not dependent upon the holding period. The value of the share would be the same whether he holds the share for 3 years or 6 years.

P.11.27 A large sized chemical company has been expected to grow at 14 per cent per year for the next 4 years and then to grow indefinitely at the same rate as that of the national economy, that is, 5 per cent. The required rate of return on the equity shares is 12 per cent. Assume that the company paid a dividend of Rs 2 per share last year. Determine the market price of the shares today.

Solution The value of equity share = the sum ofs*V* of dividend payments during years 1-4 and (ii) *PV* of expected market price at the end of year 4 based on growth rate of 5 per cent.

Year	$D_t = D_0 (1 + g)^t$	*PV factor at 12%*	*Total PV*
1	Rs $2(1 + 0.14)^1$ = 2.28	0.893	Rs 2.036
2	$2(1 + 0.14)^2$ = 2.60	0.797	2.072
3	$2(1 + 0.14)^3$ = 2.96	0.712	2.108
4	$2(1 + 0.14)^4$ = 3.38	0.636	2.150
			8.37

g_n = normal growth rate

PV of market price of the share at the end of year 4 = Rs 50.71 × *PV* factor at 12 per cent at the end of year 4 (0.636) = Rs 32.25.

$$P_0 = \text{Rs } 8.37 + \text{Rs } 32.25 = \text{Rs } 40.62$$

The market price of the share would be Rs 40.62.

P.11.28 A fast growing foreign company wants to expand its total assets by 50 per cent by the end of the current year. Given below are the company's capital structure which it considers to be optimal. There are no short-term debts.

New debentures would be sold at 11 per cent coupon rate and will be sold at par. Preference shares will have a 12 per cent rate and will also be sold at par. Equity shares currently selling at Rs 100 can be sold to net the company Rs 95. The shareholders' required rate of return is to be 17 per cent consisting of a dividend yield of 10 per cent and an expected growth rate of 7 per cent. Retained earnings for the year are estimated to be Rs 50,000 (ignore depreciation). The corporate tax is 35 per cent. You are required to calculate the following values:

(a) Assuming all asset expansion (gross expenditure for fixed assets plus related working capital) is included in the capital budget, what is the required amount of capital budget?

(b) How much of the capital budget must be financed by external equity (that is, issue of new equity shares) to maintain the optimal capital structure?

(c) Calculate the cost of (i) new issues of equity shares and (ii) retained earnings.
(d) Calculate the weighted average cost of capital using marginal weights.

Solution

(a)	(i) Desired level of asset at the end of year	Rs 15,00,000
	(ii) Present level of assets	10,00,000
Required amount of capital budget (a) – (b)		5,00,000

(b) The optimal capital structure of the company requires financing of capital budget in the following proportions: Debts, 40 per cent, preference shares, 10 per cent and equity funds, 50 per cent. In order to maintain the proportion of equity funds at the level of 50 per cent, Rs 2,50,000 (50 per cent of Rs 5,00,000 additional capital budget) should be financed by equity funds. Internal equity funds (retained earnings) of the company are estimated at Rs 50,000. Therefore, Rs 2,00,000 is required to be financed through external equity by issuing new shares.

(c) (i) Cost of new equity shares, = 17.5 per cent
(ii) Cost of retained earnings,

(d) Weighted average cost of capital using marginal weights:
(i) Cost of debt (k_d) = 11% (1 – 0.35) = 9.1 per cent

(ii) Cost of preference shares would be 12 per cent as they will be sold at par and no flotation costs are to be incurred.

Source of capital	*Amount (A)*	*Specific cost (k) (%)*	*Total costs [A (×) k]*
Debt	Rs 2,00,000	7.15	Rs 14,300
Preference shares	50,000	12	6,000
Equity	2,00,000	17.5	35,000
Retained earnings	50,000	17	8,500
	5,00,000		63,800

k_0 = Rs 63,800/5,00,000 = 12.76 per cent

Review Questions

11.20 A company is planning to raise Rs 20,00,000 additional long-term funds to finance its additional capital budget of the current year. The debentures of the company, to be sold on a 9 per cent net yield basis to the company, and equity shares to be sold at Rs 50 per share net to the company, are the two alternatives being considered by the company. The expected dividend at the end of the current year is Rs 5 per share. The expansion is expected to carry the company into a new higher risk class. The required rate of return expected from the point of view of the investment community is 16 per cent.
(a) Determine the growth rate of the company that the market is anticipating.
(b) Management is anticipating an 8 per cent growth rate. On this basis, at what price should the equity share be sold by the company?
(c) Assuming the management is anticipating a growth rate of only 4 per cent per year, what form of financing would you recommend?

11.21 Mr X, an investor, purchases an equity share of growing company, Y for Rs 210. He expects the company to pay dividends of Rs 10.5, Rs 11.025 and Rs 11.575 in years 1, 2 and 3 respectively, and he expects to sell the shares at a price of Rs 243.10 at the end of three years.
(a) Determine the growth rate in dividends.
(b) Calculate the current dividend yield.
(c) What is the required rate of return of Mr X on his equity investment?

11.22 A chemical company has been growing at a rate of 18 per cent per year in recent years. This abnormal growth rate is expected to continue for another 4 years. Then it is likely to grow at the normal rate (g_n) of 6 per cent. The required rate of return on the shares by the investment community is 12 per cent and the dividend paid per share last year was Rs 3. At what price would you, as an investor, be ready to buy the shares of this company now and at the end of years 1, 2, 3 and 4 respectively? Will there be any extra advantage in buying shares at t = 0 or in any of the subsequent four years, assuming all other things remain unchanged?

11.23 An electricity equipment manufacturing company wishes to determine the weighted average cost of capital for evaluating capital budgeting projects. You have been supplied with the following

pay Rs 3 per share as underwriting fee.

Market and book value for each type of capital are as follows:

	Book value	*Market value*
Long-term debt	Rs 18,00,000	Rs 19,30,000
Preference shares	4,50,000	5,20,000
Equity shares	60,00,000	
Retained earnings	5,00,000	100,00,000
	97,50,000	124,50,000

(a) Calculate the specific cost of each source of financing.
(b) Determine the weighted average cost of capital using (i) book value weights and (ii) market value weights.

Answers

11.20 (a) g = 6%, (b) Rs 63.62, (c) Rs 40.92, debt financing.
11.21 (a) 5%, (b) 5%, (c) 10%.
11.22 Less than Rs 79.36 (t = 0). The investor would be ready to buy the shares of the company at Rs 84.97, Rs 89.94, Rs 96.96, and Rs 102.76 at the end of years 1, 2, 3 and 4 respectively. No.
11.23 11.34% (k_0), 5.47% (k_d), 10.1% (k_p), 15% (k_e), 14.57% (k_r).
11.24 (i) 10.64%, (ii) (a) 11.2%, (b) 9.7%, (c) k_0 will decline
11.25 (a) k_d = 9.62%, k_p = 13.89%, k_e = 18.5%, k_r = 18.2% (b) (i) 16.6%, (ii) 16.88%.