CHAPTER 9
The Cost of Capital

Topics
- Cost of Capital Components
  - Debt
  - Preferred
  - Common Equity
  - WACC

What types of long-term capital do firms use?
- Long-term debt
- Preferred stock
- Common equity

Capital Components
- Capital components are sources of funding that come from investors.
- Accounts payable, accruals, and deferred taxes are not sources of funding that come from investors, so they are not included in the calculation of the cost of capital.
- We do adjust for these items when calculating the cash flows of a project, but not when calculating the cost of capital.

Before-tax vs. After-tax Capital Costs
- Tax effects associated with financing can be incorporated either in capital budgeting cash flows or in cost of capital.
- Most firms incorporate tax effects in the cost of capital. Therefore, focus on after-tax costs.
- Only cost of debt is affected.

Historical (Embedded) Costs vs. New (Marginal) Costs
- The cost of capital is used primarily to make decisions which involve raising and investing new capital. So, we should focus on marginal costs.
Cost of Debt

- Method 1: Ask an investment banker what the coupon rate would be on new debt.
- Method 2: Find the bond rating for the company and use the yield on other bonds with a similar rating.
- Method 3: Find the yield on the company’s debt, if it has any.

Component Cost of Debt

- Interest is tax deductible, so the after tax (AT) cost of debt is:
  - \( r_{dAT} = r_d BT(1 - T) \)
  - \( r_{dAT} = 10\% (1 - 0.40) = 6\% \)
- Use nominal rate.
- Flotation costs small, so ignore.

A 15-year, 12% semiannual bond sells for $1,153.72. What’s \( r_d \)?

Cost of preferred stock: \( P_p = $113.10; 10\% Q; Par = $100; F = $2. \)

Use this formula:

\[
\frac{D_p}{P_n} = \frac{0.1($100)}{$113.10 - $2.00} = \frac{$10}{$111.10} = 0.090 = 9.0\%
\]

Time Line of Preferred

\[
\begin{align*}
0 & \quad r_{ps}=? & 1 & \quad 2.50 & \quad ... & \quad 2 & \quad \infty \\
\text{-111.1} & \quad & & & & \quad & \\
\text{$111.10 =} & \quad \frac{D_p}{r_{per}} = \frac{2.50}{r_{per}} \\
\text{r_{per} =} & \quad \frac{2.50}{$111.10} = 2.25\%; \quad r_{ps(Nom)} = 2.25\%(4) = 9\%
\end{align*}
\]

Note:

- Flotation costs for preferred are significant, so are reflected. Use net price.
- Preferred dividends are not deductible, so no tax adjustment. Just \( r_{ps} \).
- Nominal \( r_{ps} \) is used.
Is preferred stock more or less risky to investors than debt?
- More risky; company not required to pay preferred dividend.
- However, firms want to pay preferred dividend. Otherwise, (1) cannot pay common dividend, (2) difficult to raise additional funds, and (3) preferred stockholders may gain control of firm.

Why is yield on preferred lower than \( r_d \)?
- Corporations own most preferred stock, because 70% of preferred dividends are nontaxable to corporations.
- Therefore, preferred often has a lower B-T yield than the B-T yield on debt.
- The A-T yield to investors and A-T cost to the issuer are higher on preferred than on debt, which is consistent with the higher risk of preferred.

Example:

\[
\begin{align*}
\text{Expected return on preferred} & = r_{ps} \times (1 - 0.7) \times (T) \\
& = 9\% - 9\% \times (0.3) \times (0.4) \\
& = 7.92\% \\
\text{Expected return on debt} & = r_d \times (1 - 0.4) \\
& = 10\% \times 0.6 \\
& = 6.00\% \\
\text{A-T Risk Premium on Preferred} & = 7.92\% - 6.00\% \\
& = 1.92\%
\end{align*}
\]

What are the two ways that companies can raise common equity?
- Directly, by issuing new shares of common stock.
- Indirectly, by reinvesting earnings that are not paid out as dividends (i.e., retaining earnings).

Why is there a cost for reinvested earnings?
- Earnings can be reinvested or paid out as dividends.
- Investors could buy other securities, earn a return.
- Thus, there is an opportunity cost if earnings are reinvested.

Cost for Reinvested Earnings (Continued)
- Opportunity cost: The return stockholders could earn on alternative investments of equal risk.
- They could buy similar stocks and earn \( r_s \), or company could repurchase its own stock and earn \( r_s \). So, \( r_s \), is the cost of reinvested earnings and it is the cost of equity.
Three ways to determine the cost of equity, \( r_s \):

1. **CAPM:**
   \[
   r_s = r_{RF} + (r_M - r_{RF})b
   \]
   \[
   = r_{RF} + (RPM)b.
   \]

2. **DCF:**
   \[
   r_s = \frac{D_1}{P_0} + g.
   \]

3. **Own-Bond-Yield-Plus-Risk Premium:**
   \[
   r_s = r_d + \text{Bond RP}.
   \]

**CAPM Cost of Equity:**
\( r_{RF} = 7\% \), \( RPM = 6\% \), \( b = 1.2 \).

\[
rs = r_{RF} + (r_M - r_{RF})b.
\]
\[
= 7.0\% + (6.0\%)1.2 = 14.2\%.
\]

**Issues in Using CAPM**

- Most analysts use the rate on a long-term (10 to 20 years) government bond as an estimate of \( r_{RF} \). For a current estimate, go to www.bloomberg.com, select “U.S. Treasuries” from the section on the left under the heading “Market.”

**Issues in Using CAPM (Continued)**

- Most analysts use a rate of 5% to 6.5% for the market risk premium (RPM)
- Estimates of beta vary, and estimates are “noisy” (they have a wide confidence interval).
- For an estimate of beta, go to Thomson ONE—Business School Edition, enter a ticker symbol, then look under Key Fundamentals.

**DCF Cost of Equity, \( r_s \):**
\( D_0 = $4.19; P_0 = $50; g = 5\% \).

\[
r_s = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g
\]
\[
= \frac{4.19(1.05)}{50} + 0.05
\]
\[
= 0.088 + 0.05
\]
\[
= 13.8\%
\]

**Estimating the Growth Rate**

- Use the historical growth rate if you believe the future will be like the past.
- Use the earnings retention model, illustrated on next slide.
Earnings Retention Model

Suppose the company has been earning 15% on equity (ROE = 15%) and retaining 35% (dividend payout = 65%), and this situation is expected to continue.

What's the expected future g?

Earnings Retention Model (Continued)

Retention growth rate:
\[ g = \text{ROE}(\text{Retention rate}) \]
\[ g = 0.35(15\%) = 5.25\% . \]

This is close to \( g = 5\% \) given earlier. Think of bank account paying 15% with retention ratio = 0. What is g of account balance? If retention ratio is 100%, what is g?

Could DCF methodology be applied if g is not constant?

YES, nonconstant g stocks are expected to have constant g at some point, generally in 5 to 10 years.

But calculations get complicated. See "FM11 Ch 9 Tool Kit.xls".

The Own-Bond-Yield-Plus-Risk-Premium Method: \( r_d = 10\% \), \( RP = 4\% \).

\[ r_s = r_d + RP \]
\[ r_s = 10.0\% + 4.0\% = 14.0\% \]

This \( RP \neq \text{CAPM } RP \).

Produces ballpark estimate of \( r_s \). Useful check.

What's a reasonable final estimate of \( r_s \)?

<table>
<thead>
<tr>
<th>Method</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAPM</td>
<td>14.2%</td>
</tr>
<tr>
<td>DCF</td>
<td>13.8%</td>
</tr>
<tr>
<td>( r_d + RP )</td>
<td>14.0%</td>
</tr>
<tr>
<td>Average</td>
<td>14.0%</td>
</tr>
</tbody>
</table>

Determining the Weights for the WACC

The weights are the percentages of the firm that will be financed by each component.

If possible, always use the target weights for the percentages of the firm that will be financed with the various types of capital.
Estimating Weights for the Capital Structure

- If you don’t know the targets, it is better to estimate the weights using current market values than current book values.
- If you don’t know the market value of debt, then it is usually reasonable to use the book values of debt, especially if the debt is short-term.

Estimating Weights (Continued)

- Suppose the stock price is $50, there are 3 million shares of stock, the firm has $25 million of preferred stock, and $75 million of debt.

Estimating Weights (Continued)

- $V_{ce} = $50 (3 million) = $150 million.
- $V_{ps} = $25 million.
- $V_{d} = $75 million.
- Total value = $150 + $25 + $75 = $250 million.

Estimating Weights (Continued)

- $w_{ce} = $150/$250 = 0.6
- $w_{ps} = $25/$250 = 0.1
- $w_{d} = $75/$250 = 0.3

What’s the WACC?

\[ WACC = w_{d}r_{d}(1 - T) + w_{ps}r_{ps} + w_{ce}r_{s} \]

\[ WACC = 0.3(10\%) (0.6) + 0.1(9\%) + 0.6(14\%) \]

\[ WACC = 1.8\% + 0.9\% + 8.4\% = 11.1\% . \]

What factors influence a company’s WACC?

- Market conditions, especially interest rates and tax rates.
- The firm’s capital structure and dividend policy.
- The firm’s investment policy. Firms with riskier projects generally have a higher WACC.
Is the firm's WACC correct for each of its divisions?
- **NO!** The composite WACC reflects the risk of an average project undertaken by the firm.
- Different divisions may have different risks. The division's WACC should be adjusted to reflect the division's risk and capital structure.

The Risk-Adjusted Divisional Cost of Capital
- Estimate the cost of capital that the division would have if it were a stand-alone firm.
- This requires estimating the division's beta, cost of debt, and capital structure.

Pure Play Method for Estimating Beta for a Division or a Project
- Find several publicly traded companies exclusively in project's business.
- Use average of their betas as proxy for project's beta.
- Hard to find such companies.

Accounting Beta Method for Estimating Beta
- Run regression between project's ROA and S&P index ROA.
- Accounting betas are correlated (0.5 – 0.6) with market betas.
- But normally can't get data on new projects' ROAs before the capital budgeting decision has been made.

Divisional Cost of Capital Using CAPM
- Target debt ratio = 10%.
- \( r_d = 12\% \).
- \( r_{RF} = 7\% \).
- Tax rate = 40%.
- \( \beta_{Division} = 1.7 \).
- Market risk premium = 6%.

Divisional Cost of Capital Using CAPM (Continued)
Division's required return on equity:
\[
r_s = r_{RF} + (r_M - r_{RF})\beta_{Div}.
\]
\[
r_s = 7\% + (6\%) \times 1.7 = 17.2\%.
\]
\[
WACC_{Div} = w_d \times r_d (1 - T) + w_e \times r_s
\]
\[
= 0.1(12\%)(0.6) + 0.9(17.2\%)
= 16.2\%.
\]
Division’s WACC vs. Firm’s Overall WACC?

- Division WACC = 16.2% versus company WACC = 11.1%.
- “Typical” projects within this division would be accepted if their returns are above 16.2%.

What are the three types of project risk?

- Stand-alone risk
- Corporate risk
- Market risk

How is each type of risk used?

- Stand-alone risk is easiest to calculate.
- Market risk is theoretically best in most situations.
- However, creditors, customers, suppliers, and employees are more affected by corporate risk.
- Therefore, corporate risk is also relevant.

A Project-Specific, Risk-Adjusted Cost of Capital

- Start by calculating a divisional cost of capital.
- Estimate the risk of the project using the techniques in Chapter 11.
- Use judgment to scale up or down the cost of capital for an individual project relative to the divisional cost of capital.

Costs of Issuing New Common Stock

- When a company issues new common stock they also have to pay flotation costs to the underwriter.
- Issuing new common stock may send a negative signal to the capital markets, which may depress stock price.
Cost of New Common Equity: \( P_0 = $50, \ D_0 = $4.19, \ g = 5\%, \) and \( F = 15\% \).

\[
\begin{align*}
    r_e &= \frac{D_0(1 + g)}{P_0(1 - F)} + g \\
    &= \frac{$4.19(1.05)}{$50(1 - 0.15)} + 5.0\% \\
    &= \frac{$4.40}{$42.50} + 5.0\% = 15.4\% \\
\end{align*}
\]

Cost of New 30-Year Debt: \( \text{Par} = $1,000, \ \text{Coupon} = 10\% \) paid annually, and \( F = 2\% \).

Using a financial calculator:
- \( N = 30 \)
- \( PV = 1000(1 - 0.02) = 980 \)
- \( PMT = -0.10(1000)(1 - 0.4) = -60 \)
- \( FV = -1000 \)

Solving for \( I \): 6.15%

Comments about flotation costs:
- Flotation costs depend on the risk of the firm and the type of capital being raised.
- The flotation costs are highest for common equity. However, since most firms issue equity infrequently, the per-project cost is fairly small.
- We will frequently ignore flotation costs when calculating the WACC.

Four Mistakes to Avoid
- Current vs. historical cost of debt
- Mixing current and historical measures to estimate the market risk premium
- Book weights vs. Market Weights
- Incorrect cost of capital components

See next slides for details.

Current vs. Historical Cost of Debt
- When estimating the cost of debt, don't use the coupon rate on existing debt.
- Use the current interest rate on new debt.

Estimating the Market Risk Premium
- When estimating the risk premium for the CAPM approach, don't subtract the current long-term T-bond rate from the historical average return on common stocks.
- For example, if the historical \( r_M \) has been about 12.2\% and inflation drives the current \( r_{RF} \) up to 10\%, the current market risk premium is not 12.2\% - 10\% = 2.2\% !
Estimating Weights

- Use the target capital structure to determine the weights.
- If you don't know the target weights, then use the current market value of equity, and never the book value of equity.
- If you don't know the market value of debt, then the book value of debt often is a reasonable approximation, especially for short-term debt.

Capital components are sources of funding that come from investors.

- Accounts payable, accruals, and deferred taxes are not sources of funding that come from investors, so they are not included in the calculation of the WACC.
- We do adjust for these items when calculating the cash flows of the project, but not when calculating the WACC.