

Introduction to Financing

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Lecture 7





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Cost of Capital

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Topic
07

TITLE OF SLIDE

- 1 The Cost of Capital: Some Preliminaries
- 2 The Cost of Equity
- 3 The Costs of Debt and Preferred Stock
- 4 The Weighted Average Cost of Capital
- 5 Divisional and Project Costs of Capital

Key Concepts and Skills

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

Cost of Capital Basics

- The cost to a firm for capital funding = the return to the providers of those funds
 - The return earned on assets depends on the risk of those assets
 - A firm's cost of capital indicates how the market views the risk of the firm's assets
 - A firm must earn at least the required return to compensate investors for the financing they have provided
 - The required return is the same as the appropriate discount rate

Cost of Equity

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

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

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

Example: Dividend Growth Model

- Your company is expected to pay a dividend of \$4.40 per share next year. (D_1)
- Dividends have grown at a steady rate of 5.1% per year and the market expects that to continue. (g)
- The current stock price is \$50. (P_0)
- What is the cost of equity?

$$R_E = \frac{4.40}{50} + .051 = .139$$

Example: Estimating the Dividend Growth Rate

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

Year	Dividend	Percent Change
2003	1.23	
2004	1.30	
2005	1.36	$(1.30 - 1.23) / 1.23 = 5.7\%$
2006	1.43	$(1.36 - 1.30) / 1.30 = 4.6\%$
2007	1.50	$(1.43 - 1.36) / 1.36 = 5.1\%$
		$(1.50 - 1.43) / 1.43 = 4.9\%$

$$\text{Average} = (5.7 + 4.6 + 5.1 + 4.9) / 4 = 5.1\%$$

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
 - Does not explicitly consider risk

The SML Approach

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

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

Example: SML

- Company's equity beta = 1.2
- Current risk-free rate = 7%
- Expected market risk premium = 6%
- What is the cost of equity capital?

$$R_E = 7 + 1.2(6) = 14.2\%$$

Advantages and Disadvantages of SML

- Advantages
 - Explicitly adjusts for systematic risk
 - Applicable to all companies, as long as beta is available
- Disadvantages
 - Must estimate the *expected* market risk premium, which does vary over time
 - Must estimate beta, which also varies over time
 - Relies on the past to predict the future, which is not always reliable

Example: Cost of Equity

- Data:

- Beta = 1.5
- Market risk premium = 9%
- Current risk-free rate = 6%.
- Analysts' estimates of growth = 6% per year
- Last dividend = \$2.
- Currently stock price = \$15.65
- Using SML: $R_E = 6\% + 1.5(9\%) = 19.5\%$
- Using DGM: $R_E = [2(1.06) / 15.65] + .06 = 19.55\%$
- The company should use an average of both rates

Cost of Debt

- The cost of debt = the required return on a company's debt
- Method 1 = Compute the yield to maturity on existing debt
- Method 2 = Use estimates of current rates based on the bond rating expected on new debt
- The cost of debt is NOT the coupon rate

Example: Cost of Debt

Current bond issue:

- 15 years to maturity
- Coupon rate = 12%
- Coupons paid semiannually
- Currently bond price = \$1,253.72

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1253.72	S.
1000	0
60	/
%-	4.45%
YTM = 4.45%*2 = 8.9%	

Component Cost of Debt

- Use the YTM on the firm's debt
- Interest is tax deductible, so the after-tax (AT) cost of debt is:

$$R_{D,AT} \square R_{D,BT} (1 - T_C)$$

- If the corporate tax rate = 40%:

$$R_{D,AT} \square 8.9\%(1 - .40) \square 5.34\%$$

Cost of Preferred Stock

- Preferred pays a constant dividend every period
- Dividends expected to be paid forever
- Preferred stock is a perpetuity
- Example:
 - Preferred annual dividend = \$10
 - Current stock price = \$111.10

$$R_p = 10 / 111.10 = 9\%$$

$$R_p = \frac{D}{P_0}$$

Weighted Average Cost of Capital

- Use the individual costs of capital to compute a weighted “average” cost of capital for the firm
- This “average” = 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

Determining the Weights for the WACC

- Weights = percentages of the firm that will be financed by each component
- Always use the target weights, if possible
 - If not available, use market values

Capital Structure Weights

- Notation

E = market value of equity

= # outstanding shares times price per share

D = market value of debt

= # outstanding bonds times bond price

V = market value of the firm = $D + E$

- Weights

E/V = percent financed with equity

D/V = percent financed with debt

WACC

$$WACC = (E/V) \times R_E + (P/V) \times R_P + (D/V) \times R_D \times (1 - T_C)$$

Where:

Weights { (E/V) = % of common equity in capital structure
 (P/V) = % of preferred stock in capital structure
 (D/V) = % of debt in capital structure

Component costs { R_E = firm's cost of equity
 R_P = firm's cost of preferred stock
 R_D = firm's cost of debt

T_C = firm's corporate tax rate

Estimating Weights

Given:

- Stock price = \$50
- 3m shares common stock
- \$25m preferred stock
- \$75m debt
- 40% Tax rate

Component Values:

- $V_E = \$50 \times (3 \text{ m}) = \150m
- $V_P = \$25\text{m}$
- $V_D = \$75\text{m}$
- $V_F = \$150 + \$25 + \$75 = \250m

Weights:

$$E/V = \$150/\$250 = 0.6 \text{ (60\%)}$$

$$P/V = \$25/\$250 = 0.1 \text{ (10\%)}$$

$$D/V = \$75/\$250 = 0.3 \text{ (30\%)}$$

WACC

Component	W	R
Debt (before tax)	0.30	10%
Preferred Stock	0.10	9%
Common equity	0.60	14%

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

$$\text{WACC} = 0.6(14\%) + 0.1(9\%) + 0.3(10\%)(1 - .40)$$

$$\text{WACC} = 8.4\% + 0.9\% + 1.8\% = \mathbf{11.1\%}$$

Table 12.1

I. The cost of equity, R_E

A. Dividend growth model approach (from Chapter 7):

$$R_E = D_1/P_0 + g$$

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 11):

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

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.

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 6.

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 6).

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 the overall firm.

B. The WACC is calculated as:

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

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.

Factors that Influence a Company's WACC

- Market conditions, especially interest rates, tax rates and the market risk premium
- The firm's capital structure and dividend policy
- The firm's investment policy
 - Firms with riskier projects generally have a higher WACC

Eastman Chemical -WACC

Capital structure weights:

$$E = 72.67 \text{ million} \times \$52.99 = \$3.851 \text{ billion}$$

$$D = 1.404 \text{ billion}$$

$$V = \$3.851 + 1.404 = 5.255 \text{ billion}$$

$$E/V = 3.851 / 5.255 = \mathbf{.7328}$$

$$D/V = 1.404 / 5.255 = \mathbf{.2672}$$

$$\begin{aligned} \mathbf{WACC} &= \mathbf{.7328(12.19\%)} + \mathbf{.2672(6.772\%)(1-.35)} \\ &= \mathbf{10.11\% \quad (\text{versus } 9.79\% \text{ in text})} \end{aligned}$$

Risk-Adjusted WACC

- A firm's WACC reflects the risk of an average project undertaken by the firm
 - "Average" ➡ risk = the firm's current operations
- Different divisions/projects may have different risks
 - The division's or project's WACC should be adjusted to reflect the appropriate risk and capital structure

Using WACC for All Projects

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

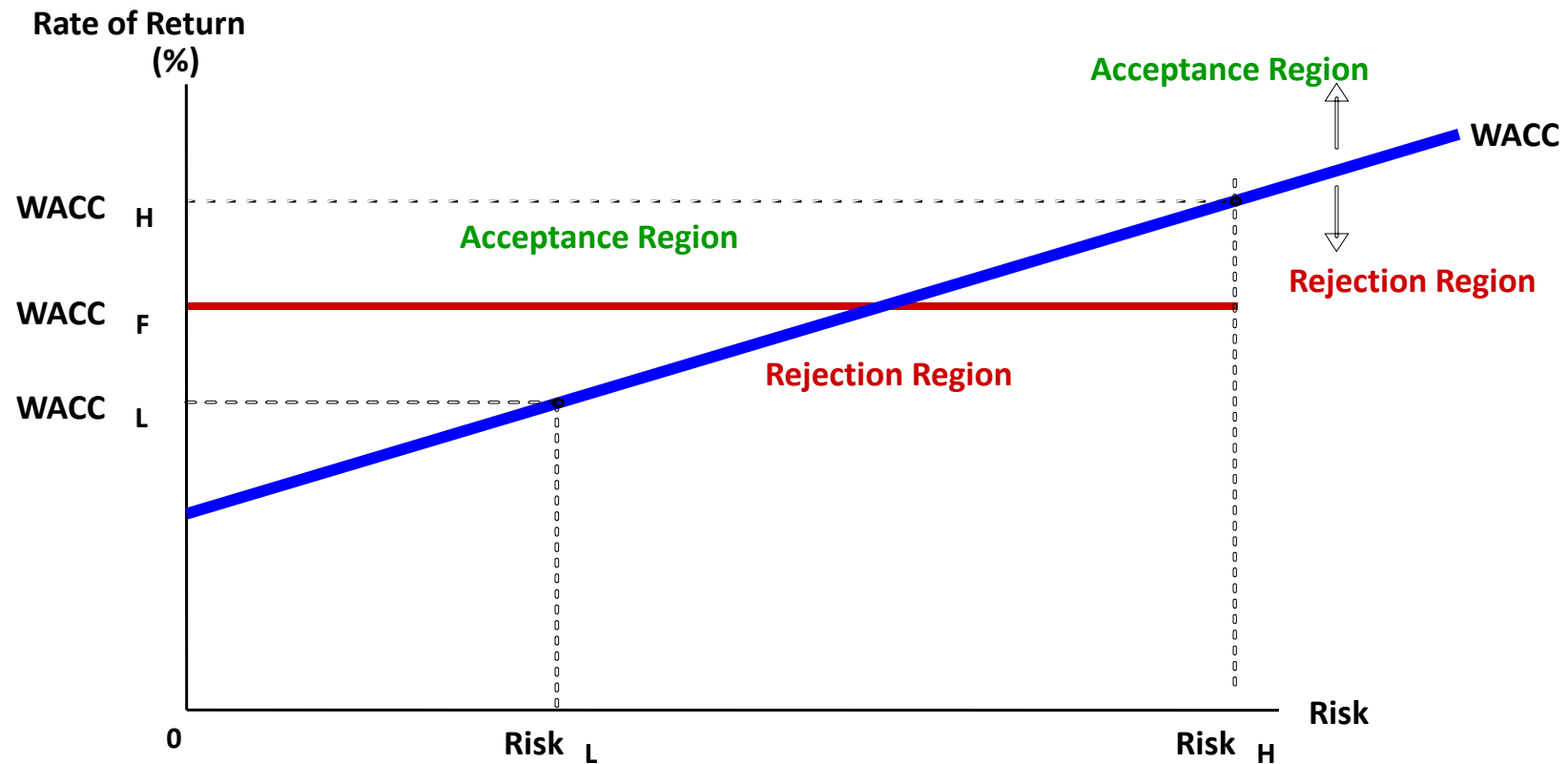
		Decision
Project	IRR	WACC=15%
A	17%	Accept
B	18%	Accept
C	12%	Reject

Using WACC for All Projects

- Assume the WACC = 15%
- Adjusting for risk changes the decisions

	Required		Decision	
Project	Return	IRR	WACC=15%	Risk Adj
A	20%	17%	Accept	Reject
B	15%	18%	Accept	Accept
C	10%	12%	Reject	Accept

Divisional Risk & the Cost of Capital



Divisional Risk & the Cost of Capital

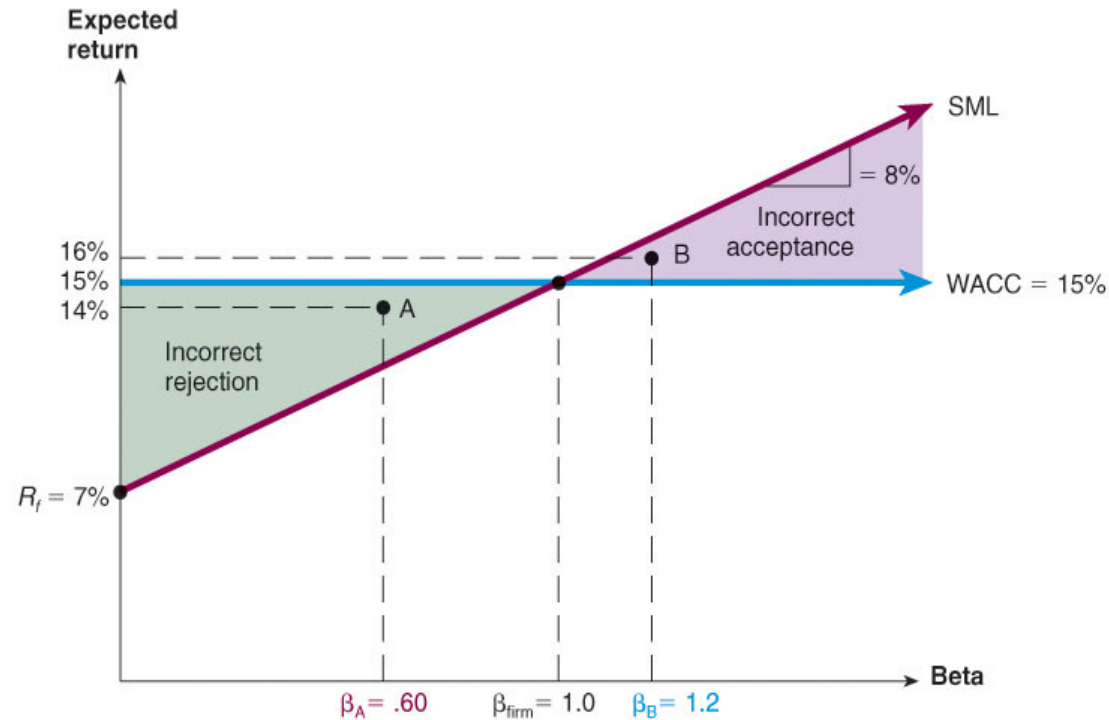


FIGURE 12.1

The security market line, SML, and the weighted average cost of capital, WACC

If a firm uses its WACC to make accept-reject decisions for all types of projects, it will have a tendency toward incorrectly accepting risky projects and incorrectly rejecting less risky projects.

Subjective Approach

- Consider the project's risk relative to the firm overall
 - If the project is riskier than the firm, use a discount rate greater than the WACC
 - If the project is less risky than the firm, use a discount rate less than the WACC

Subjective Approach - Example

Risk Level	Discount Rate	
Very Low Risk	WACC – 8%	7%
Low Risk	WACC – 3%	12%
Same Risk as Firm	WACC	15%
High Risk	WACC + 5%	20%
Very High Risk	WACC + 10%	25%

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 as 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?



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