Chapter 11
The Cost of Capital

Learning Objectives

After reading this chapter, students should be able to:

- Explain why the weighted average cost of capital (WACC) is used in capital budgeting.
- Estimate the costs of different capital components—debt, preferred stock, retained earnings, and common stock.
- Combine the different component costs to determine the firm's WACC.

Lecture Suggestions

Chapter 11 uses the rate of return concepts covered in previous chapters, along with the concept of the weighted average cost of capital (WACC), to develop a corporate cost of capital for use in capital budgeting. We begin with an overview of the WACC using Allied's capital structure to differentiate among book value, market value, and target capital structure weights that might be used in calculating the firm's WACC. We next explain how to estimate the cost of each component of capital, and how to put the components together to determine the WACC. We go on to discuss factors that affect the WACC and how to adjust the cost of capital for risk. We conclude the chapter with a discussion on some problems with cost of capital estimates.

What we cover, and the way we cover it, can be seen by scanning the slides and Integrated Case solution for Chapter 11, which appears at the end of this chapter's solutions. For other suggestions about the lecture, please see the "Lecture Suggestions" in Chapter 2, where we describe how we conduct our classes.

DAYS ON CHAPTER: 3 OF 56 DAYS (50-minute periods)

Answers to End-Of-Chapter Questions

11-1

		Probable Effect on $r_d(1 - T)$	Probable Effect on r_s	Probable Effect on WACC
a.	The corporate tax rate is lowered.	+	0	+
b.	The Federal Reserve tightens credit.	+	+	+
c.	The firm uses more debt; that is, it increases its debt/assets ratio.	+	+	0
d.	The dividend payout ratio is increased.	0	0	0
e.	The firm doubles the amount of capital it raises during the year.	0 or +	0 or +	0 or +
f.	The firm expands into a risky new area.	+	+	+
g.	The firm merges with another firm whose earnings are counter-cyclical both to those of the first firm and to the stock market.	–	–	–
h.	The stock market falls drastically, and the firm's stock price falls along with the rest.	0	+	+
i.	Investors become more risk averse.	+	+	+
j.	The firm is an electric utility with a large investment in nuclear plants. Several states propose a ban on nuclear power generation.	+	+	+

11-2 An increase in the risk-free rate will increase the cost of debt. Remember from Chapter 6, $r = r_{RF} + DRP + LP + MRP$. Thus, if r_{RF} increases so does r (the cost of debt). Similarly, if the risk-free rate increases so does the cost of equity. From the CAPM equation, $r_s = r_{RF} + (r_M - r_{RF})b$. Consequently, if r_{RF} increases r_s will increase too.

11-3 Each firm has an optimal capital structure, defined as that mix of debt, preferred, and common equity that causes its stock price to be maximized. A value-maximizing firm will determine its optimal capital structure, use it as a target, and then raise new capital in a manner designed to keep the actual capital structure on target over time. The target proportions of debt, preferred stock, and common equity, along with the costs of those components, are used to calculate the firm's weighted average cost of capital, WACC.

The weights could be based either on the accounting values shown on the firm's balance sheet (book values) or on the market values of the different securities. Theoretically, the weights should be based on market values, but if a firm's book value weights are reasonably close to its market value weights, book value weights can be used as a proxy for market value weights. Consequently, target market value weights should be used in the WACC equation.

11-4 In general, failing to adjust for differences in risk would lead the firm to accept too many risky projects and reject too many safe ones. Over time, the firm would become more risky, its WACC would increase, and its shareholder value would suffer.

The cost of capital for average-risk projects would be the firm's cost of capital, 10%. A somewhat higher cost would be used for more risky projects, and a lower cost would be used for less risky ones. For example, we might use 12% for more risky projects and 9% for less risky projects. These choices are arbitrary.

11-5 The cost of retained earnings is lower than the cost of new common equity; therefore, if new common stock had to be issued then the firm's WACC would increase.

The calculated WACC does depend on the size of the capital budget. A firm calculates its retained earnings breakpoint (and any other capital breakpoints for additional debt and preferred). This R/E breakpoint represents the amount of capital raised beyond which new common stock must be issued. Thus, a capital budget smaller than this breakpoint would use the lower cost retained earnings and thus a lower WACC. A capital budget greater than this breakpoint would use the higher cost of new equity and thus a higher WACC.

Dividend policy has a significant impact on the WACC. The R/E breakpoint is calculated as the addition to retained earnings divided by the equity fraction. The higher the firm's dividend payout, the smaller the addition to retained earnings and the lower the R/E breakpoint. (That is, the firm's WACC will increase at a smaller capital budget.)

Solutions to End-Of-Chapter Problems

11-1 $r_d(1 - T) = 0.12(0.65) = 7.80\%$.

11-2 $P_p = \$47.50$; $D_p = \$3.80$; $r_p = ?$

$$r_p = \frac{D_p}{P_p} = \frac{\$3.80}{\$47.50} = 8\%.$$

11-3 40% Debt; 60% Common equity; $r_d = 9\%$; $T = 40\%$; WACC = 9.96%; $r_s = ?$

$$\begin{aligned} \text{WACC} &= (w_d)(r_d)(1 - T) + (w_c)(r_s) \\ 0.0996 &= (0.4)(0.09)(1 - 0.4) + (0.6)r_s \\ 0.0996 &= 0.0216 + 0.6r_s \\ 0.078 &= 0.6r_s \\ r_s &= 13\%. \end{aligned}$$

11-4 $P_0 = \$30$; $D_1 = \$3.00$; $g = 5\%$; $r_s = ?$

a. $$r_s = \frac{D_1}{P_0} + g = \frac{\$3.00}{\$30.00} + 0.05 = 15\%.$$

b. $F = 10\%$; $r_e = ?$

$$r_e = \frac{D_1}{P_0(1-F)} + g = \frac{\$3.00}{\$30(1-0.10)} + 0.05$$

$$= \frac{\$3.00}{\$27.00} + 0.05 = 16.11\%.$$

11-5 Projects A, B, C, D, and E would be accepted since each project's return is greater than the firm's WACC.

11-6 **a.** $$r_s = \frac{D_1}{P_0} + g = \frac{\$2.14}{\$23} + 7\% = 9.3\% + 7\% = 16.3\%.$$

b. $r_s = r_{RF} + (r_M - r_{RF})b$
$= 9\% + (13\% - 9\%)1.6 = 9\% + (4\%)1.6 = 9\% + 6.4\% = 15.4\%$.

c. r_s = Bond rate + Risk premium = 12% + 4% = 16%.

d. Since you have equal confidence in the inputs used for the three approaches, an average of the three methodologies probably would be warranted.

$$r_s = \frac{16.3\% + 15.4\% + 16\%}{3} = 15.9\%.$$

11-7 **a.** $r_s = \frac{D_1}{P_0} + g$

$= \frac{\$3.18}{\$36} + 0.06$

$= 14.83\%$.

b. $F = (\$36.00 – \$32.40)/\$36.00 = \$3.60/\$36.00 = 10\%$.

c. $r_e = D_1/[P_0(1 – F)] + g = \$3.18/\$32.40 + 6\% = 9.81\% + 6\% = 15.81\%$.

11-8 Debt = 40%, Common equity = 60%.

$P_0 = \$22.50$, $D_0 = \$2.00$, $D_1 = \$2.00(1.07) = \$2.14$, $g = 7\%$.

$r_s = \frac{D_1}{P_0} + g = \frac{\$2.14}{\$22.50} + 7\% = 16.51\%$.

WACC = (0.4)(0.12)(1 – 0.4) + (0.6)(0.1651)
= 0.0288 + 0.0991 = 12.79%.

11-9 BV LTD = MV LTD = \$1,152; P_0 = \$4.00; Shares outstanding = 576; T = 40%

MV Equity = \$4.00 × 576 shares = \$2,304.

Capital Sources	Market Value	Market Value Weight	
Long-term debt	\$1,152	\$1,152/\$3,456 =	33.33%
Common Equity	2,304	\$2,304/\$3,456 =	66.67%
Total capital	\$3,456		100.00%

WACC = $w_d r_d(1 – T) + w_c r_s$
= 0.3333(0.13)(0.6) + 0.6667(0.16)
= 0.0260 + 0.1067 = 13.27%.

11-10 If the investment requires \$5.9 million, that means that it requires \$3.54 million (60%) of common equity and \$2.36 million (40%) of debt. In this scenario, the firm would exhaust its \$2 million of retained earnings and be forced to raise new stock at a cost of 15%. Needing \$2.36 million in debt, the firm could get by raising debt at only 10%. Therefore, its weighted average cost of capital is: WACC = 0.4(10%)(1 – 0.4) + 0.6(15%) = 11.4%.

11-11 $r_s = D_1/P_0 + g$
= \$2(1.07)/\$24.75 + 7%
= 8.65% + 7% = 15.65%.

WACC = $w_d(r_d)(1 – T) + w_c(r_s)$; $w_c = 1 – w_d$.

$13.95\% = w_d(11\%)(1 – 0.35) + (1 – w_d)(15.65\%)$
$0.1395 = 0.0715w_d + 0.1565 – 0.1565w_d$
$-0.017 = -0.085w_d$
$w_d = 0.20 = 20\%$.

11-12 a. $r_d = 10\%$, $r_d(1 - T) = 10\%(0.6) = 6\%$.

$w_d = 45\%$; $D_0 = \$2$; $g = 4\%$; $P_0 = \$20$; $T = 40\%$.

Project A: Rate of return = 13%.

Project B: Rate of return = 10%.

$r_s = \$2(1.04)/\$20 + 4\% = 14.40\%$.

b. WACC = 0.45(6%) + 0.55(14.40%) = 10.62%.

c. Since the firm's WACC is 10.62% and each of the projects is equally risky and as risky as the firm's other assets, MEC should accept Project A. Its rate of return is greater than the firm's WACC. Project B should not be accepted, since its rate of return is less than MEC's WACC.

11-13 If the firm's dividend yield is 5% and its stock price is $46.75, the next expected annual dividend can be calculated.

$$\begin{aligned}\text{Dividend yield} &= D_1/P_0\\ 5\% &= D_1/\$46.75\\ D_1 &= \$2.3375.\end{aligned}$$

Next, the firm's cost of new common stock can be determined from the DCF approach for the cost of equity.

$$\begin{aligned}r_e &= D_1/[P_0(1 - F)] + g\\ &= \$2.3375/[\$46.75(1 - 0.05)] + 0.12\\ &= 17.26\%.\end{aligned}$$

11-14 $r_p = \dfrac{\$11}{\$92.15} = 11.94\%$.

11-15 a. Examining the DCF approach to the cost of retained earnings, the expected growth rate can be determined from the cost of common equity, price, and expected dividend. However, first, this problem requires that the formula for WACC be used to determine the cost of common equity.

$$\begin{aligned}\text{WACC} &= w_d(r_d)(1 - T) + w_c(r_s)\\ 13.0\% &= 0.4(10\%)(1 - 0.4) + 0.6(r_s)\\ 10.6\% &= 0.6r_s\\ r_s &= 0.17667 \text{ or } 17.67\%.\end{aligned}$$

From the cost of common equity, the expected growth rate can now be determined.

$$\begin{aligned}r_s &= D_1/P_0 + g\\ 0.17667 &= \$3/\$35 + g\\ g &= 0.090952 \approx 9.10\%.\end{aligned}$$

b. From the formula for the long-run growth rate:

$$\begin{aligned} g &= (1 - \text{Div. payout ratio}) \times \text{ROE} \\ &= (1 - \text{Div. payout ratio}) \times (\text{NI/Equity}) \\ 0.090952 &= (1 - \text{Div. payout ratio}) \times (\$1{,}100 \text{ million}/\$6{,}000 \text{ million}) \\ 0.090952 &= (1 - \text{Div. payout ratio}) \times 0.1833333 \\ 0.496104 &= (1 - \text{Div. payout ratio}) \end{aligned}$$

Div. payout ratio = 0.503896 or 50.39%.

11-16 a. With a financial calculator, input N = 5, PV = -4.42, PMT = 0, FV = 6.50, and then solve for I/YR = g = 8.02% ≈ 8%.

b. $D_1 = D_0(1 + g) = \$2.60(1.08) = \$2.81$.

c. $r_s = D_1/P_0 + g = \$2.81/\$36.00 + 8\% = 15.81\%$.

11-17 a.

$$r_s = \frac{D_1}{P_0} + g$$

$$0.09 = \frac{\$3.60}{\$60.00} + g$$

$$0.09 = 0.06 + g$$

$$g = 3\%.$$

b.

Current EPS	\$5.400
Less: Dividends per share	3.600
Retained earnings per share	\$1.800
Rate of return	× 0.090
Increase in EPS	\$0.162
Plus: Current EPS	5.400
Next year's EPS	\$5.562

Alternatively:
$EPS_1 = EPS_0(1 + g) = \$5.40(1.03) = \$5.562$.

11-18 a. $r_d(1 - T) = 0.10(1 - 0.3) = 7\%$.
$r_p = \$5/\$49 = 10.2\%$.
$r_s = \$3.50/\$36 + 6\% = 15.72\%$.

b.

Component	Weight	×	After-Tax Cost	=	Weighted Cost
Debt	0.15		7.00%		1.05%
Preferred stock	0.10		10.20		1.02
Common stock	0.75		15.72		11.79
				WACC =	13.86%

c. Projects 1 and 2 will be accepted since their rates of return exceed the WACC.

11-19 a. If all project decisions are independent, the firm should accept all projects whose returns exceed their risk-adjusted costs of capital. The appropriate costs of capital are summarized below:

Project	Required Investment	Rate of Return	Cost of Capital
A	$4 million	14.0%	12%
B	5 million	11.5	12
C	3 million	9.5	8
D	2 million	9.0	10
E	6 million	12.5	12
F	5 million	12.5	10
G	6 million	7.0	8
H	3 million	11.5	8

Therefore, Ziege should accept projects A, C, E, F, and H.

b. With only $13 million to invest in its capital budget, Ziege must choose the best combination of Projects A, C, E, F, and H. Collectively, the projects would account for an investment of $21 million, so naturally not all these projects may be accepted. Looking at the excess return created by the projects (rate of return minus the cost of capital), we see that the excess returns for Projects A, C, E, F, and H are 2%, 1.5%, 0.5%, 2.5%, and 3.5%. The firm should accept the projects which provide the greatest excess returns. By that rationale, the first project to be eliminated from consideration is Project E. This brings the total investment required down to $15 million, therefore one more project must be eliminated. The next lowest excess return is Project C. Therefore, Ziege's optimal capital budget consists of Projects A, F, and H, and it amounts to $12 million.

c. Since Projects A, F, and H are already accepted projects, we must adjust the costs of capital for the other two value producing projects (C and E).

Project	Required Investment	Rate of Return	Cost of Capital
C	$3 million	9.5%	8% + 1% = 9%
E	6 million	12.5	12% + 1% = 13%

If new capital must be issued, Project E ceases to be an acceptable project. On the other hand, Project C's expected rate of return still exceeds the risk-adjusted cost of capital even after raising additional capital. Hence, Ziege's new capital budget should consist of Projects A, C, F, and H and requires $15 million of capital, so an additional $2 million must be raised above the initial $13 million constraint.

11-20 a. After-tax cost of new debt: $r_d(1 - T) = 0.09(1 - 0.4) = 5.4\%$.

Cost of common equity: Calculate g as follows:

With a financial calculator, input N = 9, PV = -3.90, PMT = 0, FV = 7.80, and then solve for I/YR = g = 8.01% ≈ 8%.

$$r_s = \frac{D_1}{P_0} + g = \frac{(0.55)(\$7.80)}{\$65.00} + 0.08 = \frac{\$4.29}{\$65.00} + 0.08 = 0.146 = 14.6\%.$$

b. WACC calculation:

Component	Target Weight	×	After-Tax Cost	=	Weighted Cost
Debt	0.40		5.4%		2.16%
Common equity (RE)	0.60		14.6		8.76
				WACC =	10.92%

Comprehensive/Spreadsheet Problem

Note to Instructors:
The solution to this problem is <u>not</u> provided to students at the back of their text. Instructors can access the *Excel* file on the textbook's website or the Instructor's Resource CD.

11-21 a.

INPUT DATA	
EPS	$3.20
D_0	$2.10
P_0	$55.00
g	9%
Common shares outstanding	50,000
P_p	$30.00
D_p	$3.30
Preferred shares outstanding	10,000
BT r_d	10%
Skye's beta	1.516
Market risk premium, $r_M - r_{RF}$	5.0%
Risk-free rate, r_{RF}	6.0%
Tax rate	35%
Flotation cost for common	10%

Cost of debt

BT r_d	×	(1 − T)	=	$r_d(1 - T)$
10%	×	65%	=	6.50%

Cost of preferred stock

D_p	/	P_p	=	r_p
$3.30	/	$30.00	=	11.00%

Cost of common equity from retained earnings

(D_1	/	P_0)	+	g	=	r_s
$2.29	/	$55.00	+	9%	=	13.16%

Cost of common equity from new common stock

[$D_0 \times (1 + g)$	/	$P_0 \times (1 - F)$]	+	g	=	r_e
$2.29	/	$49.50	+	9%	=	13.62%

b.

r_s	=	r_{RF}	+	b × RP_M		
r_s	=	6.0%	+	7.58%	=	13.58%

c.

r_e	=	r_s	+	Differential		
r_e	=	13.58%	+	0.46%	=	14.04%

d. (1) WACC using retained earnings

w_d	28.2%
w_p	7.1%
w_c	64.7%
	100.0%

Note that we used the MV capital structure based on long-term capital as calculated above.

$w_d \times r_d(1-T)$	+	$w_p \times r_p$	+	$w_c \times r_s$	=	WACC
1.84%	+	0.78%	+	8.65%	=	11.26%

Note that we used the average of the 2 methods used to calculate r_s.

(2) WACC using new common stock

w_d	28.2%
w_p	7.1%
w_c	64.7%
	100.0%

$w_d \times r_d(1-T)$	+	$w_p \times r_p$	+	$w_c \times r_e$	=	WACC
1.84%	+	0.78%	+	8.95%	=	11.56%

Note that we used the average of the 2 methods usd to calculate r_e.

Skye's WACC will be 11.26% so long as it finances with debt, preferred stock, and common equity raised as retained earnings. If it expands so rapidly that it uses up all of its retained earnings and must issue new common stock with a cost of 13.83% (average of DCF and CAPM estimates), then its WACC will increase to 11.56%.

Integrated Case

11-22
Coleman Technologies Inc.
Cost of Capital

Coleman Technologies is considering a major expansion program that has been proposed by the company's information technology group. Before proceeding with the expansion, the company must estimate its cost of capital. Suppose you are an assistant to Jerry Lehman, the financial vice president. Your first task is to estimate Coleman's cost of capital. Lehman has provided you with the following data, which he believes may be relevant to your task.

1. **The firm's tax rate is 40%.**
2. **The current price of Coleman's 12% coupon, semiannual payment, noncallable bonds with 15 years remaining to maturity is $1,153.72. Coleman does not use short-term interest-bearing debt on a permanent basis. New bonds would be privately placed with no flotation cost.**
3. **The current price of the firm's 10%, $100.00 par value, quarterly dividend, perpetual preferred stock is $111.10.**
4. **Coleman's common stock is currently selling for $50.00 per share. Its last dividend (D_0) was $4.19, and dividends are expected to grow at a constant annual rate of 5% in the foreseeable future. Coleman's beta is 1.2, the yield on T-bonds is 7%, and the market risk premium is estimated to be 6%. For the bond-yield-plus-risk-premium approach, the firm uses a risk premium of 4%.**
5. **Coleman's target capital structure is 30% debt, 10% preferred stock, and 60% common equity.**

To structure the task somewhat, Lehman has asked you to answer the following questions.

A. (1) What sources of capital should be included when you estimate Coleman's WACC?

Answer: [Show S11-1 through S11-3 here.] The WACC is used primarily for making long-term capital investment decisions, i.e., for capital budgeting. Thus, the WACC should include the types of capital used to pay for long-term assets, and this is typically long-term debt, preferred stock (if used), and common stock. Short-term sources of capital consist of (1) spontaneous, noninterest-bearing liabilities such as accounts payable and accrued liabilities and (2) short-term interest-bearing debt, such as notes payable. If the firm uses short-term interest-bearing debt to acquire fixed assets rather than just to finance working capital needs, then the WACC should include a short-term debt component. Noninterest-bearing debt is generally not included in the cost of capital estimate because these funds are netted out when determining investment needs, that is, net operating rather than gross operating working capital is included in capital expenditures.

A. (2) Should the component costs be figured on a before-tax or an after-tax basis?

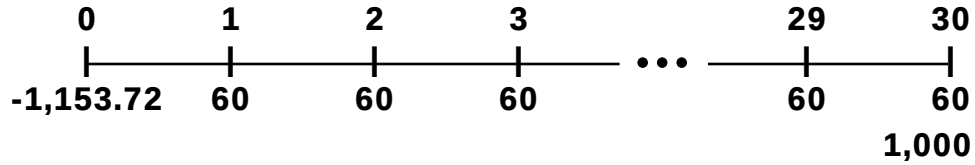
Answer: [Show S11-4 here.] Stockholders are concerned primarily with those corporate cash flows that are available for their use, namely, those cash flows available to pay dividends or for reinvestment. Since dividends are paid from and reinvestment is made with after-tax dollars, all cash flow and rate of return calculations should be done on an after-tax basis.

A. (3) Should the costs be historical (embedded) costs or new (marginal) costs?

Answer: **[Show S11-5 and S11-6 here.] In financial management, the cost of capital is used primarily to make decisions that involve raising new capital. Thus, the relevant component costs are today's marginal costs rather than historical costs.**

B. What is the market interest rate on Coleman's debt and its component cost of debt?

Answer: **[Show S11-7 through S11-11 here.] Coleman's 12% bond with 15 years to maturity is currently selling for $1,153.72. Thus, its yield to maturity is 10%:**



Enter N = 30, PV = -1153.72, PMT = 60, and FV = 1000, and then press the I/YR button to find $r_d/2$ = I/YR = 5.0%. Since this is a semiannual rate, multiply by 2 to find the annual rate, r_d = 10%, the pre-tax cost of debt.

Since interest is tax deductible, Uncle Sam, in effect, pays part of the cost, and Coleman's relevant component cost of debt is the after-tax cost:

$$r_d(1 - T) = 10.0\%(1 - 0.40) = 10.0\%(0.60) = 6.0\%.$$

Optional Question

Should you use the nominal cost of debt or the effective annual cost?

Answer: **Our 10% pre-tax estimate is the nominal cost of debt. Since the firm's debt has semiannual coupons, its effective annual rate is 10.25%:**

$$(1.05)^2 - 1.0 = 1.1025 - 1.0 = 0.1025 = 10.25\%.$$

However, nominal rates are generally used. The reason is that the cost of capital is used in capital budgeting, and capital budgeting cash flows are generally assumed to occur at year-end. Therefore, using nominal rates makes the treatment of the capital budgeting discount rate and cash flows consistent.

C. (1) What is the firm's cost of preferred stock?

Answer: **[Show S11-12 and S11-13 here.] Since the preferred issue is perpetual, its cost is estimated as follows:**

$$r_p = \frac{D_p}{P_p} = \frac{0.1(\$100)}{\$111.10} = \frac{\$10}{\$111.10} = 0.090 = 9.0\%.$$

Note (1) that since preferred dividends are not tax deductible to the issuer, there is no need for a tax adjustment, and (2) that we could have estimated the effective annual cost of the preferred, but as in the case of debt, the nominal cost is generally used.

C. (2) Coleman's preferred stock is riskier to investors than its debt, yet the preferred's yield to investors is lower than the yield to maturity on the debt. Does this suggest that you have made a mistake? (Hint: Think about taxes.)

Answer: **[Show S11-14 and S11-15 here.] Corporate investors own most preferred stock, because 70% of preferred dividends received by corporations are nontaxable. Therefore, preferred often has a lower before-tax yield than the before-tax yield on debt issued by the same company. Note, though, that the after-tax yield to a corporate investor and the after-tax cost to the issuer are higher on preferred stock than on debt.**

D. (1) Why is there a cost associated with retained earnings?

Answer: **[Show S11-16 and S11-17 here.] Coleman's earnings can either be retained and reinvested in the business or paid out as dividends. If earnings are retained, Coleman's shareholders forgo the opportunity to receive cash and to reinvest it in stocks, bonds, real estate, and the like. Thus, Coleman should earn on its retained earnings at least as much as its stockholders themselves could earn on alternative investments of equivalent risk. Further, the company's stockholders could invest in Coleman's own common stock, where they could expect to earn r_s. We conclude that retained earnings have an opportunity cost that is equal to r_s, the rate of return investors expect on the firm's common stock.**

D. (2) What is Coleman's estimated cost of common equity using the CAPM approach?

Answer: **[Show S11-18 and S11-19 here.] The CAPM estimate for Coleman's cost of common equity is 14.2%:**

$$r_s = r_{RF} + (r_M - r_{RF})b$$
$$= 7.0\% + (6.0\%)1.2 = 7.0\% + 7.2\% = 14.2\%.$$

E. **What is the estimated cost of common equity using the DCF approach?**

Answer: **[Show S11-20 and S11-21 here.] Since Coleman is a constant growth stock, the constant growth model can be used:**

$$r_s = \hat{r}_s = \frac{D_1}{P_0 + g} = \frac{D_0(1+g)}{P_0} + \frac{\$4.19(1.05)}{\$50} + 0.05$$

$$= \frac{\$4.40}{\$50} + 0.05 = 0.088 + 0.05 = 8.8\% + 5.0\% = 13.8\%.$$

F. **What is the bond-yield-plus-risk-premium estimate for Coleman's cost of common equity?**

Answer: **[Show S11-22 here.] The bond-yield-plus-risk-premium estimate is 14%:**

$$r_s = \text{Bond yield} + \text{Risk premium} = 10.0\% + 4.0\% = 14.0\%.$$

Note that the risk premium required in this method is difficult to estimate, so this approach only provides a ballpark estimate of r_s. It is useful, though, as a check on the DCF and CAPM estimates, which can, under certain circumstances, produce unreasonable estimates.

G. **What is your final estimate for r_s?**

Answer: **[Show S11-23 here.] The following table summarizes the r_s estimates:**

Method	Estimate
CAPM	14.2%
DCF	13.8
$r_d + r_p$	14.0
Average	14.0%

At this point, considerable judgment is required. If a method is deemed to be inferior due to the "quality" of its inputs, then it might be given little weight or even disregarded. In our example, though, the three methods produced relatively close results (range = 13.8%-14.2%), so we decided to use the midpoint of the range, 14%, as our estimate for Coleman's cost of common equity.

H. Explain in words why new common stock has a higher cost than retained earnings.

Answer: [Show S11-24 here.] The company is raising money in order to make an investment. The money has a cost, and this cost is based primarily on the investors' required rate of return, considering risk and alternative investment opportunities. So, the new investment must provide a return at least equal to the investors' opportunity cost.

If the company raises capital by selling stock, the company doesn't receive all of the money that investors contribute. For example, if investors put up $100,000, and if they expect a 15% return on that $100,000, then $15,000 of profits must be generated. But if flotation costs are 20% ($20,000), then the company will receive only $80,000 of the $100,000 investors contribute. That $80,000 must then produce a $15,000 profit, or a $15/$80 = 18.75% rate of return versus a 15% return on equity raised as retained earnings.

I. (1) What are two approaches that can be used to adjust for flotation costs?

Answer: The first approach is to include the flotation costs as part of the project's up-front cost. This reduces the project's estimated return.

The second approach is to adjust the cost of capital to include flotation costs. This is most commonly done by incorporating flotation costs in the DCF model.

I. (2) Coleman estimates that if it issues new common stock, the flotation cost will be 15%. Coleman incorporates the flotation costs into the DCF approach. What is the estimated cost of newly issued common stock, considering the flotation cost?

Answer: [Show S11-25 and S11-26 here.]

$$r_e = \frac{D_0(1+g)}{P_0(1-F)} + g$$

$$= \frac{\$4.19(1.05)}{\$50(1-0.15)} + 5.0\%$$

$$= \frac{\$4.40}{\$42.50} + 5.0\% = 15.35\%.$$

J. What is Coleman's overall, or weighted average, cost of capital WACC? Ignore flotation costs.

Answer: [Show S11-27 here.] Coleman's WACC is 11.1%.

Capital Structure Weights	×	A-T Component Costs	=	Product
0.3		6%		1.8%
0.1		9		0.9
0.6		14		8.4
1.0			WACC =	11.1%

$$WACC = w_d r_d(1-T) + w_p r_p + w_c r_s$$
$$= 0.3(10\%)(0.6) + 0.1(9\%) + 0.6(14\%)$$
$$= 1.8\% + 0.9\% + 8.4\% = 11.1\%.$$

K. **What factors influence Coleman's composite WACC?**

Answer: **[Show S11-28 here.] There are factors that the firm cannot control and those that they can control that influence WACC.**

Factors the firm cannot control:

Interest rates
Tax rates } **Market conditions**

Factors the firm can control:

Capital structure policy

Dividend policy

Investment policy

L. **Should the company use the composite WACC as the hurdle rate for each of its projects? Explain.**

Answer: **[Show S11-29 and S11-30 here.] No. The composite WACC reflects the risk of an average project undertaken by the firm. Therefore, the WACC only represents the "hurdle rate" for a typical project with average risk. Different projects have different risks. The project's WACC should be adjusted to reflect the project's risk.**