

# Understanding Financial Management: A Practical Guide

## Problems and Answers

### Chapter 10

#### Raising Funds and Cost of Capital

##### 10.1 Financial Markets

1. What is the difference between a financial market and a financial asset?

##### 10.2 Investment Banks

2. What are two methods a corporation can use to issue its securities to the public?

##### 10.3 The Decision to Go Public

3. Why is pricing an IPO difficult?

##### 10.4 Different Methods of Issuing New Securities

4. What are two important considerations in choosing the best method for raising capital?

##### 10.5 Public Offer

5. What are the two methods a firm can use when making a public offering of additional equity? How do these methods differ?
6. Why might a shareholder want a corporate charter to contain a preemptive right? Why is a preemptive right important?

##### 10.6 Private Placement

7. What is a private placement of new debt or equity securities? Why would a firm engage in a private placement instead of a public offering?

##### 10.7 Cost of Issuing New Securities

8. Oliver Corporation plans to issue 3 million shares of new stock. Their investment banking firm plans to sell the shares for \$25 per share and has guaranteed Oliver Corporation a price of \$22 per share.

- A. What is the underwriting spread per share and gross underwriting spread?
- B. What is the flotation cost as a percentage of the new issue?

### **10.8 Cost of Capital Concept**

- 9. What is the cost of capital? What are several important uses of the cost of capital by a firm?
- 10. What are some factors affecting the cost of capital that a firm cannot control?
- 11. What are the three long-term components in the capital structure of many firms?

### **10.9 Cost of Capital Components**

- 12. Bailey Company currently has 8% coupon bonds outstanding with a yield to maturity of 10%. Bailey is considering a new bond issue at par that would provide a similar yield to maturity. If the firm's marginal tax rate is 35%, what is Bailey's unadjusted after-tax cost of debt assuming no flotation costs?
- 13. Boston Supply Company plans to engage in a private placement of 10-year semi-annual-pay coupon bonds. Each bond has a par value of \$1,000 and semi-annual coupon payments are \$40. The firm has a marginal federal-plus-state tax rate of 34%. What is the estimated unadjusted after-tax cost of the new debt?
- 14. Suppose that instead of having a private placement, Boston Brewery plans to issue \$5 million in 10-year semi-annual coupon bonds. Each bond has a par value of \$1,000 and a coupon rate of 8%. The firm expects to sell the bonds at par and to incur flotation costs of 2%, which it plans to amortize over the life of the bond. The firm has a marginal federal-plus-state tax rate of 34%. What is the estimated adjusted after-tax cost of the new bond?
- 15. Oracle Supply Company has decided to issue \$20 million in 20-year semi-annual coupon bonds. The bonds will sell at par value with a coupon rate of 10%. Oracle expects to incur a flotation cost of 3% per bond. If the firm's marginal tax rate is 40%, what is Oracle's adjusted after-tax cost of debt?

### **Problems 16 – 19 refer to Thomson Corporation**

- 16. Thomson Corporation can sell preferred stock at its par value of \$100 per share. The firm plans to pay quarterly dividends of \$2 per share and expects to incur flotation costs of 3% per share. What is Thomson's cost of new preferred stock?
- 17. The beta of Thomson Corporation's common stock is 1.8. The risk-free rate is 4% and the return on the market is expected to be 10%. Using the CAPM, what is the firm's cost of existing equity?
- 18. Thomson Corporation recently paid an annual dividend of \$5 per share. Thomson expects dividends to grow at a constant rate of 3% percent each year. The firm's stock is currently selling at \$40 a share. If the company issues new common stock, it expects to incur a flotation cost of 10%.

- A. Using the constant growth DDM, what is Thomson's existing cost of common equity?  
 B. Using the constant growth DDM, what is Thomson's estimated cost of new common equity?
19. Thomson Corporation has a capital structure of 45% long-term debt, 5% preferred stock, and 50% common equity. Assume that Thomson's after-tax cost of long-term debt is 6.50% and its cost of preferred stock is 8.25%. Thomson expects to generate sufficient internal equity so that it will not need to sell new common stock to provide the equity component of the funds it needs for new investments. The firm decides to use 14.80%, which is based on the CAPM, as the cost of the equity portion of the capital structure. Assuming that Thomson wants to maintain the current capital structure, what is the firm's WACC?
20. An analyst at Reef Brewery wants to estimate the cost of the firm's existing equity using the capital asset pricing model (CAPM), constant growth dividend discount model (DDM), and bond-yield-plus-risk-premium approach. The analyst plans to average the results of these three methods to get a final estimate of the cost of existing debt. The analyst also wants to estimate the cost of new equity using the constant growth DDM. The analyst gathers the following information about the firm.
- Beta = 1.4
  - Risk-free rate based on 10-year Treasury bonds = 6%
  - Expected rate of return on the market = 11%
  - Stock price = \$40
  - Current annual cash dividend = \$2 per share
  - Expected (constant) growth rate = 5%
  - Before-tax cost of debt = 10%
  - Equity risk premium = 4%
  - Flotation cost of new equity = 8%
  - Marginal tax rate = 40%
- A. Using the CAPM, what is the estimated cost of existing equity?  
 B. Using the constant growth DDM, what is the firm's estimated cost of existing equity?  
 C. Using the bond-yield-plus-risk-premium approach, what is the estimated cost of existing equity?  
 D. What is the cost of existing equity based on an average of the results obtained from the three methods?  
 E. Using the constant growth DDM, what is the estimated cost of new equity?

### 10.10 Weighted Average Cost of Capital

21. Cassidy Inc. wants to estimate its WACC using market value weights in order to analyze future capital budgeting projects.
- The firm has 10,000 bonds outstanding and investors require a before-tax return of 9%. Each bond has a \$1,000 face value, a coupon rate of 8% paid semiannually, and 10 years remaining until maturity. The firm's marginal tax rate is 40%.
  - The firm has 50,000 shares of preferred stock outstanding that currently sell for \$95 a

- share. The after-tax cost of preferred stock is 8.50%.
  - The firm has 1 million shares of common stock shares outstanding that currently sell for \$25 a share. The after-tax cost of common stock is 11.20%.
  - The firm's marginal tax rate is 40%.
- A. What is the market value of the firm's debt, preferred stock, and common stock?
  - B. What is the market value weight of each capital component?
  - C. What is the firm's existing WACC?

### 10.11 Marginal Cost of Capital

22. An analyst at Downhill Ventures (DV) gathers the following information about the firm.

- The firm's capital structure consists of 28% debt, 8% preferred stock, and 64% common stock.
  - Net income for the year is expected to be \$20 million.
  - The firm's marginal tax rate is 34% and its dividend payout ratio is 40%.
  - T-bonds currently yield 7%, the average stock has an 11% rate of return, and the firm's beta is 1.5.
  - Up to \$8 million in senior debt can be raised at a pre-tax cost of 8%. Any debt above \$8 million qualifies as junior debt with a higher pre-tax cost of 10%. The firm plans to place both senior and junior debt privately.
  - New preferred stock could be sold to the public at a price of \$100, with annual dividends of \$8 per share and flotation costs of \$4 per share.
  - DV's stock currently sells at a price of \$45 per share and the firm paid a dividend of \$2.50 per share last year ( $D_0$ ). Investors expect earnings and dividends to grow at a constant rate of 8% in the future.
  - If the firm decides to raise new capital, new common stock would have a flotation cost of 15%.
- A. What are the component costs of new senior and junior debt, new preferred stock, retained earnings (use the average of the CAPM and DCF method), and new common stock (only DCF method)?
  - B. How much new capital can DV raise before it must sell new equity? That is, what is the break point for retained earnings?
  - C. How much new capital can DV raise using senior debt before it must borrow more expensive junior debt? That is, what is the break point for senior debt?
  - D. What is the WACC when DV meets its equity requirement with retained earnings?
  - E. What is the WACC when DV meets its equity requirement with new common stock, preferred stock, and senior debt?
  - F. What is the WACC when DV meets its equity requirement with new common stock, new preferred stock, and junior debt?
  - G. Construct a graph showing DV's MCC schedule.

H. If DV has forecasted \$2 million in depreciation for the planning period, what impact does this have on the MCC schedule?

23. Brett Corporation is a medium-sized manufacturer of flash memory used in MP3 players and other portable electronic devices. At the beginning of the year, Brett had 2 million shares of common stock outstanding and expects earnings to be \$10 per share. The firm maintains a 40% dividend payout ratio. Brett has also determined its optimal capital structure to be 50% long-term debt, and 50% common equity. The firm's marginal tax rate is 40%. Ignoring any depreciation-generated funds, the following chart illustrates the amounts that Brett can raise at different component costs.

<b>Marginal Cost of Capital for Brett Company</b>			
Capital Component	Target Weight (%)	Range of Financing (in millions)	Component Cost (%)
Long-term debt	50	Up to \$12	6.00
		\$12 up to \$24	6.50
Common equity	50	Up to \$12	13.00
		\$12 up to \$24	13.50

Brett is considering six capital budgeting projects during the current year. All projects are average risk and independent, except Projects B and B\*, which are mutually exclusive. The firm does not plan to repeat Projects B or B\*. The following table illustrates Brett's investment opportunity schedule (IOS).

<b>Investment Opportunity Schedule of Brett Corporation</b>				
Project	Cost	Annual Year-End Cash Flows	Life	IRR
A	\$9,000,000	\$2,163,243	7	15%
B	4,500,000	1,905,849	3	13
B*	4,500,000	1,094,516	6	12
C	7,500,000	2,417,448	4	11
D	6,000,000	1,542,555	5	9
E	1,500,000	841,154	2	8

- A. What is the MCC schedule for Brett Corporation? Graph the results.  
 B. What MCC should managers use at Brett Corporation for capital budgeting?  
 C. If Brett Corporation is not subject to capital rationing, what is the firm's optimal capital budget? Graph the IOS and MCC schedule.

## Answers

1. A *financial market* is a mechanism for bringing together buyers and sellers of financial assets. A *financial asset* is a monetary claim on an issuer in the form of a paper asset such as stocks and bonds.
2. A corporation can issue its securities directly to the public through direct sales or indirectly by using a financial intermediary such as an investment bank.
3. The pricing of an IPO is difficult because there is no observable market price before the offering and the issuing firm generally has limited operating experience.
4. Two important considerations in choosing the best method for raising capital are (1) flotation costs, the expenses involved in selling a new security issue, and (2) risk, the chance of getting the desired amount of money.
5. A firm can issue the shares using a general cash offer or a rights offer. A *general cash offer* is a public issue offering the sale of securities to all interested investors. Instead of selling new securities to the general public, a corporation may offer them to its current stockholders. Thus, existing stockholders have a right-of-first-refusal involving the sale of a new issue of common stock. This is why a new common issue offered first to existing stockholders is called a *rights offer* or *privileged subscription*.
6. A preemptive right gives existing stockholders the right to buy new shares of common stock issued in proportion to their current ownership. The purpose of the preemptive right is to protect existing shareholders from having the proportionate ownership diluted when a firm issues new common stock.
7. A private placement involves the sale of an issue of securities to a single buyer or a few buyers, bypassing the public markets. The sale is usually to institutional rather than to individual investors. Compared with a public offering, a private placement has the advantages of lower flotation costs and greater flexibility, speed, and privacy.
- 8A. The underwriting spread per share is  $\$25 - \$22 = \$3$  and the gross underwriting spread is  $3 \text{ million shares} \times \$3 = \$9 \text{ million}$ .
- 8B. The market value of the shares is  $3 \text{ million shares} \times \$25 \text{ per share} = \$75 \text{ million}$ . The flotation costs as a percentage of the new issue =  $\$9 \text{ million} / \$75 \text{ million} = 12\%$ .
9. The cost of capital is a firm's required rate of return consisting of the weighted cost of the firm's financing resources. Managers use the cost of capital as a discount or hurdle rate when evaluating capital budgeting projects and as an input in making capital structure decisions. In addition the cost of capital serves as an important link in achieving the firm's financial goal of maximizing shareholders' wealth.
10. Various factors affect a firm's cost of capital that are beyond the firm's control. For example, firms have no direct control over the level of interest rates, tax rates, and the market risk premium. All of these factors affect capital components that comprise a firm's cost of capital.

11. The three major long-term components in the capital structures of many firms are debt, preferred stock, and common equity (retained earnings and new common stock).
12. Since the bonds sell at par and have no flotation costs, the coupon rate of the bond would be the same as its yield to maturity. Substituting  $k_d = 10\%$  and  $T = 35\%$  into the equation for the unadjusted after-tax cost of debt results in  $k'_d = k_d(1 - T) = 10\%(1 - 0.35) = 6.5\%$
13. The coupon rate is  $8\%$   $[(\$40 \times 2)/\$1000]$ . Thus, the unadjusted after-tax cost of debt is:  $k'_d = 8\%(1 - 0.34) = 5.28\%$ .
14. First, calculate the net proceeds per bond as  $M(1 - F) = \$1,000(1 - 0.02) = \$980$ . Next, determine the semi-annual payment, which consists of two parts: (1) the after-tax interest cost of  $(I/2)(1 - T) = (\$80/2)(1 - 0.34) = \$40(0.66) = \$26.40$  less (2) the tax savings resulting from amortizing the flotation costs of  $(F^*/2n)(1 - T) = [(\$20/(2)(10))](1 - 0.34) = (\$1)(0.66) = \$0.66$ . Thus, the semi-annual payment is  $\$26.40 - \$0.66 = \$25.74$ . Finally, calculate the adjusted after-tax cost of new debt.

*Inputs:* 20 N; 980 PV; \$25.74 +/- PMT; 1,000 +/- FV; CPT I/Y

*Output:* 2.7048 x 2 = 5.4096.

Thus, the adjusted after-tax cost of new debt is about 5.41%.

15. First, calculate the net proceeds per bond of  $M(1 - F) = \$1,000(1 - 0.03) = \$970$ . Next, calculate the semi-annual payment over the life of the bond:  $(I/2)(1 - T) - (F^*/2n)(1 - T) = (\$100/2)(1 - 0.40) - [(\$30/(2)(20))(1 - 0.40)] = \$30 - \$0.45 = \$29.55$ . Finally, calculate the adjusted after-tax cost of new debt:

*Inputs:* 40 N; 970 PV; 29.55 +/- PMT; 1,000 +/- FV; CPT I/Y

*Output:* 3.0866 x 2 = 6.1732

Thus, the adjusted after-tax cost of debt is about 6.17%.

16. The annual dividend for the new preferred stock is  $D_p = (\$2)(4) = \$8$  and the expected net proceeds from the sale are  $P_0(1 - F) = \$100(1 - 0.03) = \$97$ . Thus, the cost of new preferred stock is:

$$k_p = \frac{D_p}{P_0(1 - F)} = \frac{\$8.00}{\$97.00} = 0.0825 \text{ or } 8.25\%$$

17. Substitute  $R_f = 4.0\%$ ,  $\beta_i = 1.8$ , and  $R_m = 10.0\%$  into the CAPM equation to estimate the cost of existing equity:  $k_e = R_f + \beta_i(R_m - R_f) = 4.0\% + 1.8(10.0\% - 4.0\%) = 14.80\%$ .

- 18A. The expected dividend after one year is  $D_1 = D_0(1 + g) = (\$5.00)(1.03) = \$5.15$ . Substitute  $D_1 = \$5.15$ ,  $P_0 = \$40$ , and  $g = 0.03$  into the constant growth DDM equation to estimate the cost of existing equity.

$$k_e = \frac{D_1}{P_0} + g = \frac{\$5.15}{\$40.00} + 0.03 = 0.1588 \text{ or } 15.88\%$$

- 18b. Substitute  $D_1 = \$5.15$ ,  $P_0 = \$40$ ,  $F = 0.10$ , and  $g = 0.03$  into the constant growth DDM equation with flotation costs to estimate the cost of new common stock.

$$k_e = \frac{\$5.15}{\$40.00(1-0.10)} + 0.03 = 0.1731 \text{ or } 17.31\%$$

19. Substitute the given weights and component costs into the WACC formula.

$$\text{WACC} = 0.45(6.50\%) + 0.05(8.25\%) + 0.50(14.80\%) = 10.74\%$$

20A. Substitute  $R_f = 6.0\%$ ,  $\beta_i = 1.4$ , and  $R_m = 11.0\%$  into the CAPM equation to estimate the cost of existing equity:  $k_e = R_f + \beta_i(R_m - R_f) = 6.0\% + 1.4(11.0\% - 6.0\%) = 13.00\%$ .

20B. The expected dividends after one year ( $D_1$ ) is  $(\$2.00)(1.05) = \$2.10$ . Substitute  $D_1 = \$2.10$ ,  $P_0 = \$40$ , and  $g = 0.05$  into the constant growth DDM equation to estimate the cost of existing equity.

$$k_e = \frac{D_1}{P_0} + g = \frac{\$2.10}{\$40.00} + 0.05 = 0.1025 \text{ or } 10.25\%$$

20C. The estimated cost of existing equity is:

$$k_e = k_d + \text{RP} = 10\% + 4\% = 14\%$$

20D. Averaging the results of the three methods results in an estimated cost of existing equity of  $(13.00\% + 10.25\% + 14.00\%)/3 = 12.42\%$ .

20E. Substitute  $D_1 = \$2.10$ ,  $P_0 = \$40$ ,  $F = 8\%$ , and  $g = 0.05$  into the constant growth DDM equation to estimate the cost of existing equity.

$$k_e = \frac{D_1}{P_0(1-F)} + g = \frac{\$2.10}{\$40.00(1-0.08)} + 0.05 = 0.1071 \text{ or } 10.71\%$$

21A. Calculate the current price of the firm's semi-annual coupon bond as follows:

*Inputs:* 20 N; 4.5 I/Y; 40 PMT +/-; 1000 FV +/-; CPT PV

*Output:* 934.9603 or about \$934.96 per bond

The market value of the firm's debt is  $(\$934.9603)(10,000 \text{ bonds}) = \$9,349,603$ .

The market value of its preferred stock is  $(\$95)(50,000 \text{ shares}) = \$4,750,000$ .

The market value of its stock is  $(\$25)(1,000,000 \text{ shares}) = \$25,000,000$ .

The total market value of the three components is:  $\$9,349,603 + \$4,750,000 + \$25,000,000 = \$39,099,603$

21B. The market value weight of debt is  $\$9,349,603/\$39,099,603 = 0.2391$  or 23.91%

The market value weight of preferred stock is  $\$4,750,000/\$39,099,603 = 0.1215 = 12.15\%$ .

The market value weight of common stock is  $\$25,000,000/\$39,099,603 = 0.6394$  or 63.94%.



21C. The firm's WACC =  $0.2391(9.00\%)(1 - 0.40) + 0.1215(8.50\%) + 0.6394(11.20\%) = 1.2911\% + 1.0328\% + 7.1613\% = 9.4852\%$  or about 9.49%.

22A. The component costs are as follows:

Cost of new senior debt:  $k_d(1 - T) = 8\%(1 - 0.34) = 8\%(0.66) = 5.28\%$

Cost of new junior debt:  $k_d(1 - T) = 10\%(1 - 0.34) = 10\%(0.66) = 6.60\%$

Cost of new preferred stock:  $k_p = \$8/(\$100 - \$4) = 8.33\%$

Cost of retained earnings (DCF) =

$$k_e = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g = \frac{\$2.50(1.08)}{\$45} + 8\% = 14.00\%$$

Cost of retained earnings (CAPM) =  $k_e = R_f + \beta(R_m - R_f) = 7\% + 1.5(11\% - 7\%) = 13.00\%$

Average cost of retained earnings =  $(14.00\% + 13.00\%)/2 = 13.50\%$

Cost of New Common Stock (DCF) =

$$k_e = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g = \frac{\$2.50(1.08)}{\$45 - \$6.75} + 8\% = 15.06\%$$

22B. DV's forecasted retained earnings are  $(\$20 \text{ million})(1 - 0.40) = \$12 \text{ million}$ . The break point for retained earnings is:

$$BP_i = \frac{TF_i}{w_i} = \frac{\$12 \text{ million}}{0.64} = \$18.75 \text{ million}$$

Thus, the firm can use the cost of new senior debt, cost of new preferred stock, and cost of retained earnings as its costs of capital up until \$18.75 million.

22C. DV can raise \$8 million in lower-cost senior debt. The break point for debt is:

$$BP_i = \frac{TF_i}{w_i} = \frac{\$8 \text{ million}}{0.28} = \$28.57 \text{ million}$$

After the \$28.57 million break point for senior debt, the firm will have to use higher cost junior debt as its debt component.

22D. When DV uses new senior debt, new preferred stock, and retained earnings, its WACC is:

$$\begin{aligned} WACC_1 &= w_d k_d(1 - T) + w_p k_p + w_e k_e = 0.28(5.28\%) + 0.08(8.33\%) + 0.64(13.50\%) \\ &= 1.48\% + 0.67\% + 8.64\% = 10.79\% \end{aligned}$$

22E. When DV uses new senior debt, new preferred stock, and new common stock, its WACC is:

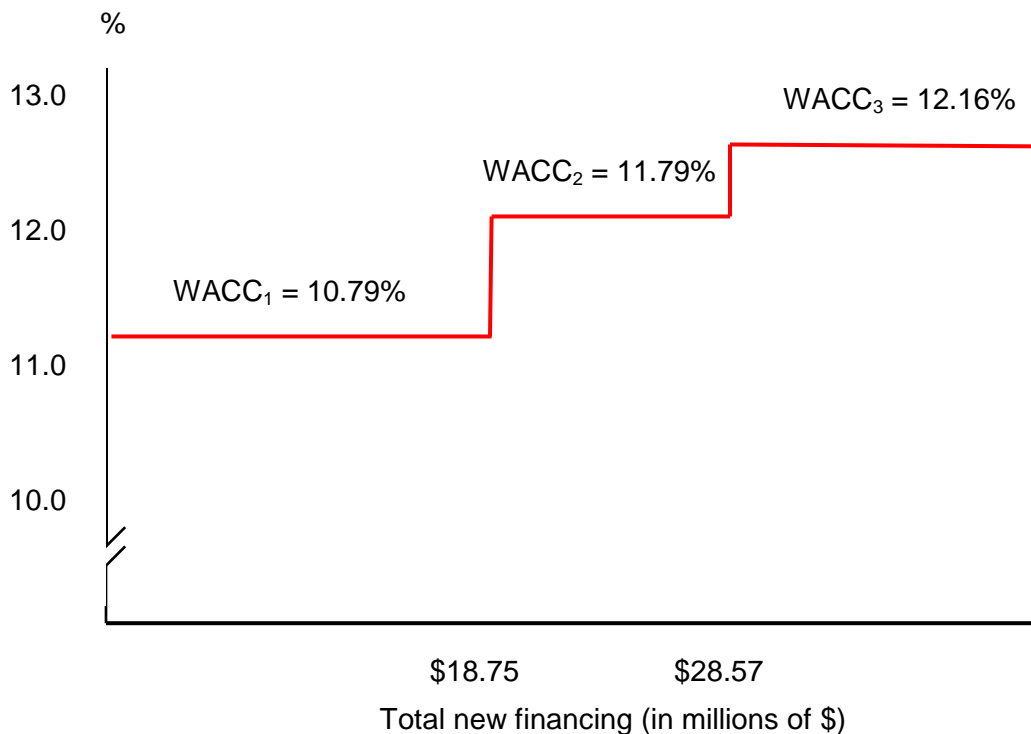
$$\begin{aligned} WACC_2 &= w_d k_d(1 - T) + w_p k_p + w_e k_e = 0.28(5.28\%) + 0.08(8.33\%) + 0.64(15.06\%) \\ &= 1.48\% + 0.67\% + 9.64\% = 11.79\% \end{aligned}$$

22F. When DV uses new common stock, new preferred stock, and junior debt, its WACC is:

$$WACC_1 = w_d k_d (1 - T) + w_p k_p + w_e k_e = 0.28(6.60\%) + 0.08(8.33\%) + 0.64(15.06\%)$$

$$= 1.85 + 0.67\% + 9.64\% = 12.16$$

22G. DV's MCC schedule is shown below:



22H. Depreciation-generated cash flows push the retained earnings break point to the right by the amount of the depreciation expense. Thus, the break point for retained earnings would shift to  $(\$18.75 \text{ million} + \$2 \text{ million}) = \$20.75 \text{ million}$  and the break point for debt would shift to  $\$30.57 \text{ million}$ .

23A. Developing the MCC schedule involves five steps. The first step involves determining the appropriate weights of new financing. The second step is to calculate the component cost of capital associated with each amount of capital raised. The third step involves calculating the break points for each capital component and the range of total new financing. The following table shows these calculations.

<b>Breakpoints and Range of Total New Financing for Brett Corporation</b>				
Capital Component	Range of New Financing (in millions)	Specific Cost %	Break Point (in millions)	Range of Total New Financing (in millions)
Long-term debt	Up to \$12	6.00	$\$12/0.50 = \$24$	Up to \$24
	\$12 up to \$24	6.50	$\$24/0.50 = \$48$	Up to \$48
Common equity	Up to \$12	13.00	$\$12/0.50 = \$24$	Up to \$24
	\$12 up to \$24	13.50	$\$24/0.50 = \$48$	Up to \$48

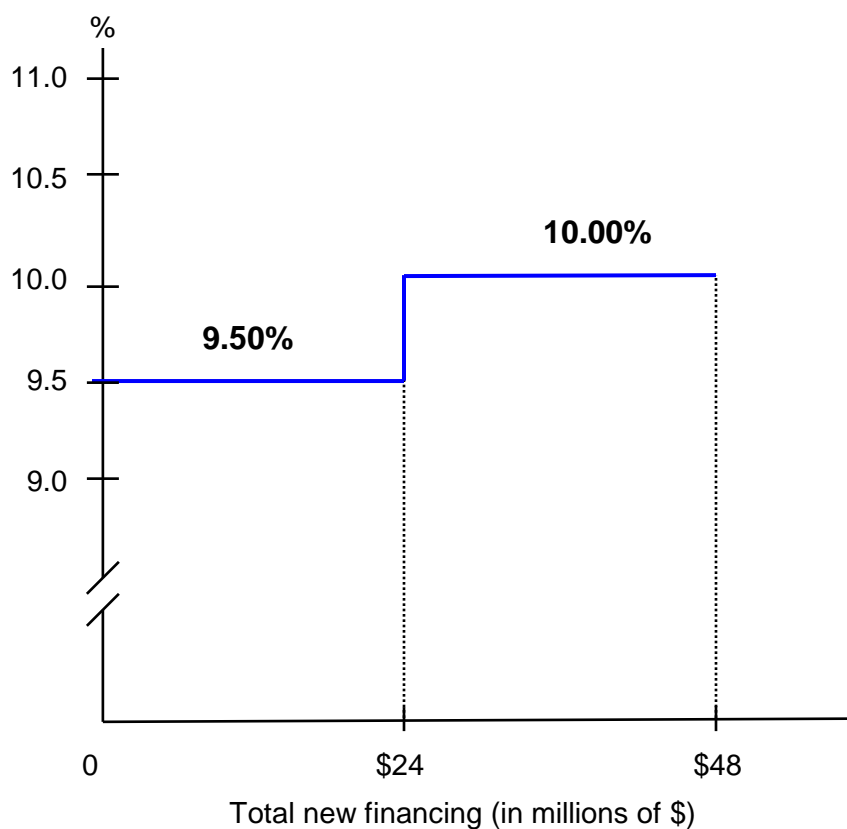
With 2 million shares of common stock outstanding, expected earnings of \$10 per share,

and a 40% dividend payout ratio, Brett Corporation should generate  $(\$10)(2 \text{ million shares})(1 - 0.40) = \$12 \text{ million}$  in new retained earnings. The break points for retained earnings and senior debt are both  $\$12 \text{ million}/0.50 = \$24 \text{ million}$ . Thus, the firm can raise up to  $\$24 \text{ million}$  before using up its lower-cost debt and new retained earnings as the equity portion of its target capital structure. Once the firm goes beyond  $\$24 \text{ million}$ , its MCC increases because of the higher cost associated with both junior debt and new common stock. Up to the first break point of  $\$24 \text{ million}$ , the MCC is equal to the WACC.

The fourth step involves calculating the MCC over each range of total new financing. The following table shows the MCC for each range of total new financing.

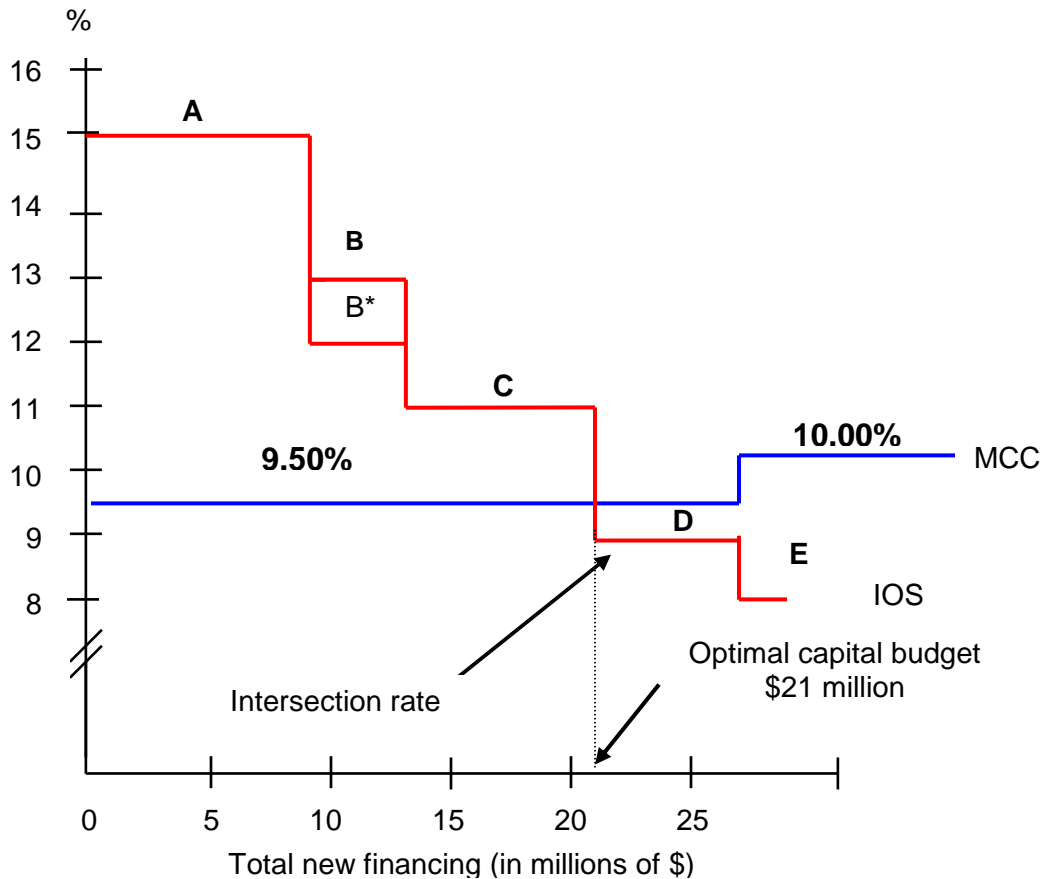
MCC for Brett Corporation	
Range of Total New Financing (in millions)	Marginal Cost of Capital
Up to \$24	$MCC_1 = 0.50(6.00) + 0.50(13.00\%) = 9.50\%$
\$24 to \$48	$MCC_2 = 0.50(6.50) + 0.50(13.50\%) = 10.00\%$

The fifth step involves plotting the MCC schedule as shown in the following figure.



23B. The following figure shows the IOS and MCC schedule for Brett Corporation. The IOS plots projects in descending order of IRR and consists of two potential schedules: one with A, B, C, D, and E and another with A, B\*, C, D, and E. The IOS and MCC schedule intersect at 9.45 percent, which represents the discount rate that the firm should use for average-risk capital investments.

23C. Below is a graph of the IOS and MCC schedule.



Since all projects have average risk, Brett Corporation should use 9.45 percent as the discount or hurdle rate. The firm should accept all independent projects with IRRs above 9.45 percent. Thus, Brett Corporation should accept Projects A and C, either B or B\*, and reject D and E. NPV and IRR may conflict for mutually exclusive projects. Using the NPV method is better than IRR in choosing between B and B\*. Here, no need exists to use the replacement chain or equivalent annual annuity methods because the firm does not plan to repeat B or B\*. Therefore, managers can rely upon the NPV method in making their choice. Because  $NPV_{B^*}$  of \$324,265 is greater than  $NPV_B$  of \$285,836, the firm should choose Project B\* over B. The optimal capital budget is \$21 million, which consists of \$9 million for Project A, \$4.5 million for Project B\*, and \$7.5 million for Project C.