Chapter 12
The Cost of Capital

Topics
- Thinking through Frankenstein Co.’s cost of capital
- Weighted Average Cost of Capital: WACC
- General Electric’s WACC estimation
- Measuring Capital Structure
- Required Rates of Return for individual types of capital.
- Flotation Costs

Cost of Capital

**Cost of Capital** - The return the firm’s investors could expect to earn if they invested in securities with comparable degrees of risk.

**Capital Structure** - The firm’s mix of long term financing and equity financing.
Frankenstein Co.’s Cost of Capital

- Dr. Frederick Frankenstein is considering expanding his company’s business and has asked his assistant Igor to estimate the company’s cost of capital.
- The company has 1 million shares of common stock outstanding at a market price of $8 per share. According to Frau Bluker, another Dr. Frankenstein assistant, stockholders demand a 22% return on the company’s stock.
- Igor’s initially estimates that Frankenstein’s cost of capital is the stockholders 22% required return under the following assumptions.
  - company’s value = value of its stock
  - risk of company = risk of its stock
  - investors’ required return from company = investors’ required return on stock. However, ...

What about debt?

- Upon further investigation, Igor discovers that Frankenstein Co. has bonds with a market value of $2 million outstanding and the company’s bondholders require a 12% return on this debt.
- Now Igor is thinking the following:
  - Value of company = value of portfolio of all the firm’s debt & equity securities
  - Risk of company = risk of portfolio
  - Rate of return on company = rate of return on portfolio
  - Investors’ required return on company (company cost of capital) = investors’ required return on portfolio

Frankenstein Co.’s Capital Structure

- Market Value of Debt $2 million
- Market Value of Equity (1m shares x $8/share) $8 million
- Market Value of Assets $10 million
- The company uses 20% debt financing and 80% equity financing, and Igor assumes the company will maintain this capital structure.
- Igor decides the cost of debt is the bondholders’ required return of 12% and the cost of equity is the stockholders’ required return of 22%.
- Igor decides that Frankenstein’s cost of capital is equal to the return of an investor owning a portfolio of all the company’s debt and equity, which is .2(12%) + .8(22%) = 20%.
What about taxes from Frankenstein’s perspective?

- Igor's logic is close but not quite right because he is forgetting that interest paid on debt is tax deductible for a corporation.
- Consider these two companies with a 35% tax rate:
  - Abby has no debt, Normal has $1000 in debt with a 10% interest rate

<table>
<thead>
<tr>
<th>Company</th>
<th>Abby</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Interest Exp.</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Pre-tax income</td>
<td>1000</td>
<td>900</td>
</tr>
<tr>
<td>Taxes (35%)</td>
<td>350</td>
<td>315</td>
</tr>
<tr>
<td>Net Income</td>
<td>650</td>
<td>585</td>
</tr>
</tbody>
</table>

- Normal's interest expense saves 35 in taxes and has an after tax cost of 65, which makes their after-tax interest rate 65/1000 or 6.5% = 10%(1−.35). Igor needs to incorporate this into his estimate.

Igor’s final Cost of Capital estimate

- Frankenstein has a tax rate of 35%, uses 20% debt financing with a cost of 12% (before-tax) and 80% equity financing.
- Frankenstein Co.’s weighted average cost of capital:

\[
\text{WACC} = .2(12\%)(1-.35) + .8(22\%)
\]

\[
= .2(7.8\%) + .8(22\%) = 19.16\%
\]

- If the company’s expansion is expected to earn more than 19.16%, the company should proceed with this investment.

WACC

Three Steps to Calculating Cost of Capital

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.

- Let’s use General Electric (GE) to illustrate this process.
GE: Let's try finding WACC for real.

- We will work this out together. Here's some information we need to gather and use.
- Gives us preferred stock, capital structure information beta, growth rate estimates and quarterly dividend information
- Corporate Bond info:
  - Bond rating: www.standardandpoors.com
  - Treasury yield and yield spreads: www.bondsonline.com

\[
\text{WACC} = \left[ \frac{D}{V} \times (1 - Tc) \right] r_{\text{deb}} + \left[ \frac{E}{V} \times r_{\text{equity}} \right]
\]

WACC formula and GE's assumptions

- For GE, their recent stock price is $35.71/share and they have a total market value of equity (market cap from Yahoo) of $378.5 billion (E)
- The market value of GE’s long-term debt is $186.3 billion (D)
- Total market value (V) of GE is $564.8 billion
- \( D/V = 186.3/564.8 = 33\% \) debt financing
- \( E/V = 378.5/564.8 = 67\% \) equity financing
Estimating required return on debt

After-tax cost of debt = pretax cost x (1 - tax rate)
= r_{pre} x (1 - Tc)

- $r_{debt}$ = bank lending rate, YTM on existing bonds
- Can estimate this YTM by looking at company's bond rating and adding default risk spread to a current T-bond with the same maturity.

GE's estimated required debt return

- GE's bonds have a credit rating of AAA from S&P. Let's assume bonds with 10 years to maturity. Tax rate = 35%
- 10-year T-bond rate = 4.4%
- 10-year AAA industrial bond spread = 0.31%

Required Equity Return: CAPM

Common Stock
\[ r_c = \text{CAPM} = r_f + B(r_m - r_f) \]
\[ \text{risk premium} \]

- \( r_c \) = Required equity return
- \( r_f \) = Risk-free rate
- \( B \) = Beta
- \( r_m \) = Market return
- \( B(r_m - r_f) \) = Market risk premium
Issues in Implementing CAPM:

- Must obtain estimates of $r_f$, $\beta$, and $r_m - r_f$ or market risk premium.
- Can use Treasuries to estimate $r_f$. But what time to maturity?
  - For financial investments like stocks, 3-month T-bills are usually used. (Current rate ~ 2.8%)
  - Since capital budgeting involves long-term investments, some argue 10 or 20 year T-bond rates make sense. (Current 10-yr T-bond rate ~4.4%)
- Many published sources of $\beta$ estimates.
  - Value Line Investment Survey, Standard & Poor’s, Yahoo Finance and Merrill Lynch.
- For $r_m - r_f$, can use historical difference between market return and T-bills (8 to 9%) or market return and long-term T-bonds (7 to 8%).

Required equity return: CAPM approach

- From Yahoo, GE’s beta is 0.9.
- The T-bill rate of 2.8% is $r_f$, the market risk premium can be the historical average of 8%. (or can assume 10-yr T-bond of 4.4% with historical market risk premium of 6.7%)

The Dividend Discount Model

- The expected return formula derived from the constant growth stock valuation model.
  - $r_{equity} = \frac{Div_1}{P_0} + g = \frac{Div_0(1+g)}{P_0} + g$
- In practice: The tough part is estimating $g$.
- Security analysts’ projections of $g$ can be used.
- According to the journal, Financial Management, these projections are a good source for growth rate estimates.
- Possible Sources for $g$: Value Line Investment Survey and Institutional Brokers’ Estimate System (I/B/E/S)
GM’s DDM cost of equity estimate

- From Yahoo Finance, recent stock price = $35.71 (P₀), announced recent dividend = $0.88 (Div₀).
- From Value Line annual rates, expected annual growth rate in dividends and earnings is 7%.

GE’s WACC estimate

- Recall, debt financing proportion (D/V) is 33% (or .33), and equity financing proportion (E/V) is 67%.
- Debt required return (r_{debt}) = 4.71%, tax rate = 35%, r_{equity} = 10%

What if a company uses preferred stock?

- GM has preferred stock selling for $27 per share that pays a dividend of $2.10. What is GM’s cost of preferred stock?
Measuring Capital Structure

- In estimating WACC, do not use the Book Value of securities.
- In estimating WACC, use the Market Value of the securities.
- Book Values often do not represent the true market value of a firm’s securities.

Market Value of Bonds - PV of all coupons and par value discounted at the current interest rate.

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

Trump’s Wings (TW) Capital Structure and WACC

- Trump’s Wings has bonds with a total par value of $10 million, 10 years to maturity, and a 10% annual coupon. Also, TW has 5 million shares of common stock with a par value of $1 per share and $5 million of retained earnings.

<table>
<thead>
<tr>
<th>Balance Sheet (book value) in $million</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Long-term Bonds</td>
<td>10</td>
</tr>
<tr>
<td>Common Stock</td>
<td>5</td>
</tr>
<tr>
<td>Retained Earnings</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>
Trump’s Wings (TW) Capital Structure and WACC

- Trump’s Wings bonds have a YTM (required return) of 8%. The common stock sells for $5 per share with an required return of 15%.
- What is the market value of these securities and Trump’s Wings WACC if their tax rate is 40%?

Trump’s Wings Market Values

Trump’s Wings WACC
To use WACC, or not to use WACC

- A company's WACC is for average risk projects for a firm.
- Most financial managers adjust WACC upward for riskier than average projects and downward for safer than average projects.
- Also, companies with diverse divisions might use industry average WACCs for other companies in the same line of business as their individual corporate divisions.

What to keep in mind about WACC.

- WACC is the correct discount rate for a company to use for average-risk capital investment projects.
- WACC is the return the company needs to earn after tax in order to satisfy all its security holders.
- Since the after-tax cost of debt is usually the cheapest source of financing for a firm, a firm may be tempted to increase their debt ratio. However, this will increase the risk associated with both debt & equity financing and a higher required rate of return on both sources of financing.
- More on this issue in Chapter 15, Debt Policy.
Flotation Costs

- The cost of implementing any financing decision must be incorporated into the cash flows of the project being evaluated.
- Only the incremental costs of financing should be included.
- This is sometimes called Adjusted Present Value.