

Chapter 3

Cost of Capital

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Definition of Cost of Capital

- The term cost of capital refers to *the minimum rate of return a firm must earn on its investments.*
- The following definitions are given by different scholars.
- **Hamption J.:** The cost of capital may be defined as “the rate of return the firm requires from investment in order to increase the value of the firm in the market place”.
- **James C. Van Horne:** The cost of capital is “a cut-off rate for the allocation of capital to investments of projects. It is the rate of return on a project that will leave unchanged the market price of the stock”.
- **Soloman Ezra:** “Cost of Capital is the minimum required rate of earnings or the cut off rate of

Importance of Cost of Capital

The cost of capital is very important in financial management and plays a crucial role in the following areas:

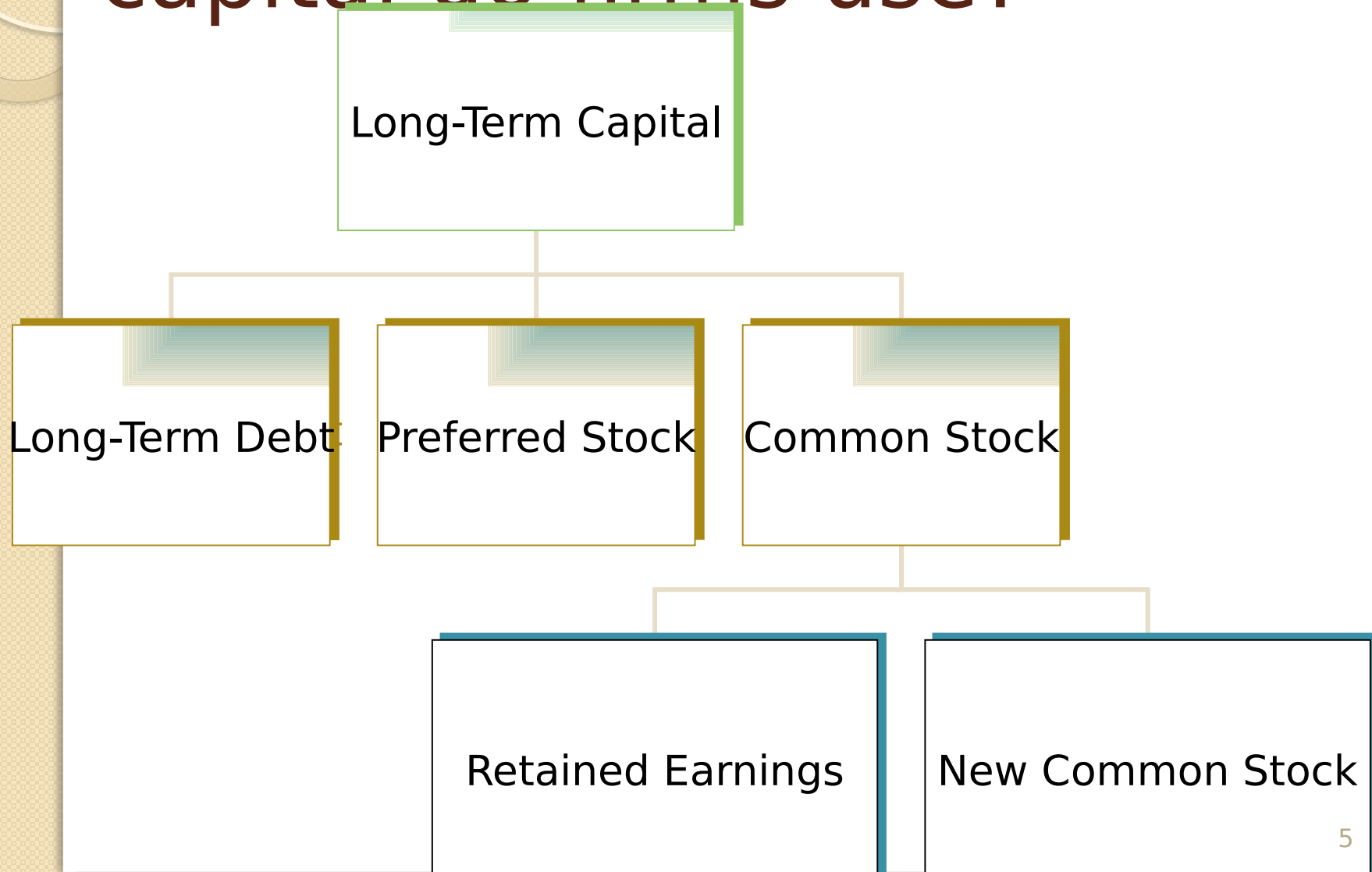
- i) **Capital budgeting decisions:** The cost of capital is used for discounting cash flows under Net Present Value method for investment proposals.
- ii) **Capital structure decisions:** An optimal capital is that structure at which the Value of the firm is maximum and cost of capital is the lowest. So, cost of capital is crucial in designing optimal capital structure.
- iii) **Evaluation of final Performance:** Cost of capital is used to evaluate the financial performance of top management. The actual profitability is compared to the expected and actual cost of capital of funds and if profit is greater than the cost of capital the performance may be said to be satisfactory.
- iv) **Other financial decisions:** Cost of capital is also

- The cost of capital represents the overall cost of financing to the firm
- The cost of capital is normally the relevant discount rate to use in analyzing an investment
- The overall cost of capital is a weighted average of the various sources, including debt, preferred stock, and common equity:

WACC = Weighted Average Cost of Capital

WACC = After-tax costs x weights

What sources of long-term capital do firms use?



Required Rates on Projects

- ❖ An important part of capital budgeting is setting the required rate for the individual project

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Example: Consider the following project



$$\text{If Required Rate} = 9\% \text{ NPV} = -1,000 + \frac{1,100}{(1 + .09)} = \$9.17$$

Accept Project since $\text{NPV} > 0$

$$\text{If Required Rate} = 11\% \text{ NPV} = -1,000 + \frac{1,100}{(1 + .11)} = -\$9.01$$

Reject Project since $\text{NPV} < 0$

Required Rates on Projects

- ❖ An important part of capital budgeting is setting the required rate for the individual project

Example: Consider the following project



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In order to estimate correct required rate, companies must find their own unique cost of raising capital

Factors Affecting Cost of Capital

- General Economic Conditions--inflation, investment opportunities
 - Affect interest rates

The Following Factors affect risk premium

- Market Conditions
- Operating and Financing Decisions
 - Affect business risk
 - Affect financial risk
- Amount of Financing
 - Affect flotation costs and market price of security

Model Assumptions

Weighted Average Cost of Capital Model

- Here, we determine the average cost of capital of a firm by assuming that the firm continues with its business, financing and dividend policies.

Computing Weighted Cost of Capital

Weighted Average Cost of Capital (WACC)

- Average cost of capital of the firm.

To find WACC

1. Compute the cost of each source of capital
2. Determine percentage of each source of capital
3. Calculate Weighted Average Cost of Capital



Computing Cost of Each Source

1. Cost of Debt, K_d (1-T)

- The ***cost of debt*** is the cost associated with raising one more dollar by issuing debt. Suppose you borrow one dollar and promise to repay it in one year, plus pay 10 cents to compensate the lender for the use of her money.
- Interest payments (or interest expenses) are tax-deductible expenses and are paid before taxes, partially reducing the firm's income taxes.

- The after-tax cost of debt, $K_d (1-T)$, is the net cost of debt, which is used to calculate the weighted average cost of capital.
- It is the interest rate on debt, K_d , minus the tax savings that result because interest is deductible.
- This is the same as K_d multiplied by $(1-T)$, where T is firm's tax rate:

After -tax cost of debt
savings

= Interest expense - Tax

= $K_d - K_d T$

= $K_d (1-T)$

- Example

Investors are willing to pay \$985 for a bond that pays \$90 a year for 10 years. Fees for issuing the bonds bring the net price (NP_0) down to \$938.55.

What is the after tax cost of debt?

The before tax cost of debt is 10%

Interest is tax deductible

Marginal Tax Rate = 40%

$$\begin{aligned}\text{After tax cost of bonds} &= k_d(1 - T) \\ &= 10.0\%(1 - 0.40) = 6\%\end{aligned}$$

Exercise

if ABC Corporation can borrow at an interest rate of 10 percent, and if it belongs to a tax rate of 40 percent, then it's after-tax cost of debt will be 6 percent.

Compute the before tax cost of debt

2. Compute Cost of Preferred Stock

- Preferred stock is a source of long-term capital for a firm.
- When a corporation sells preferred stock, it expects to pay dividends to investors in return for their money capital.
- The dividend payments are the cost of preferred stock to the firm.
- Preferred stock is both similar to and different from debt.

Computing Cost of Each Source

2. Compute Cost Preferred Stock

Cost to raise a dollar of preferred stock.

$$\text{Required rate } k_{ps} = \frac{\text{Dividend (D)}}{\text{Market Price (P}_0\text{)}}$$

however, there are floatation costs of issuing preferred stock

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Cost of Preferred Stock with floatation costs

$$k_{ps} = \frac{\text{Dividend (D)}}{\text{Net Price (NP}_0\text{)}}$$

- Example

Your company can issue preferred stock for a price of \$45, but it only receives \$42 after floatation costs. The preferred stock pays a \$5

dividend.
Computed Cost of Preferred Stock

$$k_{ps} = \frac{\$5.00}{\$42.00} = 11.90\%$$

No adjustment is made for taxes as dividends are not tax deductible.

Exercise

if the ABC Corporation issues its new preferred stock at Br. 100 per share (P_p), and that pays a Br. 9 dividend per share (D_p) per year. It incurs a 10 percent or Br. 10 flotation cost (F) of the selling price of the stock.

Compute the cost of preferred stock

3. Compute Cost of Common Equity

- Cost of Equity is the expected rate of return by the equity shareholders.
- cost of equity share capital may be defined as the minimum rate of return that a firm must earn on the equity part of total investment in a project in order to leave unchanged the market price of such shares.
- Two kinds of Common Equity
 - Retained Earnings (internal common equity)
 - Issuing new shares of common stock

- Cost of Internal Common Equity

- Management should retain earnings only if they earn as much as stockholder's next best investment opportunity.
- Cost of Internal Equity = opportunity cost of common stockholders' funds.
- Cost of internal equity must equal common stockholders' required rate of return.
- Three methods to determine
 - Dividend Growth Model
 - Capital Asset Pricing Model
 - Risk Premium Model

- Cost of Internal Common Equity

- Dividend Growth Model

- Assume constant growth in dividends

Cost of internal equity--dividend growth model

$$k_{cs} = \frac{D_1}{P_0} + g$$

Example

The market price of a share of common stock is \$60. The dividend just paid is \$3, and the expected growth rate is 10%.

$$k_{cs} = \frac{3(1+0.10)}{60} + .10 = .155 = 15.5\%$$

The main limitation in this method is estimating growth accurately

3. Compute Cost of Common Equity

- Cost of Internal Common Equity
 - Capital Asset Pricing Model
 - Estimate the cost of equity from the CAPM

$$k_{cs} = k_{rf} + \beta(k_m - k_{rf})$$

Example

The estimated Beta of a stock is 1.2. The risk-free rate is 5% and the expected market return is 13%.

$$k_{cs} = 5\% + 1.2(13\% - 5\%) = 14.6\%$$

Computing Cost of Each Source

3. Compute Cost of Common Equity

- Cost of Internal Common Equity

- Risk Premium Approach

- Adds a risk premium to the bondholder's required rate of return.

Cost of internal equity--Risk Premium

Example

$$k_{cs} = k_d + RP_c$$

Where:

RP_c = Common stock risk premium

If the risk premium is 5% and k_d is 10%

$$k_{cs} = 10\% + 5\%$$

$$= 15\%$$

Computing Cost of Each Source

3. Compute Cost of Common Equity

- Cost of New Common Stock
 - If retained earnings cannot provide all the equity capital that is needed, firms may issue new shares of common stock.
 - Dividend Growth Model--must adjust for floatation costs of the new common

Cost of new common stock

$$k_{cs} = \frac{D_1}{NP_0} + g$$

Computing Cost of Each Source

3. Compute Cost of Common Equity

- Cost of New Common Stock

Cost of new common stock

$$k_{nc} = \frac{D_1}{NP_0} + g$$

Example

Using the above example. Common stock price is currently \$60. If additional shares are issued floatation costs will be 12%. $D_0 = \$3.00$ and estimated growth is 10%.

$$NP_0 = \$60.00 - (.12 \times 60) = \$52.80$$

Floatation
Costs

Computing Cost of Each Source

3. Compute Cost of Common

- **Equity** ~~Cost of~~ New Common Stock

Cost of new common stock

$$k_{nc} = \frac{D_1}{NP_0} + g$$

Example

Using the above example. Common stock price is currently \$60. If additional shares are issued floatation costs will be 12%. $D_0 = \$3.00$ and estimated growth is 10%.

$$NP_0 = \$60.00 - (.12 \times 60) = \$52.80$$

$$k_{cs} = \frac{3(1+0.10)}{52.80} + .10 = .1625 = 16.25\%$$

Capital Structure Weights

Long Term Liabilities and Equity

Weights of each source should reflect expected financing mix

Assume a stable financial mix—so use Balance Sheet percentages to calculate the weighted average cost of capital.

Capital Structure Weights

Long Term Liabilities and Equity

Balance Sheet Green Apple Company

Assets

Current Assets	\$5,000
Plant & Equipment	<u>7,000</u>
<i>Total Assets</i>	\$12,000

Liabilities

Current Liabilities	\$2,000
Bonds	4,000
Preferred Stock	1,000
Common Stock	<u>5,000</u>
<i>Total Liabilities and Owners Equity</i>	\$12,000

Firm Raises \$10,000 of capital from long term sources

Capital Structure Weights

Long Term Liabilities and Equity

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Compute Firm's Capital Structure (% of each source)

$$\text{Bonds: } \frac{4,000}{10,000} = 40\%$$

Amount of
Bonds

Total Capital
Sources

Capital Structure Weights

Long Term Liabilities and Equity

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Compute Firm's Capital Structure (% of each source)

$$\text{Preferred Stock} \frac{1,000}{10,000} = 10\%$$

Amount of Preferred Stock

Total Capital Sources

Capital Structure Weights

Long Term Liabilities and Equity

Balance Sheet Green Apple Company

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Compute Firm's Capital Structure (% of each source)

$$\text{Common Stock} \frac{5,000}{10,000} = 50\%$$

Amount of Common
Stock

Total Capital
Sources

Capital Structure Weights

Long Term Liabilities and Equity

Balance Sheet Green Apple Company

Assets

Current Assets	\$5,000
Plant & Equipment	<u>7,000</u>
<i>Total Assets</i>	\$12,000

Liabilities

Current Liabilities	\$2,000	
Bonds	4,000	40
Preferred Stock	1,000	%
Common Stock	<u>5,000</u>	10
<i>Total Liabilities and</i>		%
<i>Owners Equity</i>	\$12,000	50
		%

When money is raised for capital projects, approximately 40% of the money comes from selling bonds, 10% comes from selling preferred stock and 50% comes from retaining earnings or selling common stock

Computing WACC

Green Apple Company estimates the following costs for each component in its capital structure:

Source of Capital	Cost
Bonds	$k_d = 10\%$
Preferred Stock	$k_{ps} = 11.9\%$
Common Stock	
Retained Earnings	$k_{cs} = 15\%$
New Shares	$k_{nc} = 16.25\%$

Green Apple's tax rate is 40%

Computing WACC

- ❖ *If using retained earnings to finance the common stock portion the capital structure*

$$\begin{aligned} \text{WACC} = k_0 = & \quad \% \text{Bonds} \times \text{Cost of Bonds} \times (1-T) \\ & + \% \text{Preferred} \times \text{Cost of Preferred} \\ & + \% \text{Common} \times \text{Cost of Common Stock} \end{aligned}$$

Computing WACC - using Retained Earnings

Balance Sheet

Assets

Current Assets	\$5,000
Plant & Equipment	<u>7,000</u>
<i>Total Assets</i>	\$12,000
	1,000

Tax Rate = 40%

Liabilities

Current Liabilities	\$2,000	
Bonds (10%)	4,000	40
Preferred Stock (11.9%)		%
		10
Common Stock (15%)	<u>5,000</u>	%
<i>Total Liabilities and</i>		50
<i>Owners Equity</i>	\$12,000	%

$$\begin{aligned} \text{WACC} = k_0 = & \quad \% \text{Bonds} \times \text{Cost of Bonds} \times (1-T) \\ & + \% \text{Preferred} \times \text{Cost of Preferred} \\ & + \% \text{Common} \times \text{Cost of Common Stock} \end{aligned}$$

$$\begin{aligned} \text{WACC} = & \quad .40 \times 10\% (1-.4) \\ & + .10 \times 11.9\% \\ & + .50 \times 15\% = 11.09\% \end{aligned}$$

Computing WACC

- ❖ If use newly issued common stock, use k_{nc} rather than k_{cs} for the cost of the equity

p

$$\begin{aligned} \text{WACC} = k_0 = & \quad \% \text{Bonds} \times \text{Cost of Bonds} \times (1-T) \\ & + \% \text{Preferred} \times \text{Cost of Preferred} \\ & + \% \text{Common} \times \text{Cost of Common Stock} \end{aligned}$$



k_{nc}

Computing WACC - using New Common Shares

Balance Sheet

Assets

Current Assets	\$5,000
Plant & Equipment	<u>7,000</u>
Total Assets	\$12,000
1,000	
<u>5,000</u>	

Tax Rate = 40%

Liabilities

Current Liabilities	\$2,000
Bonds (10%)	4,000
Preferred Stock (11.9%)	
Common Stock(16.25%)	

Total Liabilities and

Owners Equity \$12,000

$$\begin{aligned}
 \text{WACC} = k_0 = & \quad \% \text{Bonds} \times \text{Cost of Bonds} \times (1-T) \\
 & + \% \text{Preferred} \times \text{Cost of Preferred} \\
 & + \% \text{Common} \times \text{Cost of Common Stock}
 \end{aligned}$$

$$\begin{aligned}
 \text{WACC} = & \quad .40 \times 10\% (1-.4) \\
 & + .10 \times 11.9\% \\
 & + .50 \times 16.25\% = 11.72\%
 \end{aligned}$$

Exercise

On January 1, 2002, the total assets of Zway share company were Br. 54 million. There was no short-term debt. The firm's optimal capital structure is given below.

Long-term debt	Br. 27,000,000
Common equity	<u>27,000,000</u>
Total liabilities and equity	<u><u>Br. 54,000,000</u></u>

New bonds will have a 10% coupon rate and will be sold at Par. Common stock currently has a market price of Br. 60 and can be sold with a flotation cost of Br. 6 per share. Dividend yield is estimated to be 4% and the expected dividend growth rate is 8%

Required: Calculate:

- 1) the cost of debt assuming a 40% marginal corporate tax rate
- 2) the cost of common equity (50% common stock and 50% retained earnings)
- 3) the weighted average cost of capital



END