Chapter 12 Lecture – The Cost of Capital

Learning Objectives

After studying this chapter, you should be able to:

LO1 Determine a firm's cost of equity capital.
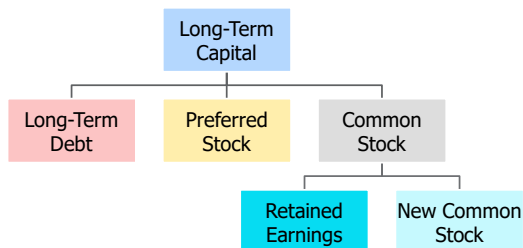
LO2 Determine a firm's cost of debt.

LO3 Determine a firm's overall cost of capital.

LO4 Identify some of the pitfalls associated with a firm's overall cost of capital and what to do about them.

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What Types of Long-term Capital do Firms Use?

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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**

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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

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The Dividend Growth Model Approach

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

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

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

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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?

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

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Example: Estimating the Dividend Growth Rate

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

Year	Dividend	Percent Change
2009	1.23	
2010	1.30	(1.30 – 1.23) / 1.23 = 5.7%
2011	1.36	(1.36 – 1.30) / 1.30 = 4.6%
2012	1.43	(1.43 – 1.36) / 1.36 = 5.1%
2013	1.50	(1.50 – 1.43) / 1.43 = 4.9%

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

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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

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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

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

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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?

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

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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

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Chapter 12 Lecture – The Cost of Capital

Weighted Average Cost of Capital (WACC)

- 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

WACC

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

Where:

Weights
$$\begin{cases} (E/V) = \% \text{ of common equity in capital structure} \\ (P/V) = \% \text{ of preferred stock in capital structure} \\ (D/V) = \% \text{ of debt in capital structure} \end{cases}$$

Component costs
$$\begin{cases} R_E = \text{firm's cost of equity} \\ R_P = \text{firm's cost of preferred stock} \\ R_D = \text{firm's cost of debt} \end{cases}$$

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:
- $V_E = \$50 \times (3\,m) = \$150m$
- $V_P = \$25m$
- $V_D = \$75m$
- $V_F = \$150+\$25+\$75=\$250m$

Weights:

E/V	= $150/$250	= 0.6 (60%)
P/V	= $25/$250	= 0.1 (10%)
D/V	= $75/$250	= 0.3 (30%)

WACC

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

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

$$\text{WACC} = 0.6(14\%) + 0.1(9\%) + 0.3(10\%)(1-.40)$$
$$\text{WACC} = 8.4\% + 0.9\% + 1.8\% = 11.1\%$$

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Chapter 12 Lecture – The Cost of Capital

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.

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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**

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Eastman Chemical – 1
Equity Data

Eastman Chemical Company Common (EMN) - NYSE

53.74 ↓0.40(0.73%) 3:11PM EST - Nasdaq Real Time Price

Prev Close:	54.13	Day's Range:	53.71 - 54.61
Open:	54.34	52wk Range:	32.45 - 55.36
Bid:	53.88 x 300	Volume:	1,141,499
Ask:	53.89 x 200	Avg Vol (3m):	1,988,190
1y Target Est:	57.00	Market Cap:	7.38B
Beta:	2.31	P/E (ttm):	11.07
Next Earnings Date:	N/A	EPS (ttm):	4.86
		Div & Yield:	1.04 (1.90%)

Source: http://finance.yahoo.com

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Eastman Chemical – 2
Dividend Growth

Growth Est	EMN	Industry	Sector	S&P 500
Current Qtr.	-11.90%	21.70%	9.10%	13.40%
Next Qtr.	-2.20%	26.50%	15.80%	17.70%
This Year	6.40%	14.50%	19.40%	9.00%
Next Year	12.00%	-3.20%	9.60%	13.10%
Past 5 Years (per annum)	18.64%	N/A	N/A	N/A
Next 5 Years (per annum)	7.67%	13.55%	11.17%	10.38%
Price/Earnings (avg. for comparison categories)	11.16	17.08	13.03	14.31
PEG Ratio (avg. for comparison categories)	1.46	1.31	1.65	1.81

Source: http://finance.yahoo.com

http://www.investopedia.com/terms/p/pegratio.asp 2-20

Eastman Chemical - 3
Beta and Shares Outstanding

Stock Price History	
Beta:	2.31
52-Week Change[3]:	11.26%
S&P500 52-Week Change[3]:	2.61%
52-Week High (Apr 29, 2011)[3]:	55.36
52-Week Low (Sep 22, 2011)[3]:	32.45
50-Day Moving Average[3]:	51.10
200-Day Moving Average[3]:	41.39
Share Statistics	
Avg Vol (3 month)[3]:	1,988,190
Avg Vol (10 day)[3]:	1,633,570
Shares Outstanding[5]:	136.92M
Float:	136.01M
% Held by Insiders[1]:	0.53%
% Held by Institutions[1]:	80.40%
Shares Short (as of Feb 15, 2012)[3]:	5.81M
Short Ratio (as of Feb 15, 2012)[3]:	2.40
Short % of Float (as of Feb 15, 2012)[3]:	4.10%
Shares Short (prior month)[3]:	2.01M

Source: http://finance.yahoo.com

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Eastman Chemical - 4
Dividends

Dividends & Splits	
Forward Annual Dividend Rate[4]:	1.04
Forward Annual Dividend Yield[4]:	1.90%
Trailing Annual Dividend Yield[3]:	0.99
Trailing Annual Dividend Yield[3]:	1.80%
5 Year Average Dividend Yield[4]:	3.30%
Payout Ratio[4]:	20.00%
Dividend Date[3]:	Apr 1, 2012
Ex-Dividend Date[4]:	Mar 13, 2012
Last Split Factor (new per old)[2]:	2:1
Last Split Date[3]:	Oct 4, 2011

Source: http://finance.yahoo.com

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Eastman Chemical - 5
Cost of Equity - SML

- **Beta:**   Yahoo Finance   2.31
            Value Line   1.25
    (1.25 is a more reasonable value)
- **T-Bill rate = 0.05% (Yahoo Finance bonds section)**
- **Market Risk Premium = 7% (assumed)**

- **Cost of Equity (SML) = 0.05% + (1.25)(7%)**
                       = 8.80%

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

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Eastman Chemical - 6
Cost of Equity - DCF

- **Growth rate**   7.67%
- **Last dividend** $1.04
- **Stock price** $53.74

- **Cost of Equity (DCF) =** $R_E = \dfrac{D_1}{P_0} + g$

$$R_E = \frac{\$1.04(1.0767)}{53.74} + .0767$$

$$R_E = 9.75\%$$

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Eastman Chemical - 7
Cost of Equity

Cost of Equity Method	Estimated Value
SML	8.80%
DCF	9.75%
Average	9.28%

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Eastman Chemical - 8
Bond Data

Coupon Rate	Maturity	Book Value (face value, in millions)	Price (% of par)	Yield to Maturity
3.00%	2015	$250	103.513%	2.028%
6.30	2018	176	117.634	3.342
5.50	2019	250	114.180	3.390
4.50	2021	250	106.992	3.570
7.25	2024	243	121.530	4.843
7.625	2024	54	122.308	5.151
7.60	2027	222	126.478	5.051

Source: http://www.sec.gov

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How to Find Cost of Debt

- **Method 1: Ask an investment banker what the coupon rate would be on new debt.**

- **Method 2: Find the bond rating for the company and use the yield on other bonds with a similar rating.**

- **Method 3: Find the yield on the company's debt, if it has any.**

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Eastman Chemical - 9
Cost of Debt

Coupon Rate	Book Value (face value, in millions)	Percentage of Total	Market Value (in millions)	Percentage of Total	Yield to Maturity	Book Values	Market Values
3.00%	$ 250	0.17	$ 258.78	0.16	2.03%	0.35%	0.32%
6.30	176	0.12	207.04	0.12	3.34	0.41	0.42
5.50	250	0.17	285.45	0.17	3.39	0.59	0.58
4.50	250	0.17	267.48	0.16	3.57	0.62	0.57
7.25	243	0.17	295.32	0.18	4.84	0.81	0.86
7.63	54	0.04	66.05	0.04	5.15	0.19	0.20
7.60	222	0.15	280.78	0.17	5.05	0.78	0.85
	$1,445	1.00	$1,660.89	1.00		3.74%	3.81%

For Eastman, the cost of debt is similar when using either book values or market values.

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Eastman Chemical - 10
WACC

Capital structure weights (market values):

E = 136.92 million x $53.74 = $7.358 billion

D = 1.661 billion

V = $7.358 + 1.661 = 9.019 billion

E/V = 7.358 / 9.019 = .82

D/V = 1.661 / 9.019 = .18

Tax rate (assumed) = 35%

Cost of Equity Method	Estimated Value
SML	8.80%
DCF	9.75%
Average	9.28%

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

WACC = .82(9.28%) + .18(3.81%)(1-.35) = 8.02%

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http://thatswacc.com

Risk-Adjusted WACC

- A firm's WACC reflects the risk of an <u>average</u> 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
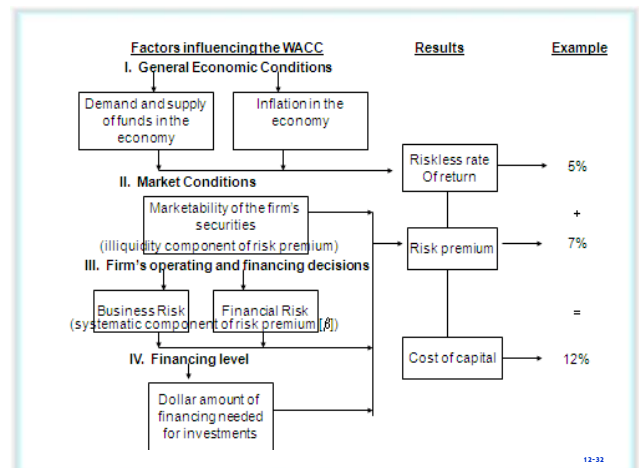
12-30

What Factors Influence a Company's WACC?

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

Is the firm's WACC correct for each division?

- **NO! The composite WACC reflects the risk of an average project undertaken by the firm.**
- **Different divisions may have different risks. The division's WACC should be adjusted to reflect the division's risk and capital structure.**

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