

THE COST OF CAPITAL

INTRODUCTION

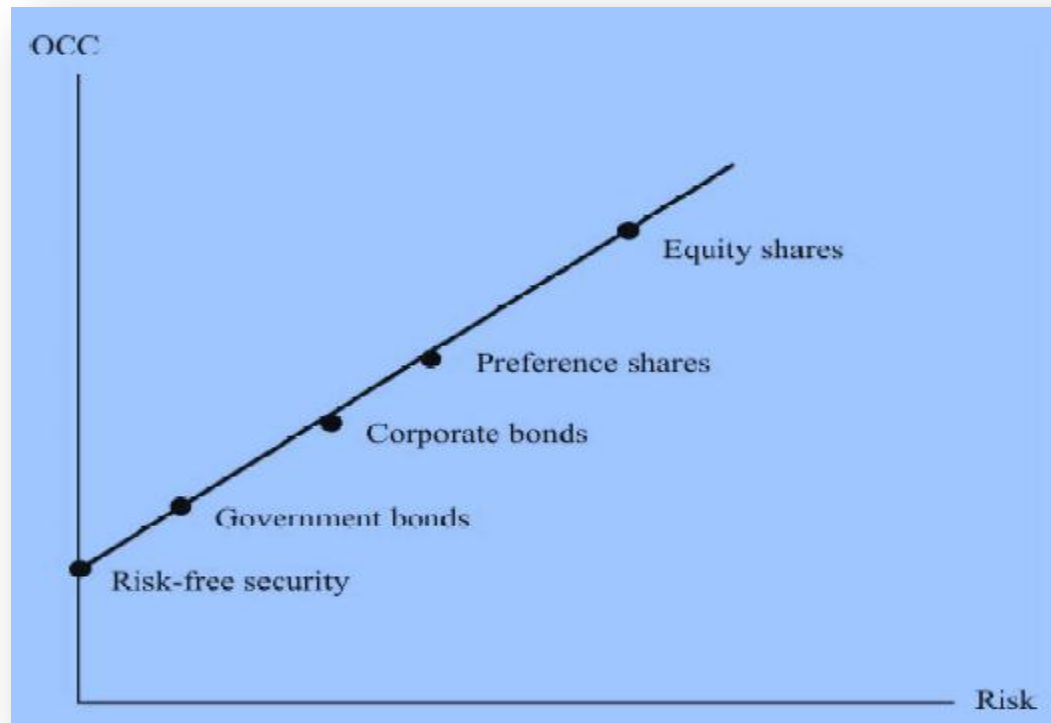
- The **project's cost of capital** is the minimum required rate of return on funds committed to the project, which depends on the riskiness of its cash flows.
- **The firm's cost of capital** will be the overall, or average, required rate of return on the aggregate of investment projects

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

Shareholders' Opportunities and Values

- The required rate of return (or the opportunity cost of capital) is shareholders is market-determined.
- In an all-equity financed firm, the equity capital of ordinary shareholders is the only source to finance investment projects, the firm's cost of capital is equal to the opportunity cost of equity capital, which will depend only on the business risk of the firm.

Creditors' Claims and Opportunities

- Creditors have a priority claim over the firm's assets and cash flows.
- The firm is under a legal obligation to pay interest and repay principal.
- There is a probability that it may default on its obligation to pay interest and principal.
- Corporate bonds are riskier than government bonds since it is very unlikely that the government will default in its obligation to pay interest and principal.

General Formula for the Opportunity Cost of Capital

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

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

- where I_0 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 Capital

- Viewed from all investors' point of view, the firm's cost of capital is the rate of return required by them for supplying capital for financing the firm's investment projects by purchasing various securities.
- The rate of return required by all investors will be an *overall rate of return — a weighted rate of return*.

Weighted Average Cost of Capital vs. Specific Costs of Capital

- The cost of capital of each source of capital is known as **component**, or **specific, cost of capital**.
- The overall cost is also called the **weighted average cost of capital (WACC)**.
- Relevant cost in the investment decisions is the **future cost** or the **marginal cost**.
- Marginal cost is the new or the incremental cost that the firm incurs if it were to raise capital now, or in the near future.
- The **historical cost** that was incurred in the past in raising capital is not relevant in financial decision-making.

DETERMINING COMPONENT COSTS OF CAPITAL

- Generally, the component cost of a specific source of capital is equal to the investors' required rate of return, and it can be determined by using

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

- But the investors' required rate of return should be adjusted for taxes in practice for calculating the cost of a specific source of capital to the firm.

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**

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

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: $F \times i = \text{Rs } 100 \times 0.15 = \text{Rs } 15$, and maturity price will be: $\text{Rs } 100 (1.05) = \text{Rs } 105$.

Now,

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

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:

$$k_d(1-T) = 0.16(1-0.35) = 0.104 \quad \text{or} \quad 10.4\%$$

Cost of the Existing Debt

- Sometimes a firm may like to compute the “current” cost of its existing debt.
- In such a case, the cost of debt should be approximated by the current market yield of the debt.

COST OF PREFERENCE CAPITAL

- **Irredeemable Preference Share**

$$k_p = \frac{\text{PDIV}}{P_0}$$

- **Redeemable Preference Share**

$$P_0 = \sum_{t=1}^n \frac{\text{PDIV}_t}{(1+k_p)^t} + \frac{P_n}{(1+k_p)^n}$$

Example

A company issues 10 per cent irredeemable preference shares. The face value per share is Rs 100, but the issue price is Rs 95. What is the cost of a preference share? What is the cost if the issue price is Rs 105?

We can compute cost of a preference share as follows:

Issue price Rs 95:

$$k_p = \frac{\text{PDIV}}{P_0} = \frac{10}{95} = 0.1053 \text{ or } 10.53\%$$

Issue price Rs 105:

$$k_p = \frac{\text{PDIV}}{P_0} = \frac{10}{105} = 0.0952 \text{ or } 9.52\%$$

COST OF EQUITY CAPITAL

- Is Equity Capital Free of Cost? No, it has an opportunity cost.
- Cost of Internal Equity: The Dividend-Growth Model

$$P_0 = \frac{DIV_1}{(k_e - g)}$$

– *Normal growth*

$$P_0 = \sum_{t=1}^n \frac{DIV_0(1+g_s)^t}{(1+k_e)^t} + \frac{DIV_{n+1}}{k_e - g_n} \times \frac{1}{(1+k_e)^n}$$

– *Supernormal growth*

– *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**

$$k_e = \frac{\text{DIV}_1}{P_0} + g$$

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

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

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

Example

The share of a company is currently selling for Rs 100. It wants to finance its capital expenditures of Rs 100 million either by retaining earnings or selling new shares. If the company sells new shares, the issue price will be Rs 95. The dividend per share next year, DIV_1 , is Rs 4.75 and it is expected to grow at 6 per cent. Calculate (i) the cost of internal equity (retained earnings) and (ii) the cost of external equity (new issue of shares).

$$k_e = \frac{\text{Rs } 4.75}{\text{Rs } 100} + 0.06 = 0.0475 + 0.06 = 0.1075 \text{ or } 10.75\%$$

The cost of external equity can be calculated as follow:

$$k_e = \frac{\text{Rs } 4.75}{\text{Rs } 95} + 0.06 = 0.05 + 0.06 = 0.11 \text{ or } 11\%$$

Example: EPS

- A firm is currently earning Rs 100,000 and its share is selling at a market price of Rs 80. The firm has 10,000 shares outstanding and has no debt. The earnings of the firm are expected to remain stable, and it has a payout ratio of 100 per cent. What is the cost of equity?
- We can use expected earnings-price ratio to compute the cost of equity. Thus:

$$k_e = \frac{\text{Rs } 10}{\text{Rs } 80} = 0.125 \text{ or } 12.5\%$$

THE CAPITAL ASSET PRICING MODEL (CAPM)

- As per the CAPM, the required rate of return on equity is given by the following relationship:

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

- Equation requires the following three parameters to estimate a firm's cost of equity:
 - The risk-free rate (R_f)
 - The market risk premium ($R_m - R_f$)
 - The beta of the firm's share (β)

Example

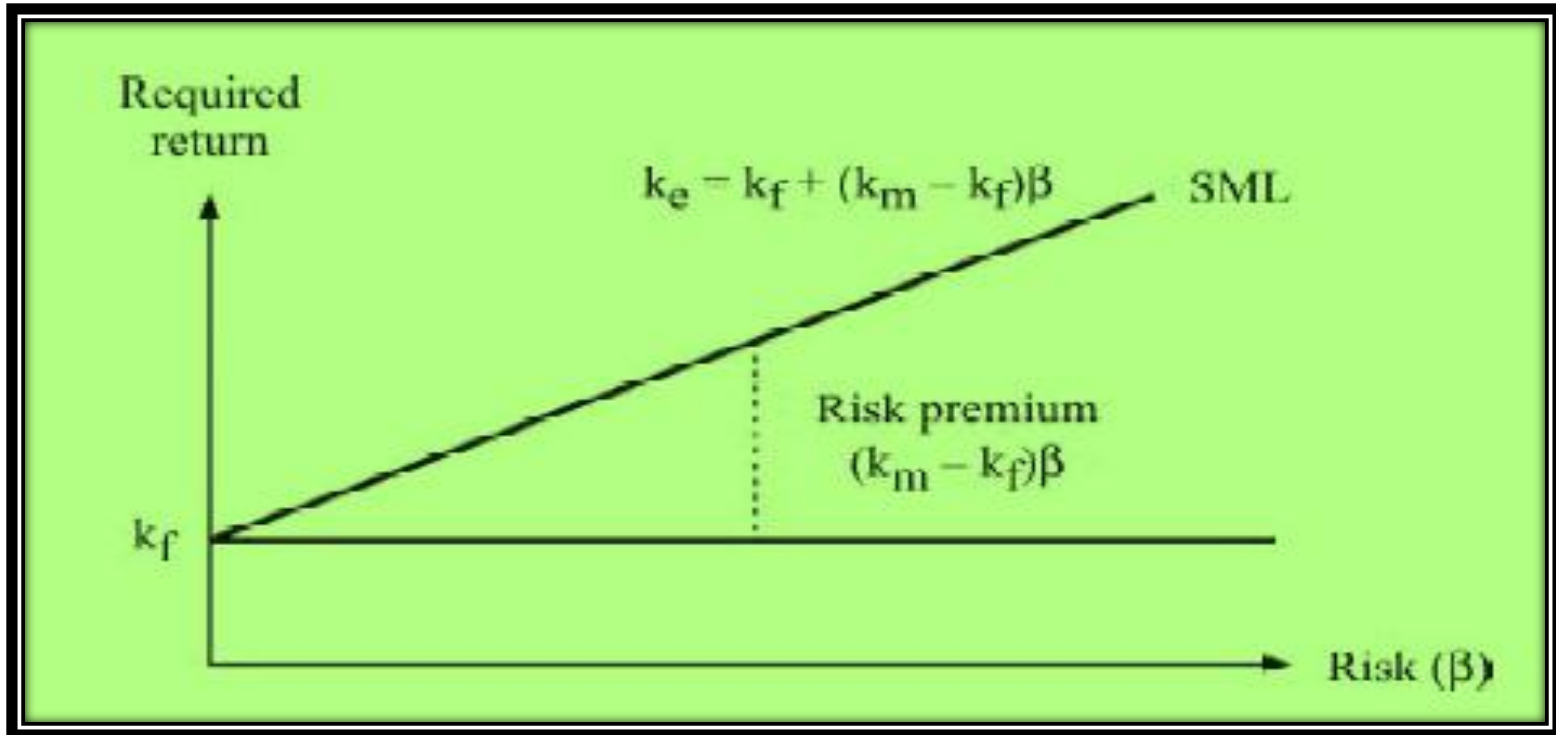
- Suppose in the year 2002 the risk-free rate is 6 per cent, the market risk premium is 9 per cent and beta of L&T's share is 1.54. The cost of equity for L&T is:

$$k_{L\&T} = 0.06 + 0.09 \times 1.54 = 0.1986 \approx 20\%$$

COST OF EQUITY: CAPM VS. DIVIDEND-GROWTH MODEL

- The dividend-growth approach has limited application in practice
 - It assumes that the dividend per share will grow at a constant rate, g , forever.
 - The expected dividend growth rate, g , should be less than the cost of equity, k_e , to arrive at the simple growth formula.
 - The dividend-growth approach also fails to deal with risk directly.

Cost of equity under CAPM



COST OF EQUITY: CAPM VS. DIVIDEND–GROWTH MODEL

- **CAPM has a wider application although it is based on restrictive assumptions.**
 - The only condition for its use is that the company's share is quoted on the stock exchange.
 - All variables in the CAPM are market determined and except the company specific share price data, they are common to all companies.
 - The value of beta is determined in an objective manner by using sound statistical methods. One practical problem with the use of beta, however, is that it does not probably remain stable over time .

THE WEIGHTED AVERAGE COST OF CAPITAL

- The following steps are involved for calculating the firm's WACC:
 - Calculate the cost of specific sources of funds
 - Multiply the cost of each source by its proportion in the capital structure.
 - Add the weighted component costs to get the WACC.

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

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

- WACC is in fact the weighted marginal cost of capital (WMCC); that is, the *weighted average cost of new capital given the firm's target capital structure*.

Book Value Versus Market Value Weights

- **Managers prefer the book value weights for calculating WACC**
 - Firms in practice set their target capital structure in terms of book values.
 - The book value information can be easily derived from the published sources.
 - The book value debt-equity ratios are analysed by investors to evaluate the risk of the firms in practice.

Book Value Versus Market Value Weights

- **The use of the book-value weights can be seriously questioned on theoretical grounds;**
 - First, the component costs are opportunity rates and are determined in the capital markets. The weights should also be market-determined.
 - Second, the book-value weights are based on arbitrary accounting policies that are used to calculate retained earnings and value of assets. Thus, they do not reflect economic values

Book Value Versus Market Value Weights

- **Market-value weights are theoretically superior to book-value weights:**
 - They reflect economic values and are not influenced by accounting policies.
 - They are also consistent with the market-determined component costs.
- **The difficulty in using market-value weights:**
 - The market prices of securities fluctuate widely and frequently.
 - A market value based target capital structure means that the amounts of debt and equity are continuously adjusted as the value of the firm changes.