# FN 201 : Lecture Note 8-9
# Cost of Capital and
# Capital Structure Decision

**Dr. Winai Homsombat**

Bachelor of Economics, International Program

Thammasat University

# The Cost of Capital

- The terms ***required return, discount rate,*** and ***cost of capital*** all refer to the cost of capital in an investment project
- The cost of capital represents **the overall cost of financing** to the firm

  - use “Weighted Average Cost of Capital: WACC”

- Cost of capital estimates are used for:
  - capital budgeting decisions
  - financing decisions
  - operating decisions

# Cost of Capital vs. Capital Structure

- A firm's financial policy is about **choosing its capital structure** – the mixture of debt and equity
- For now, we **assume the firm has a fixed debt to equity ratio** – its target capital structure
- A firm's **overall cost of capital reflects the required return on the firm's assets as a whole** – a mixture of the returns needed to compensate its creditors and its shareholders

# Outline

- Estimate the components of cost of capital:
  - Cost of equity
  - Cost of debt
  - Cost of preferred stock
- Calculate the weighted average cost of capital of the firm (WACC)
- Capital Structure Decision

# Cost of Capital

# Components of Capital

- Cost of Equity
  - Retained Earning
  - New Common Stock
- Cost of Debt
- Cost of Preferred Stock

# Cost of Equity

- Common stock equity is available through retained earnings (R/E) or by issuing new common stock:

  **Common equity = Retained Earning + New common stock**

- Why is there a cost for **retained earnings**?
  - Earnings can be **reinvested or paid out** as dividends
  - Investors could **buy other securities**, and earn a return.
  - Thus, there is an ***opportunity cost*** if earnings are retained
- The cost of **new common stock** is ***higher*** than the cost of retained earnings because of **flotation costs**

  - selling and distribution costs (such as sales commissions)

# Cost of Equity

- Dividend Growth Model Approach
- Capital Asset Pricing Model (CAPM)

# Cost of Equity – Dividend Growth Model Approach

- PV of dividend growing perpetuity
- According to the *constant growth (Gordon)* model

From: $P_o = \frac{D_1}{R_E - g}$ Rearranging: $R_E = \frac{D_1}{P_0} + g$

Note:

g = return on equity x plowback ratio

= ROE x Retention ratio

***Example:*** Summerdahl Resort's common stock is currently trading at $36 a share. The stock is expected to pay a dividend of $3.00 a share at the end of the year (D1 = $3.00), and the dividend is expected to grow at a constant rate of 5% a year. What is its cost of common equity?

# Cost of Equity – Dividend Growth Model Approach

Cost of equity with "**flotation cost**"

selling and distribution costs (such as sales commissions) of new securities

Flotation cost will cause stock price decrease and thus total money received

$$R_E = \frac{D_1}{P_0^*} + g$$ when $$P_0^* = Flotation\ cost\ adjusted\ price$$

***Example:***

Messman Manufacturing will issue common stock to the public for $30. The expected dividend and the growth in dividends are $3.00 per share and 5%, respectively. If the flotation cost is 10% of the issue's gross proceeds, what is the cost of external equity, $R_E$?

# Cost of Equity – Dividend Growth Model Approach

- **Advantages:**

  - Very Simple

- **Disadvantages:**

  - Applicable only for **dividend paying firms**

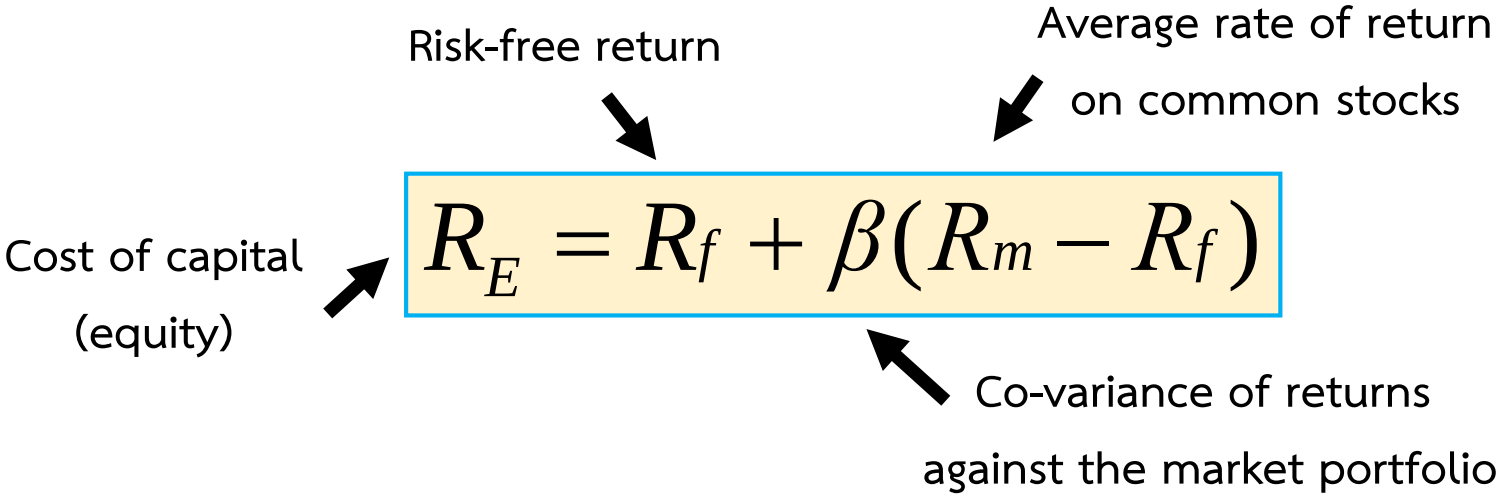
    (otherwise can use earnings growth)

  - Uses **historical data** to predict future growth

  - Very **sensitive to the estimated growth rate**

  - The approach does **not explicitly consider risk**

# Cost of Equity – CAPM




*Example:*

- ONENet has a beta 1.6, the risk-free rate is 9%, and the expected return on the market is 13%, then what would be the firm's cost of equity based on the CAPM approach?
- Booher Book Stores has a beta of 0.8. The yield on a 3-month T-bill is 4% and the yield on a 10-year T-bond is 6%. The market risk premium is 5.5%. What is the estimated cost of common equity using the CAPM?

# Cost of Equity – CAPM

- **Advantages:**

  - It explicitly **adjusts for risk**

  - It is **more applicable** to companies other than those with steady dividend growth / do not pay dividend

- **Disadvantages:**

  - If the estimates of **the market risk premium and beta are poor**, the resulting cost of equity can be *inaccurate*

  - **Uses historical data** to predict future returns

# Cost of Debt

- The cost of debt is the return required by lenders (observable)

  = **yield to maturity** on the firm's bonds outstanding.

  *Note that the coupon rate is not the cost of debt!*

- Since interest is tax deductible to the firm, the actual cost of debt is less than the yield to maturity:

**After-tax cost of debt = YTM x (1 - tax rate)**

➢ The cost of debt should also be **adjusted for flotation costs** (associated with issuing new bonds)

# Cost of Debt

Cost of debt with "**flotation cost**"

$$P_0^* = \sum_{t=1}^{N} \frac{\text{Coupon}}{(1+r_d)^t} + \frac{\text{Price}}{(1+r_d)^N}$$

when $P_0^* = \textit{Flotation cost adjusted price}$

***Example:***

- Suppose a company will issue new 20-year debt with a par value of $1,000 and a coupon rate of 9%, paid annually. The tax rate is 40%. If the flotation cost is 2% of the issue proceeds, then what is the after-tax cost of debt?
- Prescott Corporation issues a $1,000 par, 20 year bond paying the market rate of 10%. Coupons are annual. The bond will sell for par since it pays the market rate, but flotation costs amount to $50 per bond. What is the pre-tax and after-tax cost of debt for Prescott Corporation?

# Cost of Preferred Stock

- Preferred stocks are stocks **with dividend priority over common stocks**.
- They pay **a fixed dividend rate**, every period, as long as the firm exists.
- A share of preferred stock is essentially **a perpetuity**.

**The cost of preferred stock, $R_P$, is therefore:**

$$P_0 = \frac{D}{R_{PS}} \quad \Rightarrow \quad \boxed{R_{PS} = \frac{D}{P_0}}$$

***Example:*** Duggins Veterinary Supplies can issue perpetual preferred stock at a price of $50 a share with an annual dividend of $4.50 a share.

# Cost of Preferred Stock

Cost of debt with "**flotation cost**"

$$R_{PS} = \frac{D}{P_0^*}$$

when $P_0^* = Flotation\ cost\ adjusted\ price$

***Example:***

- Burnwood Tech plans to issue some $60 par preferred stock with a 6% dividend. A similar stock is selling on the market for $70. Burnwood must pay flotation costs of 5% of the issue price. What is the cost of the preferred stock?
- Nortel Networks also has 10,000 preferred shares outstanding. These preferred shares have a market value of $56 per share and pay a 10 percent dividend rate on a par value of $100. What is the required rate of return by preferred shareholders? What is the market value of preferred shares?

# Weighted Average Cost of Capital: WACC

- The company cost of capital is the **weighted average** of required returns from all source of firm's capital (WACC)

$$WACC = W_D R_D (1 - T) + W_E R_E + W_{PS} R_{PS}$$

# Weighted Average Cost of Capital: WACC

*Example:*

- *Gallagher Corporation estimates the following costs for each component in its capital structure:*

| *Source of Capital* | *Cost* |
|---|---|
| **Bonds (after tax)** | **$R_D(1-t) = 6.0\%$** |
| **Preferred Stock** | **$R_{PS} = 11.9\%$** |
| **Common Stock** | **$R_S = 16.25\%$** |

Assume that Gallagher's desired capital structure is 40% debt, 10% preferred and 50% common equity. Given **Gallagher's tax rate is 40%.** What is firm's WACC?

# Weighted Average Cost of Capital: WACC

Q: Market values or book values?

A: always use market values!

- **Market value of equity:**

  E = number of shares × market price per share

- **Market value of debt:**

  D = number of bonds outstanding × market price per bond

  - If there are multiple bonds, do the same for each bond and add.

  - If debt is not publicly traded, then find a similar publicly traded bond and use the yield to discount the bond's payments

# Weighted Average Cost of Capital: WACC

Longstreet Communications Inc. (LCI) has the following capital structure, which it considers to be optimal: debt = 25%, preferred stock = 15%, and common stock = 60%. LCI's tax rate is 40%, and investors expect earnings and dividends to grow at a constant rate of 6% in the future. LCI paid a dividend of $3.70 per share last year (D0), and its stock currently sells at a price of $60 per share. Ten-year Treasury bonds yield 6%, the market risk premium is 5%, and LCI's beta is 1.3. The following terms would apply to new security offerings.

*Preferred:* New preferred could be sold to the public at a price of $100 per share, with a dividend of $9. Flotation costs of $5 per share would be incurred.

*Debt:* Debt could be sold at an interest rate of 9%.

*Common:* New common equity will be raised only by retaining earnings.

a. Find the component costs of debt, preferred stock, and common stock.

b. What is the WACC?

# Capital Structure Decision

# Business Risk versus Financial Risk

- **Business risk:**
  - Uncertainty in future **EBIT, NOPAT, and ROIC**.
- **Financial risk:**
  - Risk from expected rate of return to **common stock holders** when financial leverage is used.

- **Goals for Capital Structure Decision**
  - **Minimize WACC**

# Choosing the Optimal Capital Structure: Example

**Example:**

b = 1.0 $R_F$ = 6% Market risk-premium = 6%

T = 40% Debt = 0

**Solution**

**Cost of equity using CAPM:**

$R_E = R_F + b\,(RP_M)$ = 12%

**Currently has no debt: $w_d$ = 0%.**

WACC = $R_E$ = 12%.

# Investment bankers provided estimates of $R_D$ for different capital structures.

| $w_d$ | 0% | 20% | 30% | 40% | 50% |
|---|---|---|---|---|---|
| $r_d$ | 0.0% | 8.0% | 8.5% | 10.0% | 12.0% |

If company recapitalizes, it will use proceeds from debt issuance to repurchase stock.

**Hamada's Formula:**

**The Cost of Equity at Different Levels of Debt**

= MM theory implies that **beta changes with leverage**.

$b_U$ is the beta of a firm when it has no debt (the unlevered beta)

$$b = b_U [1 + (1 - T)(w_d/w_s)]$$

# The Cost of Equity for $w_d$ = 20%

- Use Hamada's equation to find beta:

$$b = b_U [1 + (1 - T)(w_d/w_s)]$$
$$= 1.0 [1 + (1-0.4) (20\% / 80\%) ]$$
$$= \underline{1.15}$$

- Use CAPM to find the cost of equity:

$$r_s = r_{RF} + b_L (RPM)$$
$$= 6\% + 1.15 (6\%) = \underline{12.9\%}$$

- Calculate for new WACC:

$$WACC = w_d (1-T) r_d + w_{ce} r_s$$
$$= 0.2 (1 – 0.4) (8\%) + 0.8 (12.9\%)$$
$$= \underline{11.28\%}$$

# Beta, $r_s$, and WACC

| $w_d$ | 0% | 20% | 30% | 40% | 50% |
|---|---|---|---|---|---|
| $r_d$ | 0.0% | 8.0% | 8.5% | 10.0% | 12.0% |
| $w_s$ | 100% | 80% | 70% | 60% | 50% |
| b | 1.000 | 1.150 | 1.257 | 1.400 | 1.600 |
| $r_s$ | 12.00% | 12.90% | 13.54% | 14.40% | 15.60% |
| WACC | 12.00% | 11.28% | 11.01% | 11.04% | 11.40% |

The WACC is minimized for $w_d$ = 30%. This is the optimal capital structure.

# Example 1:

Elliott Athletics is trying to determine its optimal capital structure, which now consists of only debt and common equity. The firm does not currently use preferred stock in its capital structure, and it does not plan to do so in the future. To estimate how much its debt would cost at different debt levels, the company's treasury staff has consulted with investment bankers and, on the basis of those discussions, has created the following table:

| Market Debt-to-Value Ratio ($w_d$) | Market Equity-to-Value Ratio ($w_s$) | Market Debt-to-Equity Ratio (D/S) | Bond Rating | Before-Tax Cost of Debt ($r_d$) |
|---|---|---|---|---|
| 0.0 | 1.0 | 0.00 | A | 7.0% |
| 0.2 | 0.8 | 0.25 | BBB | 8.0 |
| 0.4 | 0.6 | 0.67 | BB | 10.0 |
| 0.6 | 0.4 | 1.50 | C | 12.0 |
| 0.8 | 0.2 | 4.00 | D | 15.0 |

Elliott uses the CAPM to estimate its cost of common equity, $r_s$. The company estimates that the risk-free rate is 5%; the market risk premium is 6%, and the company's tax rate is 40%. Elliott estimates that if it had no debt, its "unlevered" beta, $b_U$, would be 1.2. Based on this information, what is the firm's optimal capital structure, and what would be the weighted average cost of capital at the optimal capital structure?

# Example 2:

Beckman Engineering and Associates (BEA) is considering a change in its capital structure. BEA currently has $20 million in debt carrying a rate of 8%, and its stock price is $40 per share with 2 million shares outstanding. BEA is a zero-growth firm and pays out all of its earnings as dividends. The firm's EBIT is $14.933 million, and it faces a 40% federal-plus-state tax rate. The market risk premium is 4%, and the risk-free rate is 6%. BEA is considering increasing its debt level to a capital structure with 40% debt, based on market values, and repurchasing shares with the extra money that it borrows. BEA will have to retire the old debt in order to issue new debt, and the rate on the new debt will be 9%. BEA has a beta of 1.0.

a. What is BEA's unlevered beta? Use market value D/S when unlevering.
b. What are BEA's new beta and cost of equity if it has 40% debt?
c. What are BEA's WACC and total value of the firm with 40% debt?

# Question?