

Chapter Review and Self-Test Problems

- 15.1 Calculating the Cost of Equity** Suppose stock in Watta Corporation has a beta of .80. The market risk premium is 6 percent, and the risk-free rate is 6 percent. Watta's last dividend was \$1.20 per share, and the dividend is expected to grow at 8 percent indefinitely. The stock currently sells for \$45 per share. What is Watta's cost of equity capital?
- 15.2 Calculating the WACC** In addition to the information given in the previous problem, suppose Watta has a target debt-equity ratio of 50 percent. Its cost of debt is 9 percent, before taxes. If the tax rate is 35 percent, what is the WACC?
- 15.3 Flotation Costs** Suppose in the previous problem Watta is seeking \$30 million for a new project. The necessary funds will have to be raised externally. Watta's flotation costs for selling debt and equity are 2 percent and 16 percent, respectively. If flotation costs are considered, what is the true cost of the new project?

Answers to Chapter Review and Self-Test Problems

- 15.1** We start off with the SML approach. Based on the information given, the expected return on Watta's common stock is:

$$\begin{aligned} R_E &= R_f + \beta_E \times (R_M - R_f) \\ &= 6\% + .80 \times 6\% \\ &= 10.80\% \end{aligned}$$

We now use the dividend growth model. The projected dividend is $D_0 \times (1 + g)$ = \$1.20 \times 1.08 = \$1.296, so the expected return using this approach is:

$$\begin{aligned} R_E &= D_1/P_0 + g \\ &= \$1.296/45 + .08 \\ &= 10.88\% \end{aligned}$$

Because these two estimates, 10.80 percent and 10.88 percent, are fairly close, we will average them. Watta's cost of equity is approximately 10.84 percent.

- 15.2** Because the target debt-equity ratio is .50, Watta uses \$.50 in debt for every \$1 in equity. In other words, Watta's target capital structure is 1/3 debt and 2/3 equity. The WACC is thus:

$$\begin{aligned} \text{WACC} &= (E/V) \times R_E + (D/V) \times (1 - T_C) \\ &= 2/3 \times 10.84\% + 1/3 \times 9\% \times (1 - .35) \\ &= 9.177\% \end{aligned}$$

- 15.3** Because Watta uses both debt and equity to finance its operations, we first need the weighted average flotation cost. As in the previous problem, the percentage of equity financing is 2/3, so the weighted average cost is:

$$\begin{aligned} f_A &= (E/V) \times f_E + (D/V) \times f_D \\ &= 2/3 \times 16\% + 1/3 \times 2\% \\ &= 11.33\% \end{aligned}$$

If Watta needs \$30 million after flotation costs, then the true cost of the project is \$30 million/(1 - f_A) = \$30 million/.8867 = \$33.83 million.

Concepts Review and Critical Thinking Questions

- 1. WACC** On the most basic level, if a firm's WACC is 12 percent, what does this mean?
- 2. Book Values versus Market Values** In calculating the WACC, if you had to use book values for either debt or equity, which would you choose? Why?
- 3. Project Risk** If you can borrow all the money you need for a project at 6 percent, doesn't it follow that 6 percent is your cost of capital for the project?
- 4. WACC and Taxes** Why do we use an aftertax figure for cost of debt but not for cost of equity?
- 5. DCF Cost of Equity Estimation** What are the advantages of using the DCF model for determining the cost of equity capital? What are the disadvantages? What specific piece of information do you need to find the cost of equity using this model? What are some of the ways in which you could get this estimate?
- 6. SML Cost of Equity Estimation** What are the advantages of using the SML approach to finding the cost of equity capital? What are the disadvantages? What are the specific pieces of information needed to use this method? Are all of these variables observable, or do they need to be estimated? What are some of the ways in which you could get these estimates?
- 7. Cost of Debt Estimation** How do you determine the appropriate cost of debt for a company? Does it make a difference if the company's debt is privately placed as opposed to being publicly traded? How would you estimate the cost of debt for a firm whose only debt issues are privately held by institutional investors?
- 8. Cost of Capital** Suppose Tom O'Bedlam, president of Bedlam Products, Inc., has hired you to determine the firm's cost of debt and cost of equity capital.
 - a.** The stock currently sells for \$50 per share, and the dividend per share will probably be about \$5. Tom argues, "It will cost us \$5 per share to use the stockholders' money this year, so the cost of equity is equal to 10 percent ($\$5/\50)." What's wrong with this conclusion?
 - b.** Based on the most recent financial statements, Bedlam Products' total liabilities are \$8 million. Total interest expense for the coming year will be about \$1 million. Tom therefore reasons, "We owe \$8 million, and we will pay \$1 million interest. Therefore, our cost of debt is obviously $\$1 \text{ million}/\$8 \text{ million} = 12.5\%$." What's wrong with this conclusion?
 - c.** Based on his own analysis, Tom is recommending that the company increase its use of equity financing, because "debt costs 12.5 percent, but equity only costs 10 percent; thus equity is cheaper." Ignoring all the other issues, what do you think about the conclusion that the cost of equity is less than the cost of debt?
- 9. Company Risk versus Project Risk** Both Dow Chemical Company, a large natural gas user, and Superior Oil, a major natural gas producer, are thinking of investing in natural gas wells near Houston. Both are all-equity-financed companies. Dow and Superior are looking at identical projects. They've analyzed their respective investments, which would involve a negative cash flow now and positive expected cash flows in the future. These cash flows would be the same for both firms. No debt would be used to finance the projects. Both companies estimate that their project would have a net present value of \$1 million at an 18 percent discount rate and a $-\$1.1$ million NPV at a 22 percent discount rate.

Dow has a beta of 1.25, whereas Superior has a beta of .75. The expected risk premium on the market is 8 percent, and risk-free bonds are yielding 12 percent. Should either company proceed? Should both? Explain.

10. **Divisional Cost of Capital** Under what circumstances would it be appropriate for a firm to use different costs of capital for its different operating divisions? If the overall firm WACC were used as the hurdle rate for all divisions, would the riskier divisions or the more conservative divisions tend to get most of the investment projects? Why? If you were to try to estimate the appropriate cost of capital for different divisions, what problems might you encounter? What are two techniques you could use to develop a rough estimate for each division's cost of capital?

Questions and Problems

1. **Calculating Cost of Equity** The Wind Rider Co. just issued a dividend of \$2.10 per share on its common stock. The company is expected to maintain a constant 7 percent growth rate in its dividends indefinitely. If the stock sells for \$40 a share, what is the company's cost of equity?
2. **Calculating Cost of Equity** The Tubby Ball Corporation's common stock has a beta of 1.15. If the risk-free rate is 5 percent and the expected return on the market is 12 percent, what is Tubby Ball's cost of equity capital?
3. **Calculating Cost of Equity** Stock in Parrothead Industries has a beta of 1.10. The market risk premium is 8 percent, and T-bills are currently yielding 5.5 percent. Parrothead's most recent dividend was \$2.20 per share, and dividends are expected to grow at a 5 percent annual rate indefinitely. If the stock sells for \$32 per share, what is your best estimate of Parrothead's cost of equity?
4. **Estimating the DCF Growth Rate** Suppose Massey Ltd. just issued a dividend of \$.68 per share on its common stock. The company paid dividends of \$.40, \$.45, \$.52, and \$.60 per share in the last four years. If the stock currently sells for \$12, what is your best estimate of the company's cost of equity capital?
5. **Calculating Cost of Preferred Stock** Holdup Bank has an issue of preferred stock with a \$5 stated dividend that just sold for \$92 per share. What is the bank's cost of preferred stock?
6. **Calculating Cost of Debt** Legend, Inc., is trying to determine its cost of debt. The firm has a debt issue outstanding with 12 years to maturity that is quoted at 107 percent of face value. The issue makes semiannual payments and has an embedded cost of 10 percent annually. What is Legend's pretax cost of debt? If the tax rate is 35 percent, what is the aftertax cost of debt?
7. **Calculating Cost of Debt** Jiminy's Cricket Farm issued a 30-year, 9 percent semiannual bond 8 years ago. The bond currently sells for 105 percent of its face value. The company's tax rate is 35 percent.
 - a. What is the pretax cost of debt?
 - b. What is the aftertax cost of debt?
 - c. Which is more relevant, the pretax or the aftertax cost of debt? Why?
8. **Calculating Cost of Debt** For the firm in Problem 7, suppose the book value of the debt issue is \$20 million. In addition, the company has a second debt issue on the market, a zero coupon bond with seven years left to maturity; the book value of this issue is \$70 million and the bonds sell for 61 percent of par.

Basic

(Questions 1–19)

Basic*(continued)*

- What is the company's total book value of debt? The total market value? What is your best estimate of the aftertax cost of debt now?
9. **Calculating WACC** Mullineaux Corporation has a target capital structure of 50 percent common stock, 5 percent preferred stock, and 45 percent debt. Its cost of equity is 18 percent, the cost of preferred stock is 6.5 percent, and the cost of debt is 8 percent. The relevant tax rate is 35 percent.
 - a. What is Mullineaux's WACC?
 - b. The company president has approached you about Mullineaux's capital structure. He wants to know why the company doesn't use more preferred stock financing, since it costs less than debt. What would you tell the president?
 10. **Taxes and WACC** Modigliani Manufacturing has a target debt-equity ratio of .75. Its cost of equity is 18 percent and its cost of debt is 10 percent. If the tax rate is 35 percent, what is Modigliani's WACC?
 11. **Finding the Target Capital Structure** Fama's Llamas has a weighted average cost of capital of 12.5 percent. The company's cost of equity is 15 percent and its cost of debt is 8 percent. The tax rate is 35 percent. What is Fama's target debt-equity ratio?
 12. **Book Value versus Market Value** Filer Manufacturing has 8.2 million shares of common stock outstanding. The current share price is \$52, and the book value per share is \$5. Filer Manufacturing also has two bond issues outstanding. The first bond issue has a face value of \$70 million, an 8 percent coupon, and sells for 104 percent of par. The second issue has a face value of \$50 million, a 7.5 percent coupon, and sells for 97 percent of par. The first issue matures in 10 years, the second in 6 years.
 - a. What are Filer's capital structure weights on a book value basis?
 - b. What are Filer's capital structure weights on a market value basis?
 - c. Which are more relevant, the book or market value weights? Why?
 13. **Calculating the WACC** In Problem 12, suppose the most recent dividend was \$4 and the dividend growth rate is 6 percent. Assume that the overall cost of debt is the weighted average of that implied by the two outstanding debt issues. Both bonds make semiannual payments. The tax rate is 35 percent. What is the company's WACC?
 14. **WACC** Sniffles, Inc., has a target debt-equity ratio of .90. Its WACC is 13 percent, and the tax rate is 35 percent.
 - a. If Sniffles' cost of equity is 18 percent, what is its pretax cost of debt?
 - b. If instead you know that the aftertax cost of debt is 7.5 percent, what is the cost of equity?
 15. **Finding the WACC** Given the following information for Dunhill Power Co., find the WACC. Assume the company's tax rate is 35 percent.

<i>Debt:</i>	3,000 8 percent coupon bonds outstanding, \$1,000 par value, 20 years to maturity, selling for 103 percent of par; the bonds make semiannual payments.
<i>Common stock:</i>	90,000 shares outstanding, selling for \$45 per share; the beta is 1.20.
<i>Preferred stock:</i>	13,000 shares of 7 percent preferred stock outstanding, currently selling for \$108 per share.
<i>Market:</i>	8 percent market risk premium and 6 percent risk-free rate.

- 16. Finding the WACC** Titan Mining Corporation has 8 million shares of common stock outstanding, .5 million shares of 6 percent preferred stock outstanding, and 100,000 9 percent semiannual bonds outstanding, par value \$1,000 each. The common stock currently sells for \$32 per share and has a beta of 1.15, the preferred stock currently sells for \$67 per share, and the bonds have 15 years to maturity and sell for 91 percent of par. The market risk premium is 10 percent, T-bills are yielding 5 percent, and Titan Mining's tax rate is 35 percent.
- What is the firm's market value capital structure?
 - If Titan Mining is evaluating a new investment project that has the same risk as the firm's typical project, what rate should the firm use to discount the project's cash flows?
- 17. SML and WACC** An all-equity firm is considering the following projects:

Project	Beta	Expected Return
W	.70	11%
X	.95	13
Y	1.05	14
Z	1.60	16

The T-bill rate is 5 percent, and the expected return on the market is 12 percent.

- Which projects have a higher expected return than the firm's 12 percent cost of capital?
 - Which projects should be accepted?
 - Which projects would be incorrectly accepted or rejected if the firm's overall cost of capital were used as a hurdle rate?
- 18. Calculating Flotation Costs** Suppose your company needs \$6 million to build a new assembly line. Your target debt-equity ratio is 1.0. The flotation cost for new equity is 15 percent, but the flotation cost for debt is only 4 percent. Your boss has decided to fund the project by borrowing money, because the flotation costs are lower and the needed funds are relatively small.
- What do you think about the rationale behind borrowing the entire amount?
 - What is your company's weighted average flotation cost?
 - What is the true cost of building the new assembly line after taking flotation costs into account? Does it matter in this case that the entire amount is being raised from debt?
- 19. Calculating Flotation Costs** Western Alliance Company needs to raise \$12 million to start a new project and will raise the money by selling new bonds. The company has a target capital structure of 60 percent common stock, 10 percent preferred stock, and 30 percent debt. Flotation costs for issuing new common stock are 12 percent, for new preferred stock, 6 percent, and for new debt, 4 percent. What is the true initial cost figure Western should use when evaluating its project?
- 20. WACC and NPV** Sallinger, Inc., is considering a project that will result in initial aftertax cash savings of \$4 million at the end of the first year, and these savings will grow at a rate of 5 percent per year indefinitely. The firm has a target debt-equity ratio of .75, a cost of equity of 16 percent, and an aftertax cost of debt of 6 percent. The cost-saving proposal is somewhat riskier than the usual project the firm undertakes; management uses the subjective approach and

Basic
(continued)

Intermediate
(Questions 20–21)

Intermediate*(continued)***Challenge***(Questions 22–23)*

applies an adjustment factor of +2 percent to the cost of capital for such risky projects. Under what circumstances should Sallinger take on the project?

21. Flotation Costs Salsman, Inc., recently issued new securities to finance a new TV show. The project cost \$1.4 million and the company paid \$105,000 in flotation costs. In addition, the equity issued had a flotation cost of 10 percent of the amount raised, whereas the debt issued had a flotation cost of 3 percent of the amount raised. If Salsman issued new securities in the same proportion as its target capital structure, what is the company's target debt-equity ratio?

22. Flotation Costs and NPV Photochronograph Corporation (PC) manufactures time series photographic equipment. It is currently at its target debt-equity ratio of 1.2. It's considering building a new \$40 million manufacturing facility. This new plant is expected to generate aftertax cash flows of \$5.5 million in perpetuity. There are three financing options:

1. A new issue of common stock. The flotation costs of the new common stock would be 8 percent of the amount raised. The required return on the company's new equity is 18 percent.
2. A new issue of 20-year bonds. The flotation costs of the new bonds would be 3 percent of the proceeds. If the company issues these new bonds at an annual coupon rate of 9 percent, they will sell at par.
3. Increased use of accounts payable financing. Because this financing is part of the company's ongoing daily business, it has no flotation costs and the company assigns it a cost that is the same as the overall firm WACC. Management has a target ratio of accounts payable to long-term debt of .25. (Assume there is no difference between the pretax and aftertax accounts payable cost.)

What is the NPV of the new plant? Assume that PC has a 35 percent tax rate.

23. Project Evaluation This is a comprehensive project evaluation problem bringing together much of what you have learned in this and previous chapters. Suppose you have been hired as a financial consultant to Defense Electronics, Inc. (DEI), a large, publicly traded firm that is the market share leader in radar detection systems (RDSs). The company is looking at setting up a manufacturing plant overseas to produce a new line of RDSs. This will be a five-year project. The company bought some land three years ago for \$6 million in anticipation of using it as a toxic dump site for waste chemicals, but it built a piping system to safely discard the chemicals instead. The land was appraised last week for \$9.2 million. The company wants to build its new manufacturing plant on this land; the plant will cost \$14 million to build. The following market data on DEI's securities are current:

Debt: 10,000 8 percent coupon bonds outstanding, 15 years to maturity, selling for 92 percent of par; the bonds have a \$1,000 par value each and make semiannual payments.

Common stock: 250,000 shares outstanding, selling for \$70 per share; the beta is 1.4.

Preferred stock: 10,000 shares of 6 percent preferred stock outstanding, selling for \$95 per share.

Market: 8 percent expected market risk premium; 5 percent risk-free rate.

DEI uses G. M. Wharton as its lead underwriter. Wharton charges DEI spreads of 9 percent on new common stock issues, 7 percent on new preferred stock issues,

and 4 percent on new debt issues. Wharton has included all direct and indirect issuance costs (along with its profit) in setting these spreads. Wharton has recommended to DEI that it raise the funds needed to build the plant by issuing new shares of common stock. DEI's tax rate is 35 percent. The project requires \$900,000 in initial net working capital investment to get operational.

- a. Calculate the project's initial Time 0 cash flow, taking into account all side effects.
- b. The new RDS project is somewhat riskier than a typical project for DEI, primarily because the plant is being located overseas. Management has told you to use an adjustment factor of +2 percent to account for this increased riskiness. Calculate the appropriate discount rate to use when evaluating DEI's project.
- c. The manufacturing plant has an eight-year tax life, and DEI uses straight-line depreciation. At the end of the project (i.e., the end of Year 5), the plant can be scrapped for \$5 million. What is the aftertax salvage value of this manufacturing plant?
- d. The company will incur \$350,000 in annual fixed costs. The plan is to manufacture 10,000 RDSs per year and sell them at \$10,400 per machine; the variable production costs are \$8,500 per RDS. What is the annual operating cash flow, OCF, from this project?
- e. DEI's comptroller is primarily interested in the impact of DEI's investments on the bottom line of reported accounting statements. What will you tell her is the accounting break-even quantity of RDSs sold for this project?
- f. Finally, DEI's president wants you to throw all your calculations, assumptions, and everything else into the report for the chief financial officer; all he wants to know is what the RDS project's internal rate of return, IRR, and net present value, NPV, are. What will you report?

Challenge
(continued)

The following problems are interrelated and involve the steps necessary to calculate the WACC for Dell Computer.

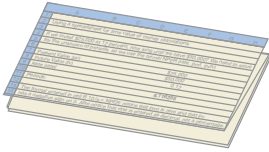
15.1 Financial Statements Most publicly traded corporations are required to submit quarterly (10Q) and annual (10K) reports to the SEC detailing the financial operations of the company over the past quarter or year, respectively. These corporate filings are available on the SEC web site at www.sec.gov. Go to the SEC web site, follow the "Search for Company Filings" link, the "Quick Forms Lookup" link, enter "Dell Computer" and search for SEC filings made by Dell. Find the most recent 10Q or 10K and download the form. Look on the balance sheet to find the book value of debt and the book value of equity. If you look further down the report, you should find a section titled "Long-term Debt and Interest Rate Risk Management" that will contain a breakdown of Dell's long-term debt.

15.2 Cost of Equity You wish to calculate the cost of equity for Dell. Go to finance.yahoo.com and enter the ticker symbol "DELL." Now follow the "Profile" link. What is the most recent stock price listed for Dell? What is the market value of equity, or market capitalization? How many shares of stock does Dell have outstanding? What is the most recent annual dividend? Can you use the dividend discount model in this case? What is the beta for Dell? Now go back to finance.yahoo.com and follow the "Bonds" link. What is the yield on 3-month

**What's On
the Web?**

Treasury bills? Assuming a 9.1 percent market risk premium, what is the cost of equity for Dell using CAPM?

- 15.3 Cost of Debt** You now need to calculate the cost of debt for Dell. Go to www.bondsonline.com, follow the “Bond Search” link, and the “Corporate” link. Enter Dell as the company and find the yield to maturity for each of Dell’s bonds. What is the weighted average cost of debt for Dell using the book value weights and using the market value weights? Does it make a difference if you use book value weights or market value weights?
- 15.4 WACC** You now have all the necessary information to calculate the weighted average cost of capital for Dell. Calculate the weighted average cost of capital for Dell using book value weights and market value weights assuming Dell has a 35 percent marginal tax rate. Which number is more relevant?



Spreadsheet Templates 15–4, 15–10, 15–23