COST OF CAPITAL

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COST OF CAPITAL

- The Cost of Capital to a company is the minimum rate of return that it must earn on its investment in order to satisfy the various categories of investors who have made investments in the form of share, debenture or term loan.
- The minimum rate of return required by a firm to maintain its market value.

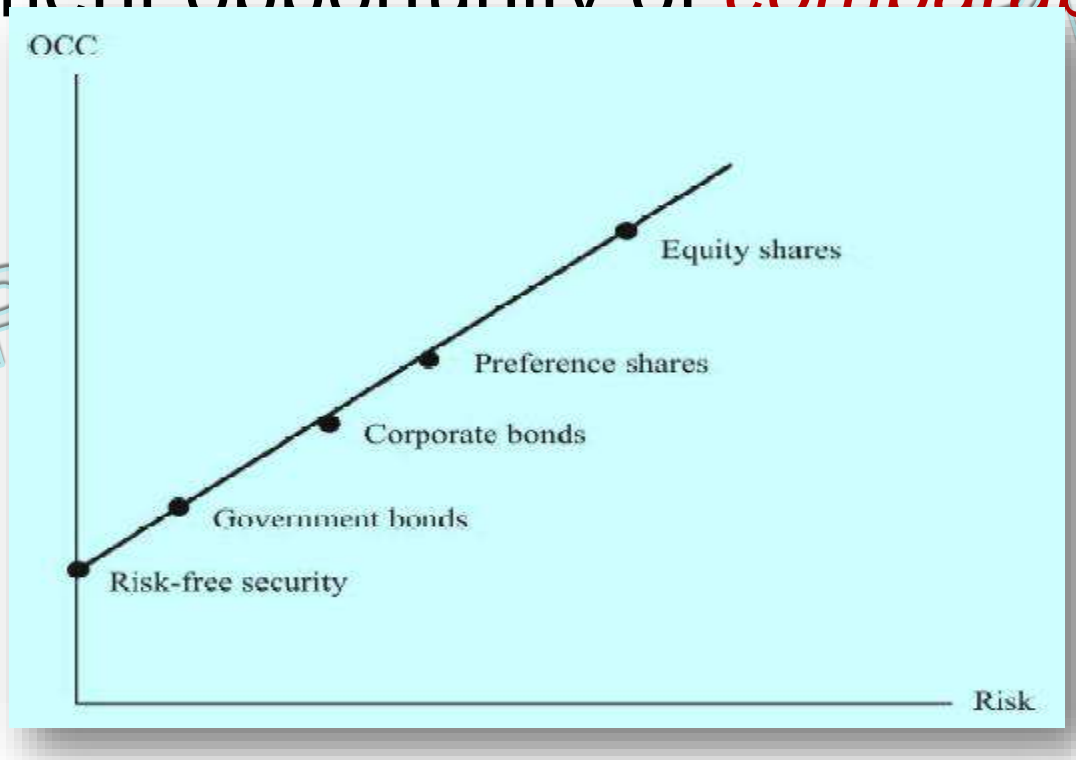
- For calculating the cost of Capital of the firm, we have to first define the cost of various sources of finance used by it.
- Sources of Finance : Debentures, Term loan, preference capital, equity capital, retained earnings.
- Capital: Money raised for use over a long duration.
- Cost of Capital: Average rate paid for the use of funds

SIGNIFICANCE OF THE COST OF CAPITAL

- Evaluating investment decisions
- Designing a firm's debt policy
- Appraising the financial performance of top management

THE CONCEPT OF THE OPPORTUNITY COST OF CAPITAL

- The opportunity cost is the rate of return foregone on the next best alternative investment opportunity of *comparable risk*.



Risk-return relationships of various securities

General Formula for the Opportunity Cost of Capital

- Opportunity cost of capital is given by the following formula:

$$I_0 = \frac{C_1}{(1+k)} + \frac{C_2}{(1+k)^2} + \cdots + \frac{C_n}{(1+k)^n}$$

- where *Io* is the capital supplied by investors in period *0* (it represents a net cash inflow to the firm), C_t are returns expected by investors (they represent cash outflows to the firm) and *k* is the required rate of return or the cost of capital.
- The opportunity cost of retained earnings is the rate of return, which the ordinary shareholders would have earned on these funds if they had been distributed as dividends to them

COST OF DEBT

- **Debt Issued at Par**

$$k_d = i = \frac{INT}{B_0}$$

- **Debt Issued at Discount or Premium**

$$B_0 = \sum_{t=1}^{n} \frac{INT_t}{(1+k_d)^t} + \frac{B_n}{(1+k_d)^n}$$

- **Tax adjustment**

$$\text{After} - \text{tax cost of debt} = k_d(1-T)$$

EXAMPLE

A 7 year, Rs 100 debenture of a firm can be sold for a net price of Rs 97.75. The rate of interest is 15 per cent per year, and bond will be redeemed at 5 per cent premium on maturity. The firm's tax rate is 35 per cent. Compute the after-tax cost of debenture.

The annual interest will be: $F \times i$ = Rs 100 × 0.15 = Rs 15, and maturity price will be: Rs 100 (1,05) = Rs 105.

Now,

$$97.75 = \sum_{t=1}^{n} \frac{15}{(1+k_d)} \quad \frac{105}{(1+k_d)^7}$$

By trial and error, we find:

$k_d = 16\%: \;\; 15(4.038) + 105(0.354) = 97.75$

The after-tax cost of debenture will be:

$k_d(1-T) = 0.16(1-0.35) = 0.104$ or 10.4%

COST OF DEBENTURES

- Cost of Debentures: The rate which equates the net amount realized to the expected cash outflows (i.e. interest and principal repayments).

$$P = \sum_{t=1}^{n} \frac{I(1-t)}{(1+k_d)^t} + \frac{F}{(1+k_d)^n}$$

where,

k_d is the post-tax cost of debenture capital.

I is the annual interest payment

t is the corporate tax rate

F is the redemption price debenture

P is the net amount realized per debenture

and n is the maturity period.

- **Approximate value of cost of debenture capital**

$$= k_d = \frac{I(1-t) + \frac{F-P}{n}}{\frac{F+P}{2}}$$

Example: A debenture having face value of Rs. 100 is sold below par at Rs. 94. it carries an interest rate of 11% and has a maturity period of 6 years. It is redeemable at par, what is the cost of debt, if the corporate tax rate is 45%?

Solution: $k_d = \frac{11(1-0.45) + \frac{100-94}{6}}{\frac{100+94}{2}}$

=0.0727 i.e. 7.27%.

COST OF TERM LOANS

- Cost of term loans = I (1-t)

where I is the interest rate payable on the term loan

t is the corporate tax rate

Example:

X Ltd has borrowed a term loan of worth Rs. 15,00,000 @ 9%. The corporate tax rate is 40%. What is the cost of the term loan?

Solution:

Cost of term-loan = I(1-t) = 0.09 x (1-0.40)

= 0.054 = 5.4%.

COST OF PREFERENCE CAPITAL

- It is computed as:

$$P = \sum_{t=1}^{n} \frac{D}{(1+k_p)^t} + \frac{F}{(1+k_p)^n}$$

where,

k_p is the cost of preference capital.

D is the preference dividend per share

F is the redemption price

P is the net amount realized per share.

and n is the maturity period.

Approximate Value of Cost of Preference Capital

$$= k_p = \frac{D + \frac{F - P}{n}}{\frac{F + P}{2}}$$

Example: A company has issued 8% preference shares. The face value per share is Rs. 100 but the issue price is Rs. 95. If the maturity period is 5 years and the preference share is redeemable at premium of 5%, what is the cost of preference shares?

Solution: $k_p = \frac{8 + \frac{105 - 95}{5}}{\frac{105 + 95}{2}}$ = 0.10 i.e. 10%.

COST OF EQUITY CAPITAL

- **Is Equity Capital Free of Cost? No, it has an opportunity cost.**
- **Cost of Internal Equity: The Dividend-Growth Model**
  - ***Normal growth*** $P_0 = \frac{DIV_1}{(k_e - g)}$
  - ***Supernormal growth*** $P_0 = \sum_{t=1}^{n} \frac{DIV_0(1+g_s)^t}{(1+k_e)^t} + \frac{DIV_{n+1}}{k_e - g_n} \times \frac{1}{(1+k_e)^n}$
  - ***Zero-growth*** $k_e = \frac{DIV_1}{P_0} = \frac{EPS_1}{P_0} \quad (\text{since } g = 0)$

COST OF EQUITY CAPITAL

- **Cost of External Equity: The Dividend Growth Model**

$$k_e = \frac{DIV_1}{P_0} + g$$

- **Earnings–Price Ratio and the Cost of Equity**

$$k_e = \frac{EPS_1(1-b)}{P_0} + br \qquad (g = br)$$

$$= \frac{EPS_1}{P_0} \qquad (b = 0)$$

Methods For Computing Cost of Equity Capital

1. Dividend Capitalization Approach
2. Realized Yield Approach
3. Capital Asset Pricing Model (CAPM)
4. Bond-Yield Plus Risk Premium Approach
5. Earnings-Price Ratio Approach

COST OF EQUITYCAPITAL

DIVIDEND CAPITALIZATION APPROACH

- Cost of equity capital is the discount rate that equates the current market price of the stock to the stream of dividends receivable by the shareholder.

$$P_e = \sum_{t=1}^{n} \frac{D_t}{(1+k_e)^t}$$

where,

P_e is the price per equity share

D_t is the expected dividend per share

k_e is the rate of return required by the equity shareholders

- **Example:** The price per share for Alpha Ltd. is Rs. 115 and the expected dividend is Rs. 8. What is the equity capitalization rate if the growth rate of the firm is 6%?
- **Solution:**

$$= \quad k_e = \frac{D_1}{P_0} + g$$

$$= \quad \frac{8}{115} + 0.06 \qquad = \ 0.1295 \text{ i.e. } 12.95\%$$

COST OF EQUITYCAPITAL

REALISED YIELD APPROACH

- The realized return over a period of n-years is computed as:

$$\left(w_1 \times w_2 \times \ldots\ldots\ldots\ldots \times w_n\right)^{1/n} - 1$$

where,

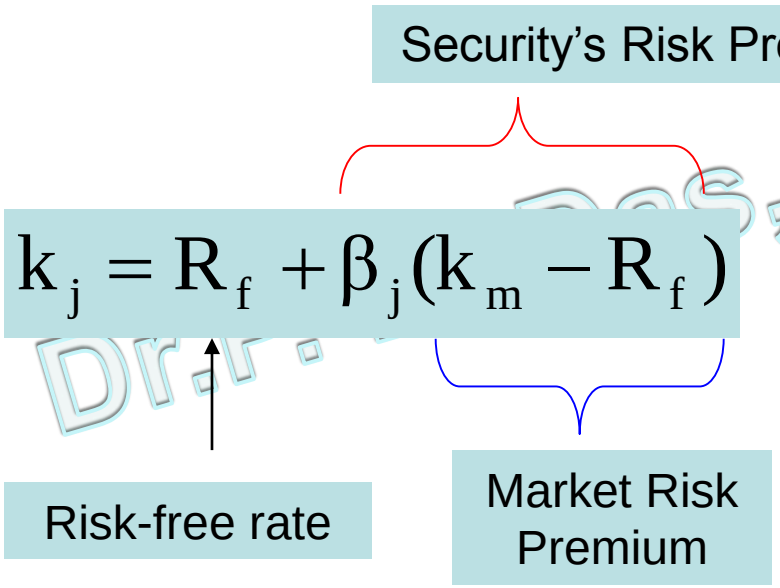
w_t is the wealth ratio and is equal to $\frac{D_t + P_t}{P_{t-1}}$

D_t is the dividend share for the year t, payable at the end of year.

P_t is the price per share at the end of year t.

CAPITAL ASSET PRICING MODEL

- Establishes linear relationship between return on security and systematic risk
- It is mathematically expressed as:



BOND-YIELD PLUS RISK PREMIUM APPROACH

- Return on equity = Yield on the long-term bonds of the company + Risk premium for bearing the higher risk involved in equity.

EARNINGS PRICE RATIO APPROACH

- Cost of Equity = $\frac{E_1 (\text{Expected EPS for the next year})}{P (\text{Market price of the share})}$

Where,

E_1 = Current EPS (1+growth rate)

COST OF EXTERNAL EQUITY

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ost of external equity = $$k'_e = \frac{D_1}{P_0(1-f)} + g$$

where,

D_1 expected at the end of the first year

f is the floatation costs expressed as a percentage of the current market price

g is the constant growth rate applicable to dividends.

P_0 is the current market price.

Example: RK Ltd. has growth rate of 5%. It current share price is Rs. 120 and the expected dividend is Rs. 10. If the floatation costs involved in raising additional equity are 3%, what is the cost of external equity?

Solution:

- Cost of external equity, $k'_e = \frac{D_1}{P_0(1-f)} + g$

$= \frac{10}{120(1-0.03)} + 0.05 = 13.59\%$

WEIGHTED AVERAGE COST OF CAPITAL

- Weighted average cost of capital = Product of the costs of various sources of finance and their proportions in the capital structure

$$\text{Weighted average cost of capital} = \sum_i w_i k_i$$

where,

w_i is the proportion of a source of finance in the capital structure

k_i is the cost of a source of finance

$$k_o = k_d(1-T)w_d + k_d w_e$$

$$k_o = k_d(1-T)\frac{D}{D+E} + k_e \frac{E}{D+E}$$

Example: Dunlop Technologies Ltd. has the following capital structure in terms of book values and market values:

Source	Book Value (Rs.)	Market Value (Rs.)
Paid-up equity Capital	20,00,000	40,00,000
Reserves and Surplus	30,00,000	-
Preference capital	10,00,000	12,00,000
Debentures	40,00,000	42,00,000

The cost of various sources of finance used by the firm is as follows:

Sources	Cost of Capital
Equity	12.5%
Debentures	11.4%
Preference capital	7.64%

Solution:

(a) WACC using market value weights

Source	Proportion
Equity (W_e) = $\frac{40,00,000}{94,00,000}$	0.4255
Preference Capital (W_p)= $\frac{12,00,000}{94,00,000}$	0.1277
Debenture Capital (W_d = $\frac{42,00,000}{94,00,000}$	0.4468

Weighted average cost of capital using market value weights

$= w_e k_e + w_p k_p + w_d k_d$

= (0.4255) 12.50 + (0.1277) 11.40 + (0.4468) 7.64

= 10.19%.

Solution: (a) WACC using book value weights

Source	Proportion
Equity (w_e) = $\frac{20,00,000}{100,00,000}$	0.20
Retained Earnings (w_r) = $\frac{30,00,000}{100,00,000}$	0.30
Preference Capital (w_p)= $\frac{10,00,000}{100,00,000}$	0.10
Debenture Capital (w_d) = $\frac{40,00,000}{100,00,000}$	0.40

Weighted average cost of capital using market value weights

$= w_e k_e + w_p k_p + w_r k_r + w_d k_d$

$= (0.20)\ 12.5 + (0.30)\ 12.5 + (0.10)\ 11.40 + (0.40)\ 7.64$

$= 10.45\%$

WEIGHTED MARGINAL COST OF CAPITAL SCHEDULE

- A schedule showing the relationship between additional financing and the weighted average cost of capital.
- **Steps involved**:

1. Estimate the cost of each source of financing for various level of its use.
2. Identify the breaking points (Level at which the cost of the new components would change)
3. Compute the WACC for various ranges of total financing between the breaking points.
4. Prepare the weighted marginal cost of capital schedule indicating the WACC for each level of total new financing.

END OF SESSION

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