The Cost of Capital

Topics to be covered

- The Cost of Capital
- The Company Cost of Capital and The Weighted Average Cost of Capital
  - Three Steps in Calculating Cost of Capital
  - Market VS. Book Weights.
  - Taxes and The Weighted-Average Cost of Capital
  - Calculating Required Rate of Return
    - The Expected Return on Bonds.
    - The Expected Return on Common Stock
    - The Expected Return on Preferred Stock
  - Calculating the Weighted Average Cost of Capital
- Interpreting the weighted average cost of capital

The Cost of Capital

Key question: How does the firm determines the cost of its funds, or more properly stated, the cost of Capital.

Example: Suppose the plant superintendent wishes to borrow money at 6 percent to purchase a conveyor system, while a division manager suggests stock be sold at the cost of 12 percent to develop a new product.

<table>
<thead>
<tr>
<th>Borrow money at 6%</th>
<th>Issue stock at 12%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of Return 8%</td>
<td>Rate of Return 11%</td>
</tr>
</tbody>
</table>

If this is the case, project with lower return will be accepted and project with higher return will be rejected.

<table>
<thead>
<tr>
<th>Financed half with debt at 6%</th>
<th>Financed another half with stock at 12%</th>
</tr>
</thead>
<tbody>
<tr>
<td>The average cost of financing will be 9%</td>
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</tbody>
</table>

Now, we will reject the 8% conveyor system and accept the 11 percent new product.

The use of debt might increase the overall risk of the firm.
In addition, for an average firm, newly-issued common stock will have the higher cost compared to newly-issued bonds, or newly-issued preferred stocks.

Each project must be measured against the overall cost of funds to the firms.

The determination of cost of capital can be best understood by examining the capital structure of a firm.
Capital Structure => the firm’s mix of long term debt and equity financing.

Capital Structure => Bonds + Common stock + Preferred stock.

Value of firm (V) = D + E + P

Where

V represents the value of firm
D represents the market value of debts (bonds)
E represents the market value of common stock equity
P represents the market value of preferred stocks.

All-equity financed (No debt) => Common stock + Preferred stock.

Value of firm (V) = E + P

Cost of capital is
=> the return the firm’s investors could expect to earn if they invested in securities with comparable degree of risk.
=> the discount rate for evaluating new, similar risk asset investments.

The cost of capital for an all-equity financed firm (R_A = R_E) is
⇒ the required return on the firm’s assets.
⇒ Owning all the stock is the same as owning all the assets.
⇒ The expected return on the stock is the expected return on the assets.

The cost of capital for a debt-equity financed firm (R) is
⇒ the weighted average of return on debt and equity weighted by market value.
⇒ Equal to the expected return on the portfolio of assets.
WACC
The weighted average cost of capital (WACC) is
\( \rightarrow \) the cost of capital for the firm as a whole.
\( \rightarrow \) The required rate of return on the overall firm.
\( \rightarrow \) The expected rate of return on a portfolio of all the firm’s securities
\( \rightarrow \) Company cost of capital = Weighted Average Costs of Debt + Weighted Average Costs of Equity
\( \rightarrow \) WACC = \( (D/V)(1-t_c)R_d + (E/V) R_E + (P/V) R_p \)

Three Steps in calculating WACC
(1) Calculate the value of each security as a proportion of the firm’s market value.
(2) Determine the required rate of return on each security.
(3) Calculate a weighted average of these required returns.

In estimating WACC, do not use the Book Value of securities since they do not represent the true market value of firm’s securities. Use the Market Value of the securities.

**Market Value of Bond**: Present value of all coupon and par value discounted at current interest rate.

\[
\text{Market Value of Bonds} = \frac{\text{Total Par Value of Bonds} \times \text{Selling price}}{\text{Face Value}}
\]

**Market Value of Equity**: Market price per share multiplied by the number of outstanding shares.

\[
\text{Market Value of Equity} = \frac{\text{Total Book Value} \times \text{Market price/share}}{\text{Book Value/Share}}
\]

\[
\text{Market Value of Preferred Stock} = \frac{\text{Total Book Value} \times \text{Market Price/Share}}{\text{Book Value/Share}}
\]
Value of Firm (V) = Market Value of Debt (D) + Market Value of Common Stock Equity (E) + Market Value of Preferred Stock (P)

Value of all equity financed firm (V) = 0 + Market Value of Common Stock Equity (E) + Market Value of Preferred Stock (P)

<table>
<thead>
<tr>
<th></th>
<th>D/V</th>
<th>E/V</th>
<th>P/V</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Weighted Average</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Required Rate of Return on each Security</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R_d = Before-tax Cost of Debt of Debt (1) R_d = Yield to maturity of bond (2) R_d(1-t_c) = After-tax Cost of Debt</td>
<td>R_E = Cost of Common Stock Equity (1) R_E = R_f + β(R_m-R_f) (2) R_E = DIV/P_0 + g</td>
<td>R_p = Cost of Preferred Stock</td>
<td>R_p = DIV/P_0</td>
</tr>
<tr>
<td>(3) WACC</td>
<td>(D/V)<em>R_d(1-t_c) + (E/V)</em> R_E + (P/V) * R_p</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example 1: The common stock of PinkPanter’s Insurance Agency has a beta of 1.5 and the following capital structure. The Treasury bill rate is 5% and market risk premium is estimated at 9 percent. PinkPanter’s tax rate is 35%.

<table>
<thead>
<tr>
<th>Security</th>
<th>Market Value</th>
<th>Weighted</th>
<th>Required Rate of Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt</td>
<td>$10,000</td>
<td>.10</td>
<td>5.39%</td>
</tr>
<tr>
<td>Preferred Stock</td>
<td>$20,000</td>
<td>.20</td>
<td>9%</td>
</tr>
<tr>
<td>Common Stock</td>
<td>$70,000</td>
<td>.70</td>
<td>18.5%</td>
</tr>
<tr>
<td>Value</td>
<td>100,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) What is the Firm’s capital structure?

(2) What is PinkPanter’s cost of common stock equity capital?

(3) What is PinkPanter’s cost of debt if debt is selling at $1,050, the coupon rate is 9%, and the maturity date is 10 years if bond pays annual coupon?

(4) What is after tax cost of debt?

(5) If the rate of return on preferred stocks is 9%, what is PinkPanter’s WACC?

Note: Debt holders get a smaller share of income as their return is guaranteed by the company. Stockholders bear more risk and receive, on average greater return.
Having known the techniques for computing the costs of various elements in the capital structure and the WACC, we must decide the weight to these costs so as to achieve the minimum overall cost of capital.

Though debt is the cheapest form of financing, it should be used only within reasonable limits. From the creditor’s standpoint, a high debt/equity ratio will be viewed as unfavorable, as it indicates that the company has a high degree of leverage. The use of debt beyond a reasonable point may increase the firm’s financial risk and therefore drive up the costs of common stock equity and overall sources of financing.

**Interpreting the weighted average cost of capital:**

1) When you can and can’t use WACC:
   The WACC is the rate of return that the business must expect to earn on its average-risk investment in order to provide the opportunity rate of return to all its investors, debts and equity.
   Investment projects under consideration with higher or lower risk than average business risk should be discounted with rates above or below the WACC.

2) Some mistakes people make using WACC:
   As debt is tax deductible and its after tax cost is far less than the cost of equity, one may reason that funding the project with increased proportions of debt will lower WACC. As the debt ratio increases, the incremental cost of debt, both explicit interest rates and implicitly through increases in the cost of equity capital raises WACC.

3) How changing capital structure affects expected returns:
   If there are no corporate taxes, a change in the capital structure won’t affect WACC. The shareholder’s required rate of return adjusts to the changing capital structure and its component parts in order to keep the WACC same.

4) Flotation costs and the cost of capital:
   Flotation costs increases the cost outlay of investment projects and lower NPV’s. They do not increase the required rate of return!

5) The cost of capital depends only on the risk of the project.