3. True or false? Use of the WACC formula assumes
   a. A project supports a fixed amount of debt over the project's economic life.
   b. The *ratio* of the debt supported by a project to project value is constant over the project's economic life.
   c. The firm rebalances debt each period, keeping the debt-to-value ratio constant.
4. What is meant by the flow-to-equity valuation method? What discount rate is used in this method? What assumptions are necessary for this method to give an accurate valuation?
5. True or false? The APV method
   a. Starts with a base-case value for the project.
   b. Calculates the base-case value by discounting project cash flows, forecasted assuming all-equity financing, at the WACC for the project.
   c. Is especially useful when debt is to be paid down on a fixed schedule.
6. A project costs $1 million and has a base-case NPV of exactly zero (NPV = 0). What is the project's APV in the following cases?
   a. If the firm invests, it has to raise $500,000 by a stock issue. Issue costs are 15% of *net* proceeds.
   b. If the firm invests, its debt capacity increases by $500,000. The present value of interest tax shields on this debt is $76,000.
7. Whispering Pines, Inc., is all-equity-financed. The expected rate of return on the company's shares is 12%.
   a. What is the opportunity cost of capital for an average-risk Whispering Pines investment?
   b. Suppose the company issues debt, repurchases shares, and moves to a 30% debt-to-value ratio ($D/V = .30$). What will the company's weighted-average cost of capital be at the new capital structure? The borrowing rate is 7.5% and the tax rate is 35%.
8. Consider a project lasting one year only. The initial outlay is $1,000 and the expected inflow is $1,200. The opportunity cost of capital is $r = .20$. The borrowing rate is $r_D = .10$, and the tax shield per dollar of interest is $T_c = .35$.
   a. What is the project's base-case NPV?
   b. What is its APV if the firm borrows 30% of the project's required investment?
9. The WACC formula seems to imply that debt is "cheaper" than equity—that is, that a firm with more debt could use a lower discount rate. Does this make sense? Explain briefly.
10. Suppose KCS Corp. buys out Patagonia Trucking, a privately owned business, for $50 million. KCS has only $5 million cash in hand, so it arranges a $45 million bank loan. A normal debt-to-value ratio for a trucking company would be 50% at most, but the bank is satisfied with KCS's credit rating.
    Suppose you were valuing Patagonia by APV in the same format as Table 20.2. How much debt would you include? Explain briefly.

PRACTICE QUESTIONS

Table 20.3 shows a *book* balance sheet for the Wishing Well Motel chain. The company's long-term debt is secured by its real estate assets, but it also uses short-term bank financing. It pays 10% interest on the bank debt and 9% interest on the secured debt. Wishing Well has 10 million shares of stock outstanding, trading at $90 per share. The expected return on Wishing Well's common stock is 18%.

Calculate Wishing Well's WACC. Assume that the book and market values of Wishing Well's debt are the same. The marginal tax rate is 35%.

TABLE 20.3

Balance sheet for Wishing Well, Inc. (figures in $ millions).

Cash and marketable securities	100	Bank loan	280
Inventory	50	Accounts payable	120
Accounts receivable	200	Current liabilities	400
Current assets	350		
Real estate	2,100	Long-term debt	1,800
Other assets	150	Equity	400
Total	2,600	Total	2,600

TABLE 20.4

Simplified book balance sheet for Rensselaer Felt (figures in $ thousands).

Cash and marketable securities	1,500	Short-term debt	75,600
Accounts receivable	120,000	Accounts payable	62,000
Inventories	125,000	Current liabilities	137,600
Current assets	246,500		
Property, plant, and equipment	302,000	Long-term debt	208,600
Other assets	89,000	Deferred taxes	45,000
Total	637,500	Shareholders' equity	246,300
		Total	637,500

12. Suppose Wishing Well is evaluating a new motel and resort on a romantic site in Madison County, Wisconsin. Explain how you would forecast the after-tax cash flows for this project. (*Hints:* How would you treat taxes? Interest expense? Changes in working capital?)
13. To finance the Madison County project, Wishing Well will have to arrange an additional $80 million of long-term debt and make a $20 million equity issue. Underwriting fees, spreads, and other costs of this financing will total $4 million. How would you take this into account in valuing the proposed investment?
14. Table 20.4 shows a simplified balance sheet for Rensselaer Felt. Calculate this company's weighted-average cost of capital. The debt has just been refinanced at an interest rate of 6% (short term) and 8% (long term). The expected rate of return on the company's shares is 15%. There are 7.46 million shares outstanding, and the shares are trading at $46. The tax rate is 35%.
15. How will Rensselaer Felt's WACC and cost of equity change if it issues $50 million in new equity and uses the proceeds to retire long-term debt? Assume the company's borrowing rates are unchanged. Use the three-step procedure from Section 20.3.
16. Digital Organics (DO) has the opportunity to invest $1 million now ($t = 0$) and expects after-tax returns of $600,000 in $t = 1$ and $700,000 in $t = 2$. The project will last for two years only. The appropriate cost of capital is 12% with all-equity financing, the borrowing rate is 8%, and DO will borrow $300,000 against the project. This debt must be repaid in two equal installments. Assume debt tax shields have a net value of $.30 per dollar of interest paid. Calculate the project's APV using the procedure followed in Table 20.2.
17. Consider another perpetual project like the crusher described in Section 20.1. Its initial investment is $1,000,000, and the expected cash inflow is $95,000 a year in perpetuity. The opportunity cost of capital with all-equity financing is 10%, and the project allows the firm to borrow at 7%. The tax rate is 35%.

    Use APV to calculate this project's value.

    a. Assume first that the project will be partly financed with $400,000 of debt and that the debt amount is to be fixed and perpetual.

    b. Then assume that the initial borrowing will be increased or reduced in proportion to changes in the future market value of this project.

    Explain the difference between your answers to (a) and (b).
18. Suppose the project described in Practice Question 17 is to be undertaken by a university. Funds for the project will be withdrawn from the university's endowment, which