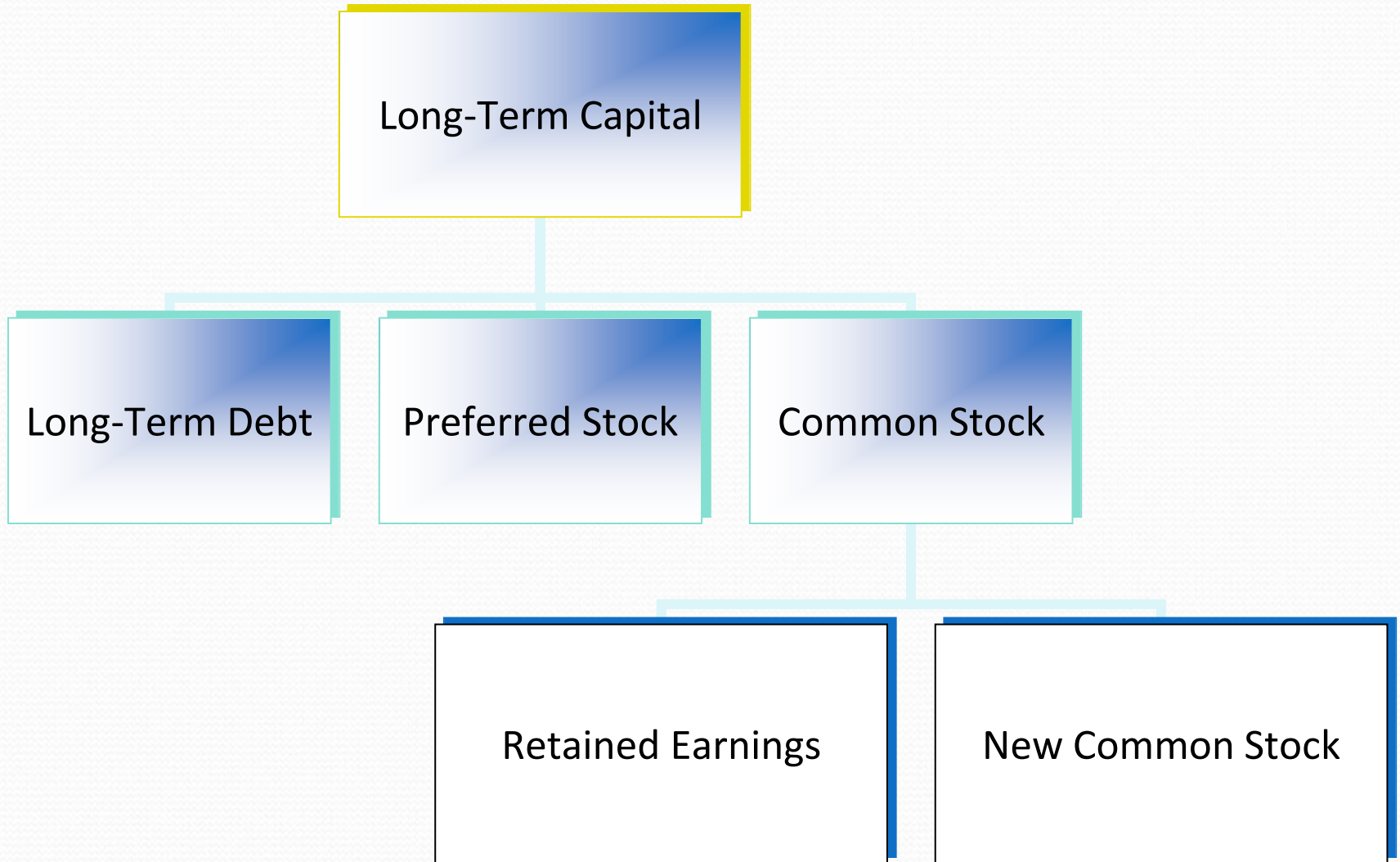



COST OF CAPITAL

Sanjukta Mohanty

What sources of long-term capital do firms use?



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- The return to an investor is the same as the cost to the company
 - The **cost of capital** is a term used in the field of financial investment to refer to the **cost of a company's funds** (both debt and equity),
 - from an investor's point of view "the shareholder's required return on a portfolio of all the company's existing securities".

- When we say a firm has a “cost of capital” of, for example, 12%, we are saying:
 - The firm can only have a positive NPV on a project if return exceeds 12%
 - The firm must earn 12% just to compensate investors for the use of their capital in a project
 - The use of capital in a project must earn 12% or more, not that it will necessarily cost 12% to borrow funds for the project
 - Any investment which does not cover the firm’s cost of funds will reduce shareholder wealth.

Opportunity Cost of Capital

- Opportunity cost is equal to the return on a foregone investment opportunity
- It is the rate of return foregone on the next best alternative investment opportunity of comparable risk.
- The required rate of return on an investment project is an opportunity cost.
- For example you may invest your saving of Rs 1000 either in 7% , 3 year postal certificate or in 6.5%, 3 year fixed deposit in a nationalized bank.
- Your decision to invest in saving bank has foregone the opportunity to invest in postal certificate. So 7% is your opportunity cost.

CONCEPT OF AVERAGE COST OF CAPITAL (WEIGHTED AVERAGE COST OF CAPITAL)

- A company's cost of capital is the weighted average cost of various sources of finance used by it, Viz., equity, preference & debt.
- A firm's overall cost of capital must reflect the required return on the firm's assets as a whole.
- If a firm uses both debt and equity financing, the cost of capital must include the cost of each, weighted to proportion of each (debt and equity) in the firm's capital structure is called the Weighted Average Cost of Capital (WACC)
- The WACC is calculated taking into account the relative weights of each component of the capital structure.
- Capital Structure = Debt + Equity
- **WACC = Weight of Debt X cost of Debt + Weight of Equity X Cost of equity.**

- Example- A company has a total capital base of Rs.500 lakh in the ratio of 1:1 of debt-equity i.e., divided equally between debt and equity; Rs.250 lakh of debt and Rs.250 lakh of equity. If the post-tax costs of debt and equity are 7% and 18% respectively, the cost of capital to the company will be equal to the weighted average cost i.e.,

- WACC = $\frac{250}{500} \times 7\% + \frac{250}{500} \times 18\%$

- = 12.5%.

COST OF DEBT & PREFERENCE

- Since debt & preference stock entail more or less fixed payments, estimating the cost of debt & preference is relatively easy.
- Conceptually, the cost of a debt instrument is the **yield to maturity** of that instrument.
- The cost of a debenture is the value of R_d or K_d in the following equation.

- Here the cost of debt is computed as an after tax cost to make it comparable with the cost of equity (earnings are after-tax as well).
- Thus, debt is discounted by the tax rate.
- After-tax cost of debt = $K_d (1-t)$
- = 15% (1-0.5) = .15 X .5

BEFORE TAX COST OF DEBT

ISSUED AT PAR AND REDEEMED AT PAR

- It is equal to the contractual (or coupon) rate of interest.
- $K_d = I = \frac{INT}{B_0}$
- Where,
- B_0 - market price/Issue price
- INT - Amount of Interest
- I – Coupon rate of Interest
- A company decide to sell a new issue of 7 year 15% bond of Rs 100 each at par. What is the before tax cost of debt?
- $K_d = Rs\ 15 / Rs\ 100 = 0.15$ or 15 %

BEFORE TAX COST OF DEBT

ISSUED AT DISCOUNT OR PREMIUM

$$P_0 = \sum_{t=1}^n \frac{I}{(1+k)^t} + \frac{F}{(1+k)^n}$$

where P_0 is the Market Price/ Issue Price

I is the annual coupon payment

k or YTM or K_d or R_d is the required rate of return

F is the maturity value of the debenture.

n is the maturity period of the bond.

AFTER-TAX COST OF DEBT = $KD(1 - T)$

Ex:

A company issues 7 year 15% bond of Rs 100 each at par. Each bond is sold bellow par for Rs 94. What is the before tax cost of debt?

COMPUTATION OF RD REQUIRES A TRIAL -&-ERROR PROCEDURE

If discount and premium is adjusted for computing taxes, the following shot cut method can also be used to calculate before- tax cost of debt.

$$\begin{aligned} K_d &= \{15 + 1/7(100 - 94)\} / \frac{1}{2} (100 + 94) \\ &= 15.86 / 97 = 0.164 = 16.4 \% \end{aligned}$$

$$K_d = \frac{INT + 1/n(F - B_0)}{\frac{1}{2}(F + B_0)}$$

$$\text{YTM} = \frac{I + (F - P)/n}{0.4 F + 0.6 P}$$

Where

I = Coupon interest in Rs.

F = Maturity value

P = Market Price

N= years to maturity

Cost of Preference Share

- The cost of preference capital is a function of the dividend expected by investors.
 - **Irredeemable Preference Share**
 - The preference share is treated as perpetual security if it is irredeemable.
 - Cost of Irredeemable Preference capital is
-
- $K_p = \frac{DIV}{P_o}$
 - P_o - Issue price of preference share

- Issues 10% irredeemable preference share
- Face Value per share = Rs 100
- Issue Price = Rs 95
- Issue Price = Rs 105
- Dividend Rate = 10%


- $K_p = 10 / 95 = 0.1053 = 10.53\%$
- $K_p = 10 / 105 = 9.52\%$

Redeemable Preference Share

Cost of Capital of Redeemable Preference Share:

If the preference shares are redeemable at the end of a specific period, then the cost of capital of preference shares can be calculated by Equation

$$P_0 = \sum_{i=1}^n \frac{PD_i}{(1+k_p)^i} + \frac{P_n}{(1+k_p)^n}$$


$$K_p = \frac{DIV + 1/n(P_n - P_0)}{1/2(P_n + P_0)}$$

COST OF EQUITY

- Here the cost of equity is the dividend received by the equity share holders.

COST OF EQUITY (THE DIVIDEND GROWTH MODEL)

- Start with the dividend growth model formula and rearrange to solve for K_E
- Here dividends are expected to grow at a constant rate g .
- $D_1 = D_0(1+g)$

$$P_0 = \frac{D_1}{K_E - g}$$

$$K_E = \frac{D_1}{P_0} + g$$

DIVIDEND GROWTH MODEL EXAMPLE

Q. Suppose that your company is expected to pay a dividend of \$1.50 per share next year. There has been a steady growth in dividends of 5.1% per year and the market expects that to continue. The current price is \$25. What is the cost of equity?

- But this **DIVIDEND GROWTH MODEL** has drawbacks when considering that some firms concentrate on growth and do not pay dividends at all, or only irregularly. Growth rates may also be hard to estimate. Also this model doesn't adjust for market risk.
- Therefore many financial managers prefer the security market line/capital asset pricing model (SML or CAPM) for estimating the cost of equity:

CAPM Theory

- A portfolio is a combination of bundle of assets or securities
- A portfolio theory provides how investors make decisions to invest their wealth in assets or securities under risk.
- Assumptions
 - 1. Investors are risk averse i.e, investors hold well diversified portfolios
 - 2. Return on assets are normally distributed.ie. Mean and variance are foundation of portfolio theory.
-

CAPITAL ASSET PRICING MODEL

- The CAPM establishes a linear relationship between the required rate of return on a security and its systematic or non-diversifiable risk as measured by Beta.
- Mathematically it is represented as

$$k_j = R_f + \beta(k_m - R_f) \quad \text{or} \quad k_j = R_f + \beta(E(R)_m - R_f)$$

Where

k_j or R_e is the required rate of return on the security,

k_m is the return on market portfolio,


R_f is the risk free rate of return

β systematic or non-diversifiable risk

$$\beta = \frac{\text{Cov}(k_j, k_m)}{\text{Var}(k_m)}$$

BETA

- The relevant or market risk or systematic risk is measured by beta.
- It is an index of the systematic risk of an asset.
- It measures the sensitivity or volatility of the securities returns to changes in the returns on the market.
- In simple- $B_1 = \frac{R_1}{R_m}$

- 
- R_1 = the avg change in the assets return.
 - R_m = the avg change in the market return.

The larger the beta, the more volatile is the asset.