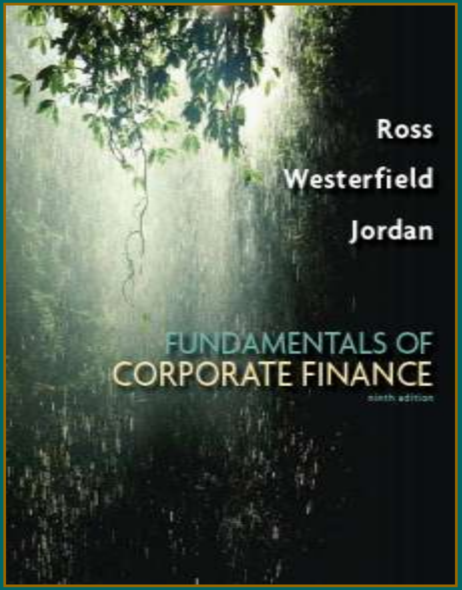
Chapter 14

Cost of Capital



Key Concepts and Skills

- Know how to determine a firm's cost of equity capital
- Know how to determine a firm's cost of debt
- Know how to determine a firm's overall cost of capital
- Understand pitfalls of overall cost of capital and how to manage them

Chapter Outline

- The Cost of Capital: Some Preliminaries
- The Cost of Equity
- The Costs of Debt and Preferred Stock
- The Weighted Average Cost of Capital
- Divisional and Project Costs of Capital
- Flotation Costs and the Weighted Average Cost of Capital

Why Cost of Capital Is Important

- We know that the return earned on assets depends on the risk of those assets
- The return to an investor is the same as the cost to the company
- Our cost of capital provides us with an indication of how the market views the risk of our assets
- Knowing our cost of capital can also help us determine our required return for capital budgeting projects

Required Return

- The required return is the same as the appropriate discount rate and is based on the risk of the cash flows
- We need to know the required return for an investment before we can compute the NPV and make a decision about whether or not to take the investment
- We need to earn at least the required return to compensate our investors for the financing they have provided

Cost of Equity

- The cost of equity is the return required by equity investors given the risk of the cash flows from the firm
  - Business risk
  - Financial risk
- There are two major methods for determining the cost of equity
  - Dividend growth model
  - SML, or CAPM

The Dividend Growth Model Approach

- Start with the dividend growth model formula and rearrange to solve for R_E

$$P_0 = \frac{D_1}{R_E - g}$$

$$R_E = \frac{D_1}{P_0} + g$$

Dividend Growth Model Example

- Suppose that your company is expected to pay a dividend of \$1.50 per share next year. There has been a steady growth in dividends of 5.1% per year and the market expects that to continue. The current price is \$25. What is the cost of equity?

$$R_E = \frac{1.50}{25} + .051 = .111 = 11.1\%$$

Example: Estimating the Dividend Growth Rate

- One method for estimating the growth rate is to use the historical average

Year	Dividend	Percent Change
2005	1.23	-
2006	1.30	(1.30 – 1.23) / 1.23 = 5.7%
2007	1.36	(1.36 – 1.30) / 1.30 = 4.6%
2008	1.43	(1.43 – 1.36) / 1.36 = 5.1%
2009	1.50	(1.50 – 1.43) / 1.43 = 4.9%

Average = (5.7 + 4.6 + 5.1 + 4.9) / 4 = 5.1%

Advantages and Disadvantages of Dividend Growth Model

- Advantage – easy to understand and use
- Disadvantages
  - Only applicable to companies currently paying dividends
  - Not applicable if dividends aren't growing at a reasonably constant rate
  - Extremely sensitive to the estimated growth rate – an increase in g of 1% increases the cost of equity by 1%
  - Does not explicitly consider risk

The SML Approach

- Use the following information to compute our cost of equity
  - Risk-free rate, R_f
  - Market risk premium, $E(R_M) - R_f$
  - Systematic risk of asset, β

$$R_E = R_f + \beta_E(E(R_M) - R_f)$$

Example - SML

- Suppose your company has an equity beta of .58, and the current risk-free rate is 6.1%. If the expected market risk premium is 8.6%, what is your cost of equity capital?
  - $R_E = 6.1 + .58(8.6) = 11.1\%$
- Since we came up with similar numbers using both the dividend growth model and the SML approach, we should feel good about our estimate

Advantages and Disadvantages of SML

- Advantages
  - Explicitly adjusts for systematic risk
  - Applicable to all companies, as long as we can estimate beta
- Disadvantages
  - Have to estimate the *expected* market risk premium, which does vary over time
  - Have to estimate beta, which also varies over time
  - We are using the past to predict the future, which is not always reliable

Example – Cost of Equity

- Suppose our company has a beta of 1.5. The market risk premium is expected to be 9%, and the current risk-free rate is 6%. We have used analysts' estimates to determine that the market believes our dividends will grow at 6% per year and our last dividend was \$2. Our stock is currently selling for \$15.65. What is our cost of equity?
  - Using SML: $R_E = 6\% + 1.5(9\%) = 19.5\%$
  - Using DGM: $R_E = [2(1.06) / 15.65] + .06 = 19.55\%$

Cost of Debt

- The cost of debt is the required return on our company's debt
- We usually focus on the cost of long-term debt or bonds
- The required return is best estimated by computing the yield-to-maturity on the existing debt
- We may also use estimates of current rates based on the bond rating we expect when we issue new debt
- The cost of debt is NOT the coupon rate

Example: Cost of Debt

- Suppose we have a bond issue currently outstanding that has 25 years left to maturity. The coupon rate is 9%, and coupons are paid semiannually. The bond is currently selling for $908.72 per $1,000 bond. What is the cost of debt?
  – N = 50; PMT = 45; FV = 1000; PV = -908.72; CPT I/Y = 5%; YTM = 5(2) = 10%

Cost of Preferred Stock

- Reminders
  - Preferred stock generally pays a constant dividend each period
  - Dividends are expected to be paid every period forever
- Preferred stock is a perpetuity, so we take the perpetuity formula, rearrange and solve for R_P
- $R_P = D / P_0$

Example: Cost of Preferred Stock

- Your company has preferred stock that has an annual dividend of $3. If the current price is $25, what is the cost of preferred stock?
- $R_P = 3 / 25 = 12\%$

The Weighted Average Cost of Capital

- We can use the individual costs of capital that we have computed to get our “average” cost of capital for the firm.
- This “average” is the required return on the firm’s assets, based on the market’s perception of the risk of those assets
- The weights are determined by how much of each type of financing is used

Capital Structure Weights

- Notation
  - E = market value of equity = # of outstanding shares times price per share
  - D = market value of debt = # of outstanding bonds times bond price
  - V = market value of the firm = D + E
- Weights
  - w_E = E/V = percent financed with equity
  - w_D = D/V = percent financed with debt

Example: Capital Structure Weights

- Suppose you have a market value of equity equal to $500 million and a market value of debt equal to $475 million.
  - What are the capital structure weights?
    - V = 500 million + 475 million = 975 million
    - w_E = E/V = 500 / 975 = .5128 = 51.28%
    - w_D = D/V = 475 / 975 = .4872 = 48.72%

Taxes and the WACC

- We are concerned with after-tax cash flows, so we also need to consider the effect of taxes on the various costs of capital
- Interest expense reduces our tax liability
  - This reduction in taxes reduces our cost of debt
  - After-tax cost of debt = $R_D(1-T_C)$
- Dividends are not tax deductible, so there is no tax impact on the cost of equity
- WACC = $w_E R_E + w_D R_D(1-T_C)$

Extended Example – WACC - I

- Equity Information
  - 50 million shares
  - $80 per share
  - Beta = 1.15
  - Market risk premium = 9%
  - Risk-free rate = 5%
- Debt Information
  - $1 billion in outstanding debt (face value)
  - Current quote = 110
  - Coupon rate = 9%, semiannual coupons
  - 15 years to maturity
- Tax rate = 40%

Extended Example – WACC - II

- What is the cost of equity?
  - $R_E = 5 + 1.15(9) = 15.35\%$
- What is the cost of debt?
  - N = 30; PV = -1,100; PMT = 45; FV = 1,000; CPT I/Y = 3.9268
  - $R_D = 3.927(2) = 7.854\%$
- What is the after-tax cost of debt?
  - $R_D(1-T_C) = 7.854(1-.4) = 4.712\%$

Extended Example – WACC - III

- What are the capital structure weights?
  - E = 50 million (80) = 4 billion
  - D = 1 billion (1.10) = 1.1 billion
  - V = 4 + 1.1 = 5.1 billion
  - w_E = E/V = 4 / 5.1 = .7843
  - w_D = D/V = 1.1 / 5.1 = .2157
- What is the WACC?
  - WACC = .7843(15.35%) + .2157(4.712%) = 13.06%

Eastman Chemical I

- Click on the web surfer to go to Yahoo Finance to get information on Eastman Chemical (EMN)
- Under Profile and Key Statistics, you can find the following information:
  - # of shares outstanding
  - Book value per share
  - Price per share
  - Beta

- Under analysts estimates, you can find analysts estimates of earnings growth (use as a proxy for dividend growth)
- The Bonds section at Yahoo Finance can provide the T-bill rate
- Use this information, along with the CAPM and DGM to estimate the cost of equity

Eastman Chemical II

- Go to FINRA to get market information on Eastman Chemical’s bond issues
  - Enter Eastman Ch to find the bond information
  - Note that you may not be able to find information on all bond issues due to the illiquidity of the bond market
- Go to the SEC site to get book valve information from the firm’s most recent 10Q

Eastman Chemical III

- Find the weighted average cost of the debt
  - Use market values if you were able to get the information
  - Use the book values if market information was not available
  - They are often very close
- Compute the WACC
  - Use market value weights if available

Example: Work the Web

- Find estimates of WACC at www.valuepro.net
- Look at the assumptions
  - How do the assumptions impact the estimate of WACC?

Table 14.1 Cost of Equity

I. The Cost of Equity, R_E

A. Dividend growth model approach (from Chapter 8):

$$R_E = D_1/P_0 + g$$

where D_1 is the expected dividend in one period, g is the dividend growth rate, and P_0 is the current stock price.

B. SML approach (from Chapter 13):

$$R_E = R_f + \beta_E \times (R_M - R_f)$$

where R_f is the risk-free rate, R_M is the expected return on the overall market, and β_E is the systematic risk of the equity.

Table 14.1 Cost of Debt

II. The Cost of Debt, R_D

A. For a firm with publicly held debt, the cost of debt can be measured as the yield to maturity on the outstanding debt. The coupon rate is irrelevant. Yield to maturity is covered in Chapter 7.

B. If the firm has no publicly traded debt, then the cost of debt can be measured as the yield to maturity on similarly rated bonds (bond ratings are discussed in Chapter 7).

Table 14.1 WACC

III. The Weighted Average Cost of Capital, WACC

A. The firm's WACC is the overall required return on the firm as a whole. It is the appropriate discount rate to use for cash flows similar in risk to those of the overall firm.

B. The WACC is calculated as:

$$\text{WACC} = (E/V) \times R_E + (D/V) \times R_D \times (1 - T_C)$$

where T_C is the corporate tax rate, E is the *market* value of the firm's equity, D is the *market* value of the firm's debt, and $V = E + D$. Note that E/V is the percentage of the firm's financing (in market value terms) that is equity, and D/V is the percentage that is debt.

Divisional and Project Costs of Capital

- Using the WACC as our discount rate is only appropriate for projects that have the same risk as the firm's current operations
- If we are looking at a project that does NOT have the same risk as the firm, then we need to determine the appropriate discount rate for that project
- Divisions also often require separate discount rates

Using WACC for All Projects - Example

- What would happen if we use the WACC for all projects regardless of risk?
- Assume the WACC = 15%

Project	Required Return	IRR
A	20%	17%
B	15%	18%
C	10%	12%

The Pure Play Approach

- Find one or more companies that specialize in the product or service that we are considering
- Compute the beta for each company
- Take an average
- Use that beta along with the CAPM to find the appropriate return for a project of that risk
- Often difficult to find pure play companies

Subjective Approach

- Consider the project's risk relative to the firm overall
- If the project has more risk than the firm, use a discount rate greater than the WACC
- If the project has less risk than the firm, use a discount rate less than the WACC
- You may still accept projects that you shouldn't and reject projects you should accept, but your error rate should be lower than not considering differential risk at all

Subjective Approach - Example

Risk Level	Discount Rate
Very Low Risk	WACC – 8%
Low Risk	WACC – 3%
Same Risk as Firm	WACC
High Risk	WACC + 5%
Very High Risk	WACC + 10%

Flotation Costs

- The required return depends on the risk, not how the money is raised
- However, the cost of issuing new securities should not just be ignored either
- Basic Approach
  - Compute the weighted average flotation cost
  - Use the target weights because the firm will issue securities in these percentages over the long term

NPV and Flotation Costs - Example

- Your company is considering a project that will cost $1 million. The project will generate after-tax cash flows of $250,000 per year for 7 years. The WACC is 15%, and the firm's target D/E ratio is .6 The flotation cost for equity is 5%, and the flotation cost for debt is 3%. What is the NPV for the project after adjusting for flotation costs?
  - f_A = (.375)(3%) + (.625)(5%) = 4.25%
  - PV of future cash flows = 1,040,105
  - NPV = 1,040,105 - 1,000,000/(1-.0425) = -4,281
- The project would have a positive NPV of 40,105 without considering flotation costs
- Once we consider the cost of issuing new securities, the NPV becomes negative

Quick Quiz

- What are the two approaches for computing the cost of equity?
- How do you compute the cost of debt and the after-tax cost of debt?
- How do you compute the capital structure weights required for the WACC?
- What is the WACC?
- What happens if we use the WACC for the discount rate for all projects?
- What are two methods that can be used to compute the appropriate discount rate when WACC isn’t appropriate?
- How should we factor flotation costs into our analysis?

Ethics Issues

- How could a project manager adjust the cost of capital (i.e., appropriate discount rate) to increase the likelihood of having his/her project accepted?
  - Is this ethical or financially sound?

Comprehensive Problem

- A corporation has 10,000 bonds outstanding with a 6% annual coupon rate, 8 years to maturity, a $1,000 face value, and a $1,100 market price.
- The company's 100,000 shares of preferred stock pay a $3 annual dividend, and sell for $30 per share.
- The company's 500,000 shares of common stock sell for $25 per share and have a beta of 1.5. The risk free rate is 4%, and the market return is 12%.
- Assuming a 40% tax rate, what is the company's WACC?

End of Chapter