Lecture 9

Cost of Capital

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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
- We call the minimal return required by investors the *required return*, or the *cost of capital*
- 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
  - neither the NPV rule nor the IRR rule can be implemented without knowledge of the appropriate discount rate

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

Lecture Outline

- Cost of Equity
  - Dividend growth model
  - SML, or CAPM
- Cost of Debt
- Weighted Average Cost of Capital

Cost of Equity

- The cost of equity is the return required by equity investors given the risk of the cash flows from the firm

- There are two major methods for determining the cost of equity
  - Dividend growth model
  - SML, or CAPM

Dividend Growth Model Approach

- Start with the dividend growth model formula and rearrange to solve for R_E
  - $P_0 = \frac{D_1}{R_E - g}$
  - $R_E = \frac{D_1}{P_0} + g$

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?

Solution:

$$R_E = \frac{D_1}{P_0} + g = \frac{1.50}{25} + 0.051 = 11.1\%$$

Estimating the Dividend Growth Rate

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

Year	Dividend	Percent Change
2008	1.23	-
2009	1.30	(1.30 – 1.23) / 1.23 = 5.7%
2010	1.36	(1.36 – 1.30) / 1.30 = 4.6%
2011	1.43	(1.43 – 1.36) / 1.36 = 5.1%
2012	1.50	(1.50 – 1.43) / 1.43 = 4.9%

- Average dividend growth rate = (5.7 + 4.6 + 5.1 + 4.9) / 4 = 5.1%

Advantages and Disadvantages

- 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 SML to compute our cost of equity
  - Risk-free rate, R_f
  - Market risk premium, $E(R_M) - R_f$
  - Systematic risk of asset, β
  - $R_E = R_f + \beta \times (E(R_M) - R_f)$

Example: Suppose your company has an equity beta of 0.58, 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?

Solution

$$R_E = R_f + \beta \times \left(E(R_M) - R_f\right) = 6.1 + 0.58 \times 8.6 = 11.1\%$$

Advantages and Disadvantages

- 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
  - Have to estimate beta
  - We are using the past to predict the future, which is not always reliable

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Cost of Debt

- The cost of debt is the return required by debt holders given the risk of the cash flows from the firm
- 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
- YTM = 10%

$$908.72 = \sum_{i=1}^{50} \frac{45}{(1 + y/2)^i} + \frac{1{,}000}{(1 + y/2)^{50}}$$

$$y = 10\%$$

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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

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
- $\boldsymbol{Weighted\ Average\ Cost\ of\ Captial = w_E R_E + w_D R_D}$
  - assume a world with no corporate taxes
- $Weighted\ Average\ Cost\ of\ Captial = w_E R_E + w_D R_D (1 - T_c)$
  - assume a world with corporate taxes

Example: WACC

- A corporation has 10 million bonds outstanding with a 9% semiannual coupon rate, 15 years to maturity, a $100 face value, and a $110 market price.
- The company's 50 million shares of common stock sell for $80 per share and have a beta of 1.15. The risk free rate is 5%, and the market risk premium is 9%.
- Assume no taxes.

a) What is the company's cost of equity?
b) What is the company's cost of debt?
c) What is the company's WACC?
d) If the company is presented with a project with an internal rate of return of 12%, should it accept the project? Assume the project has same risk as the firm's current operation.

Example: WACC

- A corporation has 10 million bonds outstanding with a 9% semiannual coupon rate, 15 years to maturity, a $100 face value, and a $110 market price.
- The company's 50 million shares of common stock sell for $80 per share and have a beta of 1.15. The risk free rate is 5%, and the market risk premium is 9%.
- Assume no taxes.

a) What is the company's cost of equity?

$$R_E = R_f + \beta\left(E(R_M) - R_f\right) = 5 + 1.15 \times 9 = 15.35\%$$

Example: WACC

- A corporation has 10 million bonds outstanding with a 9% semiannual coupon rate, 15 years to maturity, a $100 face value, and a $110 market price.
- The company's 50 million shares of common stock sell for $80 per share and have a beta of 1.15. The risk free rate is 5%, and the market risk premium is 9%.
- Assume no taxes.

b) What is the company's cost of debt?

- N = 30; PV = -110; PMT = 4.5; FV = 100
- R_D = 7.854%

$$110 = \sum_{i=1}^{30} \frac{4.5}{(1+y/2)^i} + \frac{100}{(1+y/2)^{30}}$$

$$y = 7.854\%$$

Example: WACC

- A corporation has 10 million bonds outstanding with a 9% semiannual coupon rate, 15 years to maturity, a $100 face value, and a $110 market price.
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- Assume no taxes.

c) What is the company's WACC?

- E = 50 million x 80 = 4 billion D = 10 million x 110 = 1.1 billion
- V = E + D = 4 + 1.1 = 5.1 billion
- w_E = E/V = 4 / 5.1 = 0.7843
- w_D = D/V = 1.1 / 5.1 = 0.2157
- $WACC = w_E \times R_E + w_D \times R_D = 0.7843 \times 15.35\% + 0.2157 \times 7.854\% = 13.73\%$

Example: WACC

- A corporation has 10 million bonds outstanding with a 9% semiannual coupon rate, 15 years to maturity, a $100 face value, and a $110 market price.
- The company's 50 million shares of common stock sell for $80 per share and have a beta of 1.15. The risk free rate is 5%, and the market risk premium is 9%.
- Assume no taxes.

d) If the company is presented with a project with an internal rate of return of 12%, should it accept the project? Assume the project has same risk as the firm's current operation.

IRR decision rule: accept if the IRR is greater than the required return

- internal rate of return = 12%
- require return = 13.73%

Summary

- The cost of equity is the return required by equity investors given the risk of the cash flows from the firm
- The cost of debt is the return required by debt holders given the risk of the cash flows from the firm
- We can use the individual costs of capital that we have computed to get weighted average cost of capital for the firm
- We can use the company's risk of capital to determine to the project's risk of capital, if the new project has the same risk as the firm's existing activities
- By knowing the required return for an investment, so we can compute the NPV and make a decision about whether or not to take the investment