Chapter 14

Cost of Capital

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Overview

1. Understand the concepts underlying the firm’s overall cost of capital and the purpose of its calculation.
2. Evaluate a firm’s capital structure, and determine the relative importance (weight) of each source of financing.
3. Calculate the after-tax cost of debt, preferred stock, and common equity.
4. Calculate a firm’s weighted average cost of capital
5. Discuss the pros and cons of using multiple, risk-adjusted discount rates.
6. Adjust net present value (NPV) for the costs of issuing new securities when analyzing new investment opportunities.
Cost of capital is the weighted average of the required returns of the securities that are used to finance the firm. We refer to this as the firm’s **Weighted Average Cost of Capital, or WACC**.

Most firms raise capital with a combination of debt, equity, and hybrid securities.

WACC incorporates the required rates of return of the firm’s lenders and investors and the particular mix of financing sources that the firm uses.
How does riskiness of firm affect WACC?

- Required rate of return on securities will be higher if the firm is riskier.

- Risk will influence how the firm chooses to finance, i.e., the proportion of debt and equity.

- WACC is useful in a number of settings:
  - WACC is used to value the firm.
  - WACC is used as a starting point for determining the discount rate for investment projects the firm might undertake.
  - WACC is the appropriate rate to use when evaluating performance, specifically whether or not the firm has created value for its shareholders.
The WACC equation

\[
\text{Weighted Average Cost of Capital (WACC)} = \left[ \left( \text{After-tax Cost of Debt } (k_d) \right) \times \left( \frac{\text{Proportion of Capital Raised by Debt}}{w_d} \right) \right] \\
+ \left[ \left( \text{Cost of Common Stock } (k_{cs}) \right) \times \left( \frac{\text{Proportion of Capital Raised by Common Stock}}{w_{cs}} \right) \right]
\]

\[
WACC = (k_d \times (1 - T) \times w_d) + (k_{cs} \times w_{cs})
\]

If there is preferred stock, there will be a third component on the cost of preferred stock.
A Three-Step Procedure for Estimating Firm WACC

1. Define the firm’s capital structure by determining the weight of each source of capital.

2. Estimate the opportunity cost of each source of financing. We will use the current market value of each source of capital based on its current, not historical, costs.

3. Calculate a weighted average of the costs of each source of financing.
### A Template for Calculating WACC

A firm’s WACC is a weighted average of the after-tax costs of each source of capital used by the firm in its capital structure. The following template demonstrates how to carry out the calculation of the WACC from Equation 14-1:

<table>
<thead>
<tr>
<th>Source of Capital</th>
<th>(2) Market Value Weights (Note b)</th>
<th>(3) After-tax Cost of Financing (Note c)</th>
<th>(4) Product of (2) and (3) (Note d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt</td>
<td>$w_d$</td>
<td>$k_d(1 - T)$</td>
<td>$w_d \times k_d(1 - T)$</td>
</tr>
<tr>
<td>Preferred stock</td>
<td>$w_{ps}$</td>
<td>$k_{ps}$</td>
<td>$w_{ps} \times k_{ps}$</td>
</tr>
<tr>
<td>Common equity</td>
<td>$w_{cs}$</td>
<td>$k_{cs}$</td>
<td>$w_{cs} \times k_{cs}$</td>
</tr>
<tr>
<td>Sum = 100%</td>
<td></td>
<td></td>
<td>WACC</td>
</tr>
</tbody>
</table>

**Notes:**

Note a—The sources of capital included in the WACC calculation include all interest-bearing debt (short- and long-term) but exclude non-interest bearing debt such as accounts payable and accrued expenses. In addition, preferred stock and common equity are included. The total of all the market values of all the capital sources included in the WACC computation is generally referred to as the firm’s enterprise value, and the mix of debt and equity defines the firm’s capital structure.

Note b—The weights used to average the costs of each source of capital should reflect the relative importance of each source of capital to the firm’s value on the date of the analysis. This means that the proper weights are based on the market values of each source of capital as a percent of the sum of the market values of all sources.

Note c—The investor’s required rate of return is the basis for estimating the cost of capital for each source of financing to the firm. However, since interest on the firm’s debt is tax deductible to the firm, we must adjust the lender’s required rate of return to an after-tax basis. The required rates of return for each source of financing, like the weights used to average them, should reflect current estimates based on current market conditions.

Note d—The weighted average of the individual costs of each source of capital is found by summing the product of the weights and costs of each source.
14.2 Determining the Firm’s Capital Structure Weights

- The weights are based on the following sources of capital: debt (short-term and long-term), preferred stock, and common equity.

- Liabilities such as accounts payable and accrued expenses are not included in capital structure.

- Ideally, the weights should be based on observed market values. However, not all market values may be readily available. Hence, we generally use book values for debt and market values for equity.
Checkpoint 14.1

Calculating the WACC for Templeton Extended Care Facilities, Inc.

In the spring of 2010, Templeton was considering the acquisition of a chain of extended care facilities and wanted to estimate its own WACC as a guide to the cost of capital for the acquisition. Templeton’s capital structure consists of the following:

<table>
<thead>
<tr>
<th></th>
<th>Market Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt</td>
<td>$100 million</td>
</tr>
<tr>
<td>Preferred stock</td>
<td>50 million</td>
</tr>
<tr>
<td>Common stock</td>
<td>250 million</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$400 million</strong></td>
</tr>
</tbody>
</table>
Checkpoint 14.1

Templeton contacted the firm’s investment banker to get estimates of the firm’s current cost of financing and was told that if the firm were to borrow the same amount of money today, it would have to pay lenders 8%; however, given the firm’s 25% tax rate, the after-tax cost of borrowing would only be $6\% = 8\%(1 - .25)$. Preferred stockholders currently demand a 10% rate of return, and common stockholders demand 15%. Templeton’s CFO knew that the WACC would be somewhere between 6% and 15% since the firm’s capital structure is a blend of the three sources of capital whose costs are bounded by this range.
STEP 1: **Picture the problem**

The weighted average cost of capital combines the after-tax cost of financing for each of the firm’s sources of capital in a weighted average, where the weights are proportionate to the relative importance of each source of financing in the firm’s capital structure (note that these are market—not book—values) as follows:

<table>
<thead>
<tr>
<th>Capital Structure</th>
<th>Calculation</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt (short- and long-term)</td>
<td>$100</td>
<td>$100/$400 = 0.250</td>
</tr>
<tr>
<td>Preferred stock</td>
<td>50</td>
<td>$50/$400 = 0.125</td>
</tr>
<tr>
<td>Common stock</td>
<td>250</td>
<td>$250/$400 = 0.625</td>
</tr>
<tr>
<td>Total</td>
<td>$400</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**After-tax cost of financing**

- Debt: 6%
- Preferred stock: 10%
- Common stock: 15%

**Capital structure weights**

- Debt: 25.0%
- Preferred stock: 12.5%
- Common stock: 62.5%
STEP 3: Solve

Using the template found in Figure 14.2, we calculate Templeton’s WACC as follows:

<table>
<thead>
<tr>
<th>Source</th>
<th>Weights ×</th>
<th>After-tax Cost of Financing</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt</td>
<td>0.250</td>
<td>0.060</td>
<td>0.015</td>
</tr>
<tr>
<td>Preferred Stock</td>
<td>0.125</td>
<td>0.100</td>
<td>0.0125</td>
</tr>
<tr>
<td>Common Stock</td>
<td>0.625</td>
<td>0.150</td>
<td>0.09375</td>
</tr>
<tr>
<td><strong>100.0%</strong></td>
<td><strong>WACC =</strong></td>
<td><strong>0.12125 or 12.125%</strong></td>
<td></td>
</tr>
</tbody>
</table>

STEP 4: Analyze

Templeton’s CFO estimated that the firm’s WACC is 12.125%, which lies within the range between the highest cost source of capital (common stock at 15%) and the lowest (debt at 6%). The weighted average is much closer to the cost of common equity than to the cost of debt, since 62.5% of the firm’s financing has been raised from common stock. We have carried the WACC calculation out to three decimal places, which suggests that we are able to measure the WACC with a great deal of precision.
After completing her estimate of Templeton’s WACC, the CFO decided to explore the possibility of adding more low-cost debt to the capital structure. With the help of the firm’s investment banker, the CFO learned that Templeton could probably push its use of debt to 37.5% of the firm’s capital structure by issuing more debt and retiring (purchasing) the firm’s preferred shares. This could be done without increasing the firm’s costs of borrowing or the required rate of return demanded by the firm’s common stockholders. What is your estimate of the WACC for Templeton under this new capital structure proposal?

WACC = \( w_{cs} k_{cs} + w_{d} k_{d} (1-T) \)

= \( .625 \times 15\% + .375 \times 6\% = 11.625\% \).
14.3 Estimating the Cost of Individual Sources of Capital

- The Cost of Debt
  - **The cost of debt** is the rate of return the firm’s lenders demand when they loan money to the firm.
  - Note, the rate of return is **not** the same as coupon rate, which is the rate contractually set at the time of issue.
  - We can estimate the market’s required rate of return by examining the **yield to maturity** on the firm’s debt.
  - After-tax cost of debt = Yield \( \times (1 - \text{tax rate}) \)
The Cost of Debt

Example 14.1 What will be the yield to maturity on a debt that has par value of $1,000, a coupon interest rate of 5%, time to maturity of 10 years and is currently trading at $900? What will be the cost of debt if the tax rate is 30%?

- We can calculate yield to maturity of the bond using a financial calculator or excel: YTM=6.38%.
- After-tax cost of debt = YTM(1-Tax Rate)=6.38%(1-.3)=4.47%
The Cost of Debt

- It is not easy to find the market price of a specific bond as most bonds do not trade in the public market.

- Because of this, it is a standard practice to estimate the cost of debt using the average yield to maturity on a portfolio of bonds with similar credit rating and maturity as the firm’s outstanding debt.

- The average yield to maturity for a specific rating class varies over time. It can also differ across different industry groups.
### A Guide to Corporate Bond Ratings

Three firms are the primary sources of default ratings on corporate debt: Moody's, S&P, and Fitch. Investment grade debt is rated Baa3 and BBB— or higher.

<table>
<thead>
<tr>
<th>Moody's</th>
<th>S&amp;P</th>
<th>Fitch</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaa</td>
<td>AAA</td>
<td>AAA</td>
<td>Prime. Maximum Safety</td>
</tr>
<tr>
<td>Aa1</td>
<td>AA+</td>
<td>AA+</td>
<td>High Grade High Quality</td>
</tr>
<tr>
<td>Aa2</td>
<td>AA</td>
<td>AA</td>
<td></td>
</tr>
<tr>
<td>Aa3</td>
<td>AA−</td>
<td>AA−</td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>A+</td>
<td>A+</td>
<td>Upper Medium Grade</td>
</tr>
<tr>
<td>A2</td>
<td>A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>A−</td>
<td>A−</td>
<td></td>
</tr>
<tr>
<td>Baa1</td>
<td>BBB+</td>
<td>BBB+</td>
<td>Lower Medium Grade</td>
</tr>
<tr>
<td>Baa2</td>
<td>BBB</td>
<td>BBB</td>
<td></td>
</tr>
<tr>
<td>Baa3</td>
<td>BBB−</td>
<td>BBB−</td>
<td></td>
</tr>
<tr>
<td>Ba1</td>
<td>BB+</td>
<td>BB+</td>
<td>Non-Investment Grade</td>
</tr>
<tr>
<td>Ba2</td>
<td>BB</td>
<td>BB</td>
<td>Speculative</td>
</tr>
<tr>
<td>Ba3</td>
<td>BB−</td>
<td>BB−</td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>B+</td>
<td>B+</td>
<td>Highly Speculative</td>
</tr>
<tr>
<td>B2</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>B−</td>
<td>B−</td>
<td></td>
</tr>
<tr>
<td>Caa1</td>
<td>CCC+</td>
<td>CCC</td>
<td>Substantial Risk</td>
</tr>
<tr>
<td>Caa2</td>
<td>CCC</td>
<td>_</td>
<td>In Poor Standing</td>
</tr>
<tr>
<td>Caa3</td>
<td>CCC−</td>
<td>_</td>
<td></td>
</tr>
<tr>
<td>Ca</td>
<td>_</td>
<td>_</td>
<td>Extremely Speculative</td>
</tr>
<tr>
<td>C</td>
<td>_</td>
<td>_</td>
<td>May be in Default</td>
</tr>
<tr>
<td>_</td>
<td>_</td>
<td>DDD</td>
<td>Default</td>
</tr>
<tr>
<td>_</td>
<td>_</td>
<td>DD</td>
<td></td>
</tr>
<tr>
<td>_</td>
<td>D</td>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>
## Corporate Bond Yields: Default Ratings and Term to Maturity

Yield to maturity for corporate bonds, arrayed by default rating and term to maturity. These data were compiled on March 1, 2006, and are typical. However, you would want to use the most recent data available when analyzing the cost of debt financing. Note that as the credit rating falls, the yield to maturity rises. Also, the yield to maturity typically increases for longer maturity bonds.

<table>
<thead>
<tr>
<th>Rating</th>
<th>1 yr</th>
<th>2 yr</th>
<th>3 yr</th>
<th>5 yr</th>
<th>7 yr</th>
<th>10 yr</th>
<th>30 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaa/AAA</td>
<td>4.88</td>
<td>4.87</td>
<td>4.95</td>
<td>5.03</td>
<td>5.16</td>
<td>5.27</td>
<td>5.46</td>
</tr>
<tr>
<td>Aa1/AA+</td>
<td>4.96</td>
<td>5.01</td>
<td>4.99</td>
<td>5.11</td>
<td>5.24</td>
<td>5.36</td>
<td>5.55</td>
</tr>
<tr>
<td>Aa2/AA</td>
<td>4.98</td>
<td>5.08</td>
<td>5.07</td>
<td>5.17</td>
<td>5.27</td>
<td>5.39</td>
<td>5.59</td>
</tr>
<tr>
<td>Aa3/AA−</td>
<td>4.99</td>
<td>5.1</td>
<td>5.08</td>
<td>5.21</td>
<td>5.31</td>
<td>5.4</td>
<td>5.65</td>
</tr>
<tr>
<td>A1/A+</td>
<td>5.17</td>
<td>5.19</td>
<td>5.2</td>
<td>5.28</td>
<td>5.39</td>
<td>5.52</td>
<td>5.73</td>
</tr>
<tr>
<td>A2/A</td>
<td>5.2</td>
<td>5.22</td>
<td>5.22</td>
<td>5.3</td>
<td>5.41</td>
<td>5.54</td>
<td>5.77</td>
</tr>
<tr>
<td>A3/A−</td>
<td>5.24</td>
<td>5.25</td>
<td>5.25</td>
<td>5.35</td>
<td>5.44</td>
<td>5.57</td>
<td>5.8</td>
</tr>
<tr>
<td>Baa1/BBB+</td>
<td>5.36</td>
<td>5.43</td>
<td>5.48</td>
<td>5.55</td>
<td>5.81</td>
<td>6</td>
<td>6.26</td>
</tr>
<tr>
<td>Baa2/BBB</td>
<td>5.39</td>
<td>5.51</td>
<td>5.56</td>
<td>5.6</td>
<td>5.88</td>
<td>6.1</td>
<td>6.33</td>
</tr>
<tr>
<td>Baa3/BBB−</td>
<td>5.46</td>
<td>5.56</td>
<td>5.58</td>
<td>5.65</td>
<td>5.94</td>
<td>6.18</td>
<td>6.39</td>
</tr>
<tr>
<td>B1/BB+</td>
<td>6.59</td>
<td>6.66</td>
<td>6.73</td>
<td>6.78</td>
<td>6.95</td>
<td>7.14</td>
<td>7.31</td>
</tr>
<tr>
<td>Baa2/BB</td>
<td>6.69</td>
<td>6.76</td>
<td>6.83</td>
<td>6.88</td>
<td>7.05</td>
<td>7.24</td>
<td>7.41</td>
</tr>
<tr>
<td>Baa3/BB−</td>
<td>6.79</td>
<td>6.86</td>
<td>6.93</td>
<td>6.98</td>
<td>7.15</td>
<td>7.34</td>
<td>7.51</td>
</tr>
<tr>
<td>B1/B+</td>
<td>7.39</td>
<td>7.46</td>
<td>7.53</td>
<td>7.78</td>
<td>8.15</td>
<td>8.54</td>
<td>9.01</td>
</tr>
<tr>
<td>B2/B</td>
<td>7.49</td>
<td>7.56</td>
<td>7.63</td>
<td>7.88</td>
<td>8.25</td>
<td>8.64</td>
<td>9.11</td>
</tr>
<tr>
<td>B3/B−</td>
<td>7.59</td>
<td>7.66</td>
<td>7.73</td>
<td>7.98</td>
<td>8.35</td>
<td>8.74</td>
<td>9.21</td>
</tr>
<tr>
<td>US Treasury Yield</td>
<td>4.74</td>
<td>4.71</td>
<td>4.68</td>
<td>4.63</td>
<td>4.6</td>
<td>4.59</td>
<td>4.56</td>
</tr>
</tbody>
</table>

**Legend:** These data are actually reported as “spread to Treasury yields,” so for a 30-year Baa1/BBB+ corporate bond the yield would be reported as 170 basis points over the 30-year U.S. Treasury yield of 4.66%. A basis point is 1/100th of a percent. Therefore, 170 basis points is 1.7%, such that the corporate bond yield is 4.56% + 1.70% = 6.26%.
The Cost of Preferred Equity

- The cost of preferred equity is the rate of return investors require of the firm when they purchase its preferred stock.
- The cost is not adjusted for taxes since dividends are paid to preferred stockholders out of after-tax income.
- The cost of preferred stock can be inferred from its trading price and the fixed dividend:

\[ k_{ps} = \frac{D_{ps}}{P_{ps}} \]
The Cost of Preferred Equity

Example 14.2 Consider the preferred shares of Relay Company that are trading at $25 per share. What will be the cost of preferred equity if these stocks have a par value of $35 and pay annual dividend of 4%?

- Dividend = $35 \times 4\% = $1.4
- Cost of preferred equity = \frac{\text{Dividend}}{\text{price}} = \frac{1.4}{25} = 5.6\%.
The Cost of Common Equity

- The **cost of common equity** is the rate of return investors expect to receive from investing in firm’s stock.

- This return comes in the form of cash distributions of dividends and cash proceeds from the sale of the stock.

- Cost of common equity is harder to estimate since common stockholders do not have a contractually defined return similar to the interest on bonds or dividends on preferred stock. There are two approaches to estimating the cost of common equity:
  - Dividend growth model (introduced in chapter 10)
  - CAPM (introduced in chapter 8)
The Dividend Growth Model – Discounted Cash Flow Approach

- Using this approach, we estimate the expected stream of dividends as the source of future estimated cash flows.

- We use the estimated dividends and current stock price to calculate the internal rate of return on the stock investment. This return is used as an estimate of cost of equity.

- Originally, we use the dividend growth model to estimate the stock value. Now we take the market price of the stock as the fair value, and learn what the discount rate (required rate of return) should be if the market price is the fair value.
The constant growth case

- If we assume that the dividend grows at a constant rate, $g$, the stock can be valued as

$$V_{cs} = \frac{D_1}{k_{cs} - g}$$

where $k_{cs}$ is the cost of common equity or required rate of return on the equity and $V_{cs}$ is the fair value.

- If we set the market price to the fair value, $P_{cs} = V_{cs}$, we can infer the cost of common equity as,

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

$D/P$ is called the dividend yield (DY).
Checkpoint 14.2

Estimating the Cost of Common Equity for Pearson plc Using the Dividend Growth Model

Pearson plc (PSO) is an international media company that operates three business groups: Pearson Education, the Financial Times, and Penguin. In the spring of 2009, Pearson’s CFO called for an update of the firm’s cost of capital. The first phase of the estimation focused on the firm’s cost of common equity. How would the CFO determine the cost of the company’s equity, using the dividend growth model?

PSO stock is traded at $10.09. The last dividend paid is $0.47 per share, and we expect a growth rate of 6.25%.

\[
k_{cs} = \frac{D_1}{P_{cs}} + g = \frac{D_0(1 + g)}{P_{cs}} + g = \frac{.47(1 + .0625)}{10.09} + 6.25\% = 11.2\%
\]
Checkpoint 14.2: Check Yourself

- Prepare two additional estimates of Pearson’s cost of common equity using the dividend growth model where you use growth rates at 5% and 7.81%, respectively.

  - 9.89%, 12.83%.
Estimating the Rate of Growth, $g$

- The growth rate can be obtained from various websites that post analysts forecasts of growth rates.

- We can also estimate the growth rate using the historical data and computing the arithmetic average or geometric average.
Estimating the Rate of Growth, $g$ (cont.)

<table>
<thead>
<tr>
<th>Year</th>
<th>Dividend</th>
<th>$ Change</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>$0.800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>0.825</td>
<td>$0.025</td>
<td>3.1%</td>
</tr>
<tr>
<td>2006</td>
<td>0.840</td>
<td>0.015</td>
<td>1.8%</td>
</tr>
<tr>
<td>2007</td>
<td>0.875</td>
<td>0.035</td>
<td>4.2%</td>
</tr>
<tr>
<td>2008</td>
<td>0.900</td>
<td>0.025</td>
<td>2.9%</td>
</tr>
<tr>
<td></td>
<td>Arithmetic Average</td>
<td></td>
<td>3.0%</td>
</tr>
<tr>
<td></td>
<td>Geometric Average</td>
<td></td>
<td>2.99%</td>
</tr>
</tbody>
</table>
Pros and Cons of the Dividend Growth Model Approach

- While dividend growth model is easy to use, it is severely dependent upon the quality of growth rate estimates.

- Furthermore, not all firms pay dividends.

- Many times, the growth rate is estimated/forecasted on EPS instead of on dividends.
The Capital Asset Pricing Model

- CAPM was used in chapter 8 to determine the expected or required rate of return for risky investments.

\[
\text{Cost of Common Equity (} k_{cs} \text{)} = \text{Risk-Free Rate (} r_f \text{)} + \left( \text{Equity Beta} \times \text{Market Risk Premium} \right)
\]

- Cost of is determined by three key ingredients:
  - The risk-free rate of interest,
  - The beta or systematic risk of the common stock returns, and
  - The market risk premium.
Pros & Cons the CAPM approach

- **Pros**
  1. The model is simple to understand and use.
  2. The model does not depend on dividends or growth rate. It can be applied to companies that do not currently pay dividends or are not expected to experience a constant rate of growth in dividends.

- **Cons**
  1. CAPM does not offer any guidance on the appropriate choice for the *risk-free rate*. Risk-free rate may vary widely depending on the Treasury security chosen.
  2. Estimates of *beta* can vary widely depending upon the market index and time period chosen.
  3. Estimates of *market risk premium* will also vary depending on the time period and security chosen.
Estimating the Cost of Common Equity for Pearson plc using the CAPM

A review of current market conditions at the end of March 2009 reveals that the 10-year U.S. Treasury Bond yield that we will use to measure the risk-free rate was 2.81%, the estimated market risk premium is 6.5%, and the beta for Pearson’s common stock is 1.20.

Determine Pearson’s cost of common equity using the CAPM, as of March 2009.

Cost of equity = Rf + Beta x Market risk premium

= 2.81% + 1.20x6.5% = 10.61%
Checkpoint 14.3: Check Yourself

Prepare two additional estimates of Pearson’s cost of common equity using the CAPM where you use the most extreme values of each of the three factors that drive the CAPM.
Checkpoint 14.3: Analysis

- CAPM describes the relationship between the expected rates of return on risky assets in terms of their systematic risk. Its value depends on:
  - The risk-free rate of interest,
  - The beta or systematic risk of the common stock returns, and
  - The market risk premium.

- However, there can be wide variation in the estimates for each one of these variables.

- Here we are given the following estimates:
  - The risk-free rate of interest (0.03% or 3.73%)
  - The beta or systematic risk of the common stock returns (1 or 1.5)
  - The market risk premium (4% or 8%)
The low-high range on the cost of equity:
- The low: $k_{cs} = 0.03\% + 1(4\%) = 4.03\%$
- The high: $k_{cs} = 3.73\% + 1.5(8\%) = 15.73\%$

Pearson’s cost of equity is shown to be sensitive to the estimates used for risk-free rate of interest, beta and market risk premium.

Based on the estimates used, the cost of common equity ranges from 4.03% to 15.73%.
14.4 Summing Up: Calculating the Firm’s WACC

- The final step is to calculate the firm’s overall cost of capital by taking the weighted average of the firm’s financing mix that we evaluated in Steps One and Two.

- The following issues should be kept in mind:
  - Determine weights based on market value rather than book value (if possible).
  - Use market (current) costs rather than historical rates (such as coupon rates).
  - Use forward looking weights and opportunity costs.
Should the firm’s WACC be used to evaluate all new investments?

In theory, it is appropriate only if the risk of the new project is equal to the overall risk of the firm. This may generally not be the case necessitating the need for a unique cost of capital for each project.

However, a recent survey found that more than 50% of the firms tend to use single, company-wide discount rate to evaluate all of their investment proposals.

There are advantages and costs associated with estimating a unique discount rate for each project.
The Pros & Cons for Using Multiple Discount Rates

- Pros
  - Multiple discount rates is consistent with finance theory that suggests that unique discount rate will reflect the unique risk of the investment.

- Cons
  - It may be difficult to trace the source of financing for individual project since most firms raise money in bulk for all the projects.
  - It adds to the time and cost in getting approval for new projects.
  - Financing cost, in general, depends on the risk of firm (with the project included), not the risk of a specific project.
  - If a firm fails on one project, it does not mean that the company will default on the debt used on that project. The equity holder has claims on the whole company, not just one particular project.
14.6 Floatation Costs

- **Floatation costs** are costs incurred by a firm when it raises money to finance new investments by selling bonds and stocks.

- For example, these costs may include fees paid to an investment banker, and costs incurred when securities are sold at a discount to the current market price.

- Because of floatation costs, the firm will have to raise more than the amount it needs.

\[
\text{Floatation Cost Adjusted \ Initial Outlay} = \frac{\text{Financing Needed}}{\left(1 - \frac{\text{Floatation Cost}}{\text{as a percent}}\right)}
\]
Example 14.3 If a firm needs $100 million to finance its new project and the floatation cost is expected to be 5.5%, how much should the firm raise by selling securities?

- Floating Cost Adjusted Money Need

\[ \text{Floating Cost Adjusted Money Need} = \frac{100 \text{ million}}{1 - 0.055} = 105.82 \text{ million} \]

- The firm will raise $105.82 million, which includes floatation cost of $5.82 million.
The Tricon Telecom Company is considering a $100 million investment that would allow it to develop fiber optic high-speed Internet connectivity to its 2 million subscribers. The investment will be financed using the firm’s desired mix of debt and equity with 40% debt financing and 60% common equity financing. The firm’s investment banker advised the firm’s CFO that the issue costs associated with debt would be 2% while the equity issue costs would be 10%.

Tricon uses a 10% cost of capital to evaluate its telecom investments and has estimated that the new fiber optic project will yield future cash flows valued at $115 million. However, to this point no consideration has been given to the effect of the costs of raising the financing for the project or flotation costs. Should the firm go forward with the investment in light of the flotation costs?

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Checkpoint 14.4: Floatation Costs and Project NPV

- Weighted average floatation cost:
  \[ \text{Weighted average} = 40\%(2\%) + 60\%(10\%) = 6.8\%. \]

- Floatation cost adjusted initial outlay
  \[ \text{Initial outlay} = \frac{100}{1 - 6.8\%} = 107.3 \text{ million}. \]
  Hence, floatation cost is 7.3 million.

- Project NPV: The present value of both cash inflows and cash outflows:
  \[ \text{NPV} = 115 - 107.3 = 7.70 \text{ million}. \]
Before Tricon could finalize the financing for the new project, stock market conditions changed such that new stock became more expensive to issue. In fact, floatation costs rose to 15% of new equity issued and the cost of debt rose to 3%. Is the project still viable (assuming the present value of future cash flows remain unchanged)?

The project NPV will be equal to the present value of the future cash flows less the initial outlay and floatation costs.

\[
\text{NPV} = \text{PV(inflows)} - (\text{Floatation cost adjusted Initial outlay})
\]

\[
= 115-100/(1-(.4\times3\%+.6\times15\%)) = 115-111.36 = $3.64
\]

Floatation cost is 11.36 million.