

Question Book for
Lecture Note 8 Cost of Capital

Problems

EASY PROBLEMS 1–8

- (9–1) Calculate the after-tax cost of debt under each of the following conditions:
After-Tax Cost of Debt
- Interest rate of 13%, tax rate of 0%
 - Interest rate of 13%, tax rate of 20%
 - Interest rate of 13%, tax rate of 35%
- (9–2) LL Incorporated's currently outstanding 11% coupon bonds have a yield to maturity of 8%. LL believes it could issue new bonds at par that would provide a similar yield to maturity. If its marginal tax rate is 35%, what is LL's after-tax cost of debt?
After-Tax Cost of Debt
- (9–3) Duggins Veterinary Supplies can issue perpetual preferred stock at a price of \$50 a share with an annual dividend of \$4.50 a share. Ignoring flotation costs, what is the company's cost of preferred stock, r_{ps} ?
Cost of Preferred Stock
- (9–4) Burnwood Tech plans to issue some \$60 par preferred stock with a 6% dividend. A similar stock is selling on the market for \$70. Burnwood must pay flotation costs of 5% of the issue price. What is the cost of the preferred stock?
Cost of Preferred Stock with Flotation Costs
- (9–5) Summerdahl Resort's common stock is currently trading at \$36 a share. The stock is expected to pay a dividend of \$3.00 a share at the end of the year ($D_1 = \$3.00$), and the dividend is expected to grow at a constant rate of 5% a year. What is its cost of common equity?
Cost of Equity: DCF
- (9–6) Booher Book Stores has a beta of 0.8. The yield on a 3-month T-bill is 4% and the yield on a 10-year T-bond is 6%. The market risk premium is 5.5%, and the return on an average stock in the market last year was 15%. What is the estimated cost of common equity using the CAPM?
Cost of Equity: CAPM
- (9–7) Shi Importer's balance sheet shows \$300 million in debt, \$50 million in preferred stock, and \$250 million in total common equity. Shi's tax rate is 40%, $r_d = 6\%$, $r_{ps} = 5.8\%$, and $r_s = 12\%$. If Shi has a target capital structure of 30% debt, 5% preferred stock, and 65% common stock, what is its WACC?
WACC
- (9–8) David Ortiz Motors has a target capital structure of 40% debt and 60% equity. The yield to maturity on the company's outstanding bonds is 9%, and the company's tax rate is 40%. Ortiz's CFO has calculated the company's WACC as 9.96%. What is the company's cost of equity capital?
WACC

INTERMEDIATE PROBLEMS 9–14

- (9–9) A company's 6% coupon rate, semiannual payment, \$1,000 par value bond that matures in 30 years sells at a price of \$515.16. The company's federal-plus-state tax rate is 40%. What is the firm's after-tax component cost of debt for purposes of calculating the WACC? (*Hint:* Base your answer on the *nominal* rate.)
Bond Yield and After-Tax Cost of Debt
- (9–10) The earnings, dividends, and stock price of Shelby Inc. are expected to grow at 7% per year in the future. Shelby's common stock sells for \$23 per share, its last dividend was \$2.00, and the company will pay a dividend of \$2.14 at the end of the current year.
Cost of Equity

- Using the discounted cash flow approach, what is its cost of equity?
- If the firm's beta is 1.6, the risk-free rate is 9%, and the expected return on the market is 13%, then what would be the firm's cost of equity based on the CAPM approach?
- If the firm's bonds earn a return of 12%, then what would be your estimate of r_s using the over-own-bond-yield-plus-judgmental-risk-premium approach? (*Hint: Use the midpoint of the risk premium range.*)
- On the basis of the results of parts a through c, what would be your estimate of Shelby's cost of equity?

(9-11)
Cost of Equity

Radon Homes' current EPS is \$6.50. It was \$4.42 five years ago. The company pays out 40% of its earnings as dividends, and the stock sells for \$36.

- Calculate the historical growth rate in earnings. (*Hint: This is a 5-year growth period.*)
- Calculate the *next* expected dividend per share, D_1 . (*Hint: $D_0 = 0.4(\$6.50) = \2.60 .*) Assume that the past growth rate will continue.
- What is Radon Homes' cost of equity, r_s ?

(9-12)
Calculation of g and
EPS

Spencer Supplies' stock is currently selling for \$60 a share. The firm is expected to earn \$5.40 per share this year and to pay a year-end dividend of \$3.60.

- If investors require a 9% return, what rate of growth must be expected for Spencer?
- If Spencer reinvests earnings in projects with average returns equal to the stock's expected rate of return, then what will be next year's EPS? (*Hint: $g = \text{ROE} \times \text{Retention ratio}$.*)

(9-13)
The Cost of Equity and
Flotation Costs

Messman Manufacturing will issue common stock to the public for \$30. The expected dividend and the growth in dividends are \$3.00 per share and 5%, respectively. If the flotation cost is 10% of the issue's gross proceeds, what is the cost of external equity, r_e ?

(9-14)
The Cost of Debt and
Flotation Costs

Suppose a company will issue new 20-year debt with a par value of \$1,000 and a coupon rate of 9%, paid annually. The tax rate is 40%. If the flotation cost is 2% of the issue proceeds, then what is the after-tax cost of debt? Disregard the tax shield from the amortization of flotation costs.

CHALLENGING
PROBLEMS 15-17

(9-15)
WACC Estimation

On January 1, the total market value of the Tysseland Company was \$60 million. During the year, the company plans to raise and invest \$30 million in new projects. The firm's present market value capital structure, shown below, is considered to be optimal. There is no short-term debt.

Debt	\$30,000,000
Common equity	<u>30,000,000</u>
Total capital	<u><u>\$60,000,000</u></u>

New bonds will have an 8% coupon rate, and they will be sold at par. Common stock is currently selling at \$30 a share. The stockholders' required rate of return is estimated to be 12%, consisting of a dividend yield of 4% and an expected constant growth rate of 8%. (The next expected dividend is \$1.20, so the dividend yield is $\$1.20/\$30 = 4\%$.) The marginal tax rate is 40%.

- In order to maintain the present capital structure, how much of the new investment must be financed by common equity?
- Assuming there is sufficient cash flow for Tysseland to maintain its target capital structure without issuing additional shares of equity, what is its WACC?
- Suppose now that there is not enough internal cash flow and the firm must issue new shares of stock. Qualitatively speaking, what will happen to the WACC? No numbers are required to answer this question.

(9-16)

Market Value Capital
Structure

Suppose the Schoof Company has this *book value* balance sheet:

Current assets	\$30,000,000	Current liabilities	\$10,000,000
Fixed assets	50,000,000	Long-term debt	30,000,000
		Common equity	
		Common stock	
		(1 million shares)	1,000,000
		Retained earnings	39,000,000
Total assets	<u>\$80,000,000</u>	Total claims	<u>\$80,000,000</u>

The current liabilities consist entirely of notes payable to banks, and the interest rate on this debt is 10%, the same as the rate on new bank loans. These bank loans are not used for seasonal financing but instead are part of the company's permanent capital structure. The long-term debt consists of 30,000 bonds, each with a par value of \$1,000, an annual coupon interest rate of 6%, and a 20-year maturity. The going rate of interest on new long-term debt, r_d , is 10%, and this is the present yield to maturity on the bonds. The common stock sells at a price of \$60 per share. Calculate the firm's *market value* capital structure.

(9-17)

WACC Estimation

The table below gives the balance sheet for Travellers Inn Inc. (TII), a company that was formed by merging a number of regional motel chains.

Travellers Inn: December 31, 2009 (Millions of Dollars)

Cash	\$ 10	Accounts payable	\$ 10
Accounts receivable	20	Accruals	10
Inventories	<u>20</u>	Short-term debt	<u>5</u>
Current assets	\$ 50	Current liabilities	\$ 25
Net fixed assets	50	Long-term debt	30
		Preferred stock	5
		Common equity	
		Common stock	\$ 10
		Retained earnings	<u>30</u>
		Total common equity	<u>\$ 40</u>
Total assets	<u>\$100</u>	Total liabilities and equity	<u>\$100</u>

The following facts also apply to TII.

- Short-term debt consists of bank loans that currently cost 10%, with interest payable quarterly. These loans are used to finance receivables and inventories on a seasonal basis, so bank loans are zero in the off-season.

- (2) The long-term debt consists of 20-year, semiannual payment mortgage bonds with a coupon rate of 8%. Currently, these bonds provide a yield to investors of $r_d = 12\%$. If new bonds were sold, they would have a 12% yield to maturity.
- (3) TII's perpetual preferred stock has a \$100 par value, pays a quarterly dividend of \$2, and has a yield to investors of 11%. New perpetual preferred would have to provide the same yield to investors, and the company would incur a 5% flotation cost to sell it.
- (4) The company has 4 million shares of common stock outstanding. $P_0 = \$20$, but the stock has recently traded in the price range from \$17 to \$23. $D_0 = \$1$ and $EPS_0 = \$2$. ROE based on average equity was 24% in 2008, but management expects to increase this return on equity to 30%; however, security analysts and investors generally are not aware of management's optimism in this regard.
- (5) Betas, as reported by security analysts, range from 1.3 to 1.7; the T-bond rate is 10%; and RP_M is estimated by various brokerage houses to be in the range from 4.5% to 5.5%. Some brokerage house analysts report forecasted growth dividend growth rates in the range of 10% to 15% over the foreseeable future.
- (6) TII's financial vice president recently polled some pension fund investment managers who hold TII's securities regarding what minimum rate of return on TII's common would make them willing to buy the common rather than TII bonds, given that the bonds yielded 12%. The responses suggested a risk premium over TII bonds of 4 to 6 percentage points.
- (7) TII is in the 40% federal-plus-state tax bracket.
- (8) TII's principal investment banker predicts a decline in interest rates, with r_d falling to 10% and the T-bond rate to 8%, although the bank acknowledges that an increase in the expected inflation rate could lead to an increase rather than a decrease in interest rates.

Assume that you were recently hired by TII as a financial analyst and that your boss, the treasurer, has asked you to estimate the company's WACC under the assumption that no new equity will be issued. Your cost of capital should be appropriate for use in evaluating projects that are in the same risk class as the assets TII now operates.

2. **Cost of Preferred Stock.** Micro Spinoffs also has preferred stock outstanding. The stock pays a dividend of \$4 per share, and the stock sells for \$40. What is the cost of preferred stock?
3. **Calculating WACC.** Suppose Micro Spinoffs's cost of equity is 12.5 percent. What is its WACC if equity is 50 percent, preferred stock is 20 percent, and debt is 30 percent of total capital?
4. **Cost of Equity.** Reliable Electric is a regulated public utility, and it is expected to provide steady growth of dividends of 5 percent per year for the indefinite future. Its last dividend was \$5 per share; the stock sold for \$60 per share just after the dividend was paid. What is the company's cost of equity?
5. **Calculating WACC.** Reactive Industries has the following capital structure. Its corporate tax rate is 35 percent. What is its WACC?

Security	Market Value	Required Rate of Return
Debt	\$20 million	8%
Preferred stock	\$10 million	10%
Common stock	\$50 million	15%

6. **Company versus Project Discount Rates.** Geothermal's WACC is 11.4 percent. Executive Fruit's WACC is 12.3 percent. Now Executive Fruit is considering an investment in geothermal power production. Should it discount project cash flows at 12.3 percent? Why or why not?
7. **Flotation Costs.** A project costs \$10 million and has NPV of \$+2.5 million. The NPV is computed by discounting at a WACC of 15 percent. Unfortunately, the \$10 million investment will have to be raised by a stock issue. The issue would incur flotation costs of \$1.2 million. Should the project be undertaken?

Practice Problems

8. **WACC.** The common stock of Buildwell Conservation & Construction, Inc., has a beta of .80. The Treasury bill rate is 4 percent and the market risk premium is estimated at 8 percent. BCCI's capital structure is 30 percent debt paying a 5 percent interest rate, and 70 percent equity. What is BCCI's cost of equity capital? Its WACC? Buildwell pays no taxes.
9. **WACC and NPV.** BCCI (see the previous problem) is evaluating a project with an internal rate of return of 12 percent. Should it accept the project? If the project will generate a cash flow of \$100,000 a year for 7 years, what is the most BCCI should be willing to pay to initiate the project?
10. **Calculating WACC.** Find the WACC of William Tell Computers. The total book value of the firm's equity is \$10 million; book value per share is \$20. The stock sells for a price of \$30 per share, and the cost of equity is 15 percent. The firm's bonds have a par value of \$5 million and sell at a price of 110 percent of par. The yield to maturity on the bonds is 9 percent, and the firm's tax rate is 40 percent.
11. **WACC.** Nodebt, Inc., is a firm with all-equity financing. Its equity beta is .80. The Treasury bill rate is 5 percent and the market risk premium is expected to be 10 percent. What is Nodebt's asset beta? What is Nodebt's weighted-average cost of capital? The firm is exempt from paying taxes.
12. **Cost of Capital.** A financial analyst at Dawn Chemical notes that the firm's total interest payments this year were \$10 million while total debt outstanding was \$80 million, and he concludes that the cost of debt was 12.5 percent. What is wrong with this conclusion?
13. **Cost of Equity.** Bunkhouse Electronics is a recently incorporated firm that makes electronic entertainment systems. Its earnings and dividends have been growing at a rate of 30 percent,

and the current dividend yield is 2 percent. Its beta is 1.2, the market risk premium is 8 percent, and the risk-free rate is 4 percent.

- a. Calculate two estimates of the firm's cost of equity.
 - b. Which estimate seems more reasonable to you? Why?
14. **Cost of Debt.** Olympic Sports has two issues of debt outstanding. One is a 9 percent coupon bond with a face value of \$20 million, a maturity of 10 years, and a yield to maturity of 10 percent. The coupons are paid annually. The other bond issue has a maturity of 15 years, with coupons also paid annually, and a coupon rate of 10 percent. The face value of the issue is \$25 million, and the issue sells for 92.8 percent of par value. The firm's tax rate is 35 percent.
- a. What is the before-tax cost of debt for Olympic?
 - b. What is Olympic's after-tax cost of debt?
15. **Capital Structure.** Examine the following book-value balance sheet for University Products, Inc. What is the capital structure of the firm based on market values? The preferred stock currently sells for \$15 per share and the common stock for \$20 per share. There are one million common shares outstanding.

BOOK VALUE BALANCE SHEET
(all values in millions)

Assets		Liabilities and Net Worth	
Cash and short-term securities	\$ 1	Bonds, coupon = 8%, paid annually (maturity = 10 years, current yield to maturity = 9%)	\$10.0
Accounts receivable	3	Preferred stock (par value \$20 per share)	2.0
Inventories	7	Common stock (par value \$.10)	.1
Plant and equipment	21	Additional paid in stockholders' capital	9.9
		Retained earnings	10.0
Total	\$32	Total	\$32.0

16. **Calculating WACC.** Turn back to University Products's balance sheet from the previous problem. If the preferred stock pays a dividend of \$2 per share, the beta of the stock is .8, the market risk premium is 10 percent, the risk-free rate is 6 percent, and the firm's tax rate is 40 percent, what is University's weighted-average cost of capital?
17. **Project Discount Rate.** University Products is evaluating a new venture into home computer systems (see problems 15 and 16). The internal rate of return on the new venture is estimated at 13.4 percent. WACCs of firms in the personal computer industry tend to average around 14 percent. Should the new project be pursued? Will University Products make the correct decision if it discounts cash flows on the proposed venture at the firm's WACC?
18. **Cost of Capital.** The total market value of Okefenokee Real Estate Company is \$6 million, and the total value of its debt is \$4 million. The treasurer estimates that the beta of the stock currently is 1.5 and that the expected risk premium on the market is 10 percent. The Treasury bill rate is 4 percent.
- a. What is the required rate of return on Okefenokee stock?
 - b. What is the beta of the company's existing portfolio of assets? The debt is perceived to be virtually risk-free.

- c. Estimate the weighted-average cost of capital assuming a tax rate of 40 percent.
- d. Estimate the discount rate for an expansion of the company's present business.
- e. Suppose the company wants to diversify into the manufacture of rose-colored glasses. The beta of optical manufacturers with no debt outstanding is 1.2. What is the required rate of return on Okefenokee's new venture?

- 19. **Changes in Capital Structure.** Look again at our calculation of Big Oil's WACC. Suppose Big Oil is excused from paying taxes. How would its WACC change? Now suppose Big Oil makes a large stock issue and uses the proceeds to pay off all its debt. How would the cost of equity change?
- 20. **Changes in Capital Structure.** Refer again to problem 19. Suppose Big Oil starts from the financing mix in Table 4.13, and then borrows an additional \$200 million from the bank. It then pays out a special \$200 million dividend, leaving its assets and operations unchanged. What happens to Big Oil's WACC, still assuming it pays no taxes? What happens to the cost of equity?
- 21. **WACC and Taxes.** "The after-tax cost of debt is lower when the firm's tax rate is higher; therefore, the WACC falls when the tax rate rises. Thus, with a lower discount rate, the firm must be worth more if its tax rate is higher." Explain why this argument is wrong.
- 22. **Cost of Capital.** An analyst at Dawn Chemical notes that its cost of debt is far below that of equity. He concludes that it is important for the firm to maintain the ability to increase its borrowing because if it cannot borrow, it will be forced to use more expensive equity to finance some projects. This might lead it to reject some projects that would have seemed attractive if evaluated at the lower cost of debt. Comment on this reasoning.