Chapter 9
The Cost of Capital

Cost of Capital is the firm's average cost of funds, which is the average return required by the firm's investors

Firms use various sources of long-term capital:
Long-term debt
Preferred stock
Common equity

Focus on after-tax rather before-tax capital costs. Focus on new (marginal) costs rather than historical (embedded) costs.

Cost of Debt
The relevant cost of new debt, the required rate of return of bondholders:

$$k_d{}^* = \frac{INT + \left(\dfrac{M - V_d}{N}\right)}{\left[\dfrac{2(V_d) + M}{3}\right]}$$

Example: A company has a 15-year, 12% coupon bond that sells for $1,153.72. The bond pays interest semiannually. What is k_d?

$$k_d{}^* =$$

Interest expense is tax deductible. Assume a tax rate of 40%:

$$k_{dT} = k_d (1 - T) =$$

k_{dT} = bondholders' required rate of return minus tax savings
Flotation costs for debt are small, so ignore.

Cost of preferred stock
The cost of preferred stock is the rate of return required on the firm's preferred stock.
From Chapter 8, we have

$$P_p = \frac{D_p}{k_p} \qquad \text{rearrange:} \quad k_p = \frac{D_p}{P_p}$$

Flotation costs for preferred are significant, so are generally reflected. Use net price:
price - floatation costs.

$$k_p = \frac{D_p}{P_p - F} \qquad \text{where F is the dollar flotation cos ts}$$

Example: Suppose a company's preferred stock sells for $113.10; has a par value of
$100; pays a 10% (of par value) dividend; and will experience a $2 per share flotation
charge if it issues new preferred stock. What is the company's cost of preferred?

$$k_p =$$

Preferred dividends are not tax-deductible, so no tax adjustment. Just k_p.

Cost of common Equity
Companies can "raise" equity in two ways
1. Companies can issue new shares of common stock.
2. Companies can retain earnings.

Why is there a cost for retained earnings?

Earnings can be reinvested or paid out as dividends.
If paid out, then investors can buy other securities, earn a return.
So, there is an opportunity cost if earnings are retained.

<u>Opportunity cost</u>: The return stockholders can earn on alternative investments of equal risk.

Common stockholders can buy similar stocks and earn k_s, or the company can repurchase its own stock and earn k_s. So, k_s, is the cost of retained earnings and it is the cost of common equity.

Three ways to determine the cost of equity, k_s:
1. Capital Asset Pricing Model (CAPM) $k_s = k_{rf} + (k_M - k_{rf})\beta$

2. Discounted Cash Flow $k_s = \dfrac{D_1}{P_0} + g$

$$g = (\text{Re tention ratio})(\text{ROE}) = (1 - \text{payout rate})(\text{ROE})$$

3. Own-Bond-Yield-Plus-Risk Premium $k_s = k_d + RP$

Example: Assume a risk-free rate of 7%, a return on the market portfolio for 13%. If this company has $\beta = 1.2$, what is the cost of equity based on the CAPM?

$k_s = k_{rf} + (k_M - k_{rf})\beta =$

Example: If the firm just paid a dividend of $4.19, has a dividend growth rate of 5%, and is currently selling for $50, what is the DCF cost of equity?

$k_s = \dfrac{D_1}{P_0} + g =$

Example: If the company's cost of debt, k_d, is 10% and it believes that the cost of equity is generally 4 percentage points higher than k_d (in other words, RP=4%), what is k_s using the own-bond-yield-plus-risk-premium method?

$$k_s = k_d + RP =$$

Note:
This **RP ≠ CAPM risk premium**, $(k_M - k_{rf})$.
Produces ballpark estimate of k_s. Useful check.

We have three differing estimates of the cost of equity--What's a reasonable final estimate of k_s?

External equity (or new common stock)
Is the cost of newly issued common stock, k_e, the same as the cost of retained earnings?

Our method for determining the cost of external equity, k_e, is based on the cost of retained earnings. It is adjusted for flotation costs.

Example. The firm just paid a dividend of $4.19, has a dividend growth rate of 5%, and is currently selling for $50. Issuance costs for new common are $2 per share for this company. What is this company's cost of external equity?

$$k_e = \frac{D_1}{P_{Net}} + g = \frac{D_1}{P_0 - F} + g =$$

Optimal Capital Structure
Is the percentage of debt, preferred stock, and common equity that will maximize the price of the firm's stock

For our example, let's assume this company's optimal capital structure is 30% debt, 10% preferred stock, and 60% common equity

Weighted Average Cost of Capital (WACC) is the weighted average of the component costs of debt, preferred stock, and common equity

$$WACC = w_d k_d (1-t) + w_p k_p + w_{ce} k_s$$

where w is the proportion of each component in the capital structure. Note: the w's must sum to 1.0.

**Example:** Assuming our example company uses retained earnings for common equity, what's its WACC?

$$WACC = w_d k_d (1-t) + w_{ps} k_{ps} + w_{ce} k_s =$$

Marginal Cost of Capital (MCC) is the cost of obtaining another dollar of new capital—the weighted average cost of the last dollar of new capital raised.

Can the company raise an unlimited amount of new capital at the 11.1% cost? Probably not. As a company raises larger and larger amounts of funds during a given time period, the costs of those funds begin to rise.

MCC Schedule. Marginal cost of capital schedule is a graph that relates the firm's weighted average cost of each dollar of capital to the total amount of new capital raised. It reflects changing costs depending on amounts of capital raised.
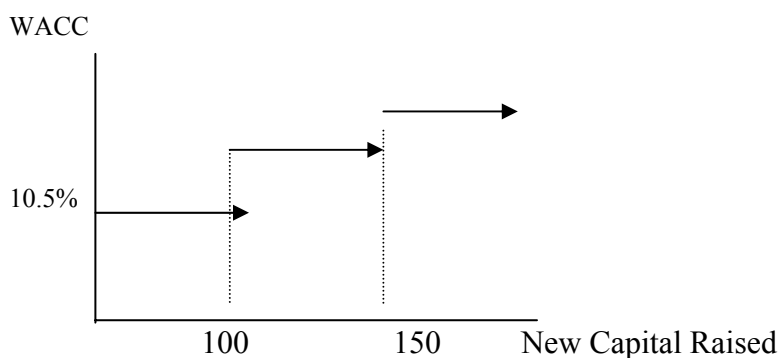
A "Break Point" is the dollar value of new capital that can be raised before an increase in the firm's weighted average cost of capital occurs

$$\text{Re tained earnings breakpo int} = \frac{\textbf{Addition to retained earnings}}{\textbf{equity fraction}}$$

Example:
Suppose that the company anticipates retaining $60 million dollars in the coming year-- how much can be spent on capital investments before external equity must be sold?

General equation for a break point:

$$\text{Break po int} = \frac{\textbf{Total amount of lower cos t capital of a given type}}{\textbf{Pr oportion of this type of capital in the capital structure}} = \underline{\hspace{2cm}} =$$

MCC Schedule and break points depend on capital structure used

Combining the MCC and Investment Opportunity Schedules
1. Construct the MCC schedule showing the company's cost of capital
2. Then, construct the Investment Opportunity Schedule (IOS), which is the graph of the firm's investment opportunities ranked in order of the projects' internal rate of return
3. Combine the two on one graph

Example: Adams Corporation has four investment projects with the following costs and rates of return:

PROJECT	COST	RATE OF RETURN
A	$2,000	16.00%
B	3,000	15.00
C	5,000	13.75
D	2,000	12.50

The company estimates that it can issue debt at a before-tax cost of 10 percent, and its tax rate is 30 percent. The company also can issue preferred stock at $49 per share, which pays a constant dividend of $5 per share.

The company stock currently sells at $36 per share. The year-end dividend is expected to be $3.50, and the dividend is expected to grow at a constant rate of 6 percent per year. The company capital structure consists of 75 percent common stock, 15 percent debt, and 10 percent preferred stock.

Which projects should the firm select if the projects are all of average risk?