

2. *Calculating the levered beta for J. Lowes's new project:* Assuming the same unlevered beta for this new project as for the existing competitors, we have, from Equation 18.4:

**Levered Beta**

$$\beta_{\text{Equity}} = \left( 1 + \frac{(1 - t_c) \text{Debt}}{\text{Equity}} \right) \beta_{\text{Unlevered firm}}$$

$$2.16 = \left( 1 + \frac{.66 \times 1}{1} \right) \times 1.3$$

3. *Calculating the cost of levered equity for the new project:* We calculate the discount rate from the security market line (SML) as follows:

**Discount Rate**

$$R_s = R_f + \beta \times [\bar{R}_M - R_f]$$

$$.244 = .05 + 2.16 \times .09$$

4. *Calculating the WACC for the new project:* The formula for determining the weighted average cost of capital,  $R_{\text{WACC}}$ , is:

$$R_{\text{WACC}} = \frac{B}{V} R_b (1 - t_c) + \frac{S}{V} R_s$$

$$.139 = \frac{1}{2} \times .05 \times .66 + \frac{1}{2} \times .244$$

5. *Determining the project's value:* Because the cash flows are perpetual, the NPV of the project is:

$$\frac{\text{Unlevered cash flows (UCF)}}{R_{\text{WACC}}} - \text{Initial investment}$$

$$\frac{\$300,000}{.139} - \$1 \text{ million} = \$1.16 \text{ million}$$

## Summary and Conclusions

Earlier chapters of this text showed how to calculate net present value for projects of all-equity firms. We pointed out in the last two chapters that the introduction of taxes and bankruptcy costs changes a firm's financing decisions. Rational corporations should employ some debt in a world of this type. Because of the benefits and costs associated with debt, the capital budgeting decision is different for levered firms than for unlevered firms. The present chapter has discussed three methods for capital budgeting by levered firms: the adjusted present value (APV), flows to equity (FTE), and weighted average cost of capital (WACC) approaches.

## Concept Questions

- APV** How is the APV of a project calculated?
- WACC and APV** What is the main difference between the WACC and APV methods?
- FTE** What is the main difference between the FTE approach and the other two approaches?
- Capital Budgeting** You are determining whether your company should undertake a new project and have calculated the NPV of the project using the WACC method when the CFO, a former accountant, notices that you did not use the interest payments in

calculating the cash flows of the project. What should you tell him? If he insists that you include the interest payments in calculating the cash flows, what method can you use?

5. **Beta and Leverage** What are the two types of risk that are measured by a levered beta?

## Questions and Problems

### connect

BASIC  
(Questions 1-9)



- NPV and APV** Zoso is a rental car company that is trying to determine whether to add 25 cars to its fleet. The company fully depreciates all its rental cars over five years using the straight-line method. The new cars are expected to generate \$140,000 per year in earnings before taxes and depreciation for five years. The company is entirely financed by equity and has a 35 percent tax rate. The required return on the company's unlevered equity is 13 percent, and the new fleet will not change the risk of the company.
  - What is the maximum price that the company should be willing to pay for the new fleet of cars if it remains an all-equity company?
  - Suppose the company can purchase the fleet of cars for \$395,000. Additionally, assume the company can issue \$260,000 of five-year, 8 percent debt to finance the project. All principal will be repaid in one balloon payment at the end of the fifth year. What is the adjusted present value (APV) of the project?
- APV** Gemini, Inc., an all-equity firm, is considering a \$1.9 million investment that will be depreciated according to the straight-line method over its four-year life. The project is expected to generate earnings before taxes and depreciation of \$685,000 per year for four years. The investment will not change the risk level of the firm. The company can obtain a four-year, 9.5 percent loan to finance the project from a local bank. All principal will be repaid in one balloon payment at the end of the fourth year. The bank will charge the firm \$28,000 in flotation fees, which will be amortized over the four-year life of the loan. If the company financed the project entirely with equity, the firm's cost of capital would be 13 percent. The corporate tax rate is 30 percent. Using the adjusted present value method, determine whether the company should undertake the project.
- Flow to Equity** Milano Pizza Club owns three identical restaurants popular for their specialty pizzas. Each restaurant has a debt-equity ratio of 40 percent and makes interest payments of \$34,000 at the end of each year. The cost of the firm's levered equity is 19 percent. Each store estimates that annual sales will be \$1.2 million; annual cost of goods sold will be \$510,000; and annual general and administrative costs will be \$340,000. These cash flows are expected to remain the same forever. The corporate tax rate is 40 percent.
  - Use the flow to equity approach to determine the value of the company's equity.
  - What is the total value of the company?
- WACC** If Wild Widgets, Inc., were an all-equity company, it would have a beta of 1.1. The company has a target debt-equity ratio of .40. The expected return on the market portfolio is 12 percent, and Treasury bills currently yield 5 percent. The company has one bond issue outstanding that matures in 20 years and has an 8 percent coupon rate. The bond currently sells for \$975. The corporate tax rate is 34 percent.
  - What is the company's cost of debt?
  - What is the company's cost of equity?
  - What is the company's weighted average cost of capital?
- Beta and Leverage** North Pole Fishing Equipment Corporation and South Pole Fishing Equipment Corporation would have identical equity betas of 1.25 if both were all equity financed. The market value information for each company is shown here:

	North Pole	South Pole
Debt	\$2,900,000	\$3,800,000
Equity	\$3,800,000	\$2,900,000

The expected return on the market portfolio is 12.40 percent, and the risk-free rate is 5.30 percent. Both companies are subject to a corporate tax rate of 35 percent. Assume the beta of debt is zero.

- What is the equity beta of each of the two companies?
- What is the required rate of return on each of the two companies' equity?



- NPV of Loans** Daniel Kaffe, CFO of Kendrick Enterprises, is evaluating a 10-year, 8 percent loan with gross proceeds of \$5,350,000. The interest payments on the loan will be made annually. Flotation costs are estimated to be 1.25 percent of gross proceeds and will be amortized using a straight-line schedule over the 10-year life of the loan. The company has a tax rate of 40 percent, and the loan will not increase the risk of financial distress for the company.
  - Calculate the net present value of the loan excluding flotation costs.
  - Calculate the net present value of the loan including flotation costs.
- NPV for an All-Equity Company** Shattered Glass, Inc., is an all-equity firm. The cost of the company's equity is currently 14 percent, and the risk-free rate is 6 percent. The company is currently considering a project that will cost \$11.4 million and last six years. The project will generate revenues minus expenses each year in the amount of \$3.8 million. If the company has a tax rate of 40 percent, should it accept the project?
- WACC** National Electric Company (NEC) is considering a \$40 million project in its power systems division. Tom Edison, the company's chief financial officer, has evaluated the project and determined that the project's unlevered cash flows will be \$2.6 million per year in perpetuity. Mr. Edison has devised two possibilities for raising the initial investment: Issuing 10-year bonds or issuing common stock. NEC's pretax cost of debt is 7.2 percent, and its cost of equity is 11.4 percent. The company's target debt-to-value ratio is 80 percent. The project has the same risk as NEC's existing businesses, and it will support the same amount of debt. NEC is in the 34 percent tax bracket. Should NEC accept the project?
- WACC** Bolero, Inc., has compiled the following information on its financing costs:

Type of Financing	Book Value	Market Value	Cost
Short-term debt	\$10,000,000	\$11,000,000	6.8
Long-term debt	3,000,000	3,000,000	3.5%
Common stock	6,000,000	26,000,000	14.5
Total	\$19,000,000	\$40,000,000	

The company is in the 35 percent tax bracket and has a target debt-equity ratio of 60 percent. The target short-term debt/long-term debt ratio is 20 percent.

- What is the company's weighted average cost of capital using book value weights?
  - What is the company's weighted average cost of capital using market value weights?
  - What is the company's weighted average cost of capital using target capital structure weights?
  - What is the difference between WACCs? Which is the correct WACC to use for project evaluation?
- APV** Triad Corporation has established a joint venture with Tobacco Road Construction, Inc., to build a toll road in North Carolina. The initial investment in paving equipment is \$30 million. The equipment will be fully depreciated using the straight-line method over its economic life of five years. Earnings before interest,

INTERMEDIATE  
(Questions 10–13)



taxes, and depreciation collected from the toll road are projected to be \$3.8 million per annum for 20 years starting from the end of the first year. The corporate tax rate is 35 percent. The required rate of return for the project under all-equity financing is 13 percent. The pretax cost of debt for the joint partnership is 8.5 percent. To encourage investment in the country's infrastructure, the U.S. government will subsidize the project with an \$18 million, 15-year loan at an interest rate of 5 percent per year. All principal will be repaid in one balloon payment at the end of year 15. What is the adjusted present value of this project?

- APV** For the company in the previous problem, what is the value of being able to issue subsidized debt instead of having to issue debt at the terms it would normally receive? Assume the face amount and maturity of the debt issue are the same.
- APV** MVP, Inc., has produced rodeo supplies for over 20 years. The company currently has a debt-equity ratio of 50 percent and is in the 40 percent tax bracket. The required return on the firm's levered equity is 16 percent. MVP is planning to expand its production capacity. The equipment to be purchased is expected to generate the following unlevered cash flows:

Year	Cash Flow
0	-\$21,000,000
1	6,900,000
2	11,000,000
3	9,500,000

The company has arranged a \$7 million debt issue to partially finance the expansion. Under the loan, the company would pay interest of 9 percent at the end of each year on the outstanding balance at the beginning of the year. The company would also make year-end principal payments of \$2,333,333 per year, completely retiring the issue by the end of the third year. Using the adjusted present value method, should the company proceed with the expansion?

- WACC** Neon Corporation's stock returns have a covariance with the market portfolio of .036. The standard deviation of the returns on the market portfolio is 20 percent, and the expected market risk premium is 7.5 percent. The company has bonds outstanding with a total market value of \$35 million and a yield to maturity of 8 percent. The company also has 6 million shares of common stock outstanding, each selling for \$20. The company's CEO considers the firm's current debt-equity ratio optimal. The corporate tax rate is 35 percent, and Treasury bills currently yield 6 percent. The company is considering the purchase of additional equipment that would cost \$45 million. The expected unlevered cash flows from the equipment are \$13.5 million per year for five years. Purchasing the equipment will not change the risk level of the firm.
  - Use the weighted average cost of capital approach to determine whether Neon should purchase the equipment.
  - Suppose the company decides to fund the purchase of the equipment entirely with debt. What is the cost of capital for the project now? Explain.
- APV, FTE, and WACC** Seger, Inc., is an unlevered firm with expected annual earnings before taxes of \$28 million in perpetuity. The current required return on the firm's equity is 20 percent, and the firm distributes all of its earnings as dividends at the end of each year. The company has 1.5 million shares of common stock outstanding and is subject to a corporate tax rate of 35 percent. The firm is planning a

CHALLENGE  
(Questions 14–17)

recapitalization under which it will issue \$35 million of perpetual 9 percent debt and use the proceeds to buy back shares.

- a. Calculate the value of the company before the recapitalization plan is announced. What is the value of equity before the announcement? What is the price per share?
  - b. Use the APV method to calculate the company value after the recapitalization plan is announced. What is the value of equity after the announcement? What is the price per share?
  - c. How many shares will be repurchased? What is the value of equity after the repurchase has been completed? What is the price per share?
  - d. Use the flow to equity method to calculate the value of the company's equity after the recapitalization.
15. **APV, FTE, and WACC** Mojito Mint Company has a debt–equity ratio of .35. The required return on the company's unlevered equity is 17 percent, and the pretax cost of the firm's debt is 9 percent. Sales revenue for the company is expected to remain stable indefinitely at last year's level of \$28,900,000. Variable costs amount to 60 percent of sales. The tax rate is 40 percent, and the company distributes all its earnings as dividends at the end of each year.
- a. If the company were financed entirely by equity, how much would it be worth?
  - b. What is the required return on the firm's levered equity?
  - c. Use the weighted average cost of capital method to calculate the value of the company. What is the value of the company's equity? What is the value of the company's debt?
  - d. Use the flow to equity method to calculate the value of the company's equity.
16. **APV, FTE, and WACC** Lone Star Industries just issued \$195,000 of perpetual 9 percent debt and used the proceeds to repurchase stock. The company expects to generate \$83,000 of earnings before interest and taxes in perpetuity. The company distributes all its earnings as dividends at the end of each year. The firm's unlevered cost of capital is 15 percent, and the corporate tax rate is 40 percent.
- a. What is the value of the company as an unlevered firm?
  - b. Use the adjusted present value method to calculate the value of the company with leverage.
  - c. What is the required return on the firm's levered equity?
  - d. Use the flow to equity method to calculate the value of the company's equity.
17. **Projects That Are Not Scale Enhancing** Blue Angel, Inc., a private firm in the holiday gift industry, is considering a new project. The company currently has a target debt–equity ratio of .40, but the industry target debt–equity ratio is .35. The industry average beta is 1.2. The market risk premium is 7 percent, and the risk-free rate is 5 percent. Assume all companies in this industry can issue debt at the risk-free rate. The corporate tax rate is 40 percent. The project requires an initial outlay of \$475,000 and is expected to result in an \$80,000 cash inflow at the end of the first year. The project will be financed at Blue Angel's target debt–equity ratio. Annual cash flows from the project will grow at a constant rate of 5 percent until the end of the fifth year and remain constant forever thereafter. Should Blue Angel invest in the project?

[www.mhhe.com/edumarketinsight](http://www.mhhe.com/edumarketinsight)

1. Locate the annual income statements for Walt Disney (DIS) and calculate the marginal tax rate for the company for the last year. Next, find the beta for Disney in the S&P stock report. Using the current debt and equity from the most recent annual balance sheet, calculate the unlevered beta for Disney.

S&P  
Problem

STANDARD  
& POOR'S

## Appendix 18A The Adjusted Present Value Approach to Valuing Leveraged Buyouts

To access the appendix for this chapter, please visit [www.mhhe.com/rwj](http://www.mhhe.com/rwj).

### THE LEVERAGED BUYOUT OF CHEEK PRODUCTS, INC.

Cheek Products, Inc. (CPI) was founded 53 years ago by Joe Cheek and originally sold snack foods such as potato chips and pretzels. Through acquisitions, the company has grown into a conglomerate with major divisions in the snack food industry, home security systems, cosmetics, and plastics. Additionally, the company has several smaller divisions. In recent years, the company has been underperforming, but the company's management doesn't seem to be aggressively pursuing opportunities to improve operations (and the stock price).

Meg Whalen is a financial analyst specializing in identifying potential buyout targets. She believes that two major changes are needed at Cheek. First, she thinks that the company would be better off if it sold several divisions and concentrated on its core competencies in snack foods and home security systems. Second, the company is financed entirely with equity. Because the cash flows of the company are relatively steady, Meg thinks the company's debt–equity ratio should be at least .25. She believes these changes would significantly enhance shareholder wealth, but she also believes that the existing board and company management are unlikely to take the necessary actions. As a result, Meg thinks the company is a good candidate for a leveraged buyout.

A leveraged buyout (LBO) is the acquisition by a small group of equity investors of a public or private company. Generally, an LBO is financed primarily with debt. The new shareholders service the heavy interest and principal payments with cash from operations and/or asset sales. Shareholders generally hope to reverse the LBO within three to seven years by way of a public offering or sale of the company to another firm. A buyout is therefore likely to be successful only if the firm generates enough cash to serve the debt in the early years and if the company is attractive to other buyers a few years down the road.

Meg has suggested the potential LBO to her partners, Ben Feller and Brenton Flynn. Ben and Brenton have asked Meg to provide projections of the cash flows for the company. Meg has provided the following estimates (in millions):

	2010	2011	2012	2013	2014
Sales	\$2,115	\$2,371	\$2,555	\$2,616	\$2,738
Costs	562	738	776	839	884
Depreciation	373	397	413	434	442
EBT	\$1,180	\$1,236	\$1,366	\$1,343	\$1,412
Capital expenditures	\$ 215	\$ 186	\$ 234	\$ 237	\$ 234
Change in NWC	\$ (94)	\$ (143)	\$ 78	\$ 73	\$ 83
Asset sales	\$1,092	\$ 791			

At the end of five years, Meg estimates that the growth rate in cash flows will be 3.5 percent per year. The capital expenditures are for new projects and the replacement