CHAPTER 17 FINANCIAL LEVERAGE AND CAPITAL STRUCTURE POLICY

Answers to Concepts Review and Critical Thinking Questions

- 1. Business risk is the equity risk arising from the nature of the firm's operating activity, and is directly related to the systematic risk of the firm's assets. Financial risk is the equity risk that is due entirely to the firm's chosen capital structure. As financial leverage, or the use of debt financing, increases, so does financial risk and, hence, the overall risk of the equity. Thus, Firm B could have a higher cost of equity if it uses greater leverage
- 2. No, it doesn't follow. While it is true that the equity and debt costs are rising, the key thing to remember is that the cost of debt is still less than the cost of equity. Since we are using more and more debt, the WACC does not necessarily rise.
- **3.** Because many relevant factors such as bankruptcy costs, tax asymmetries, and agency costs cannot easily be identified or quantified, it's practically impossible to determine the precise debt/equity ratio that maximizes the value of the firm. However, if the firm's cost of new debt suddenly becomes much more expensive, it's probably true that the firm is too highly leveraged.
- 4. The more capital intensive industries, such as airlines, cable television, and electric utilities, tend to use greater financial leverage. Also, industries with less predictable future earnings, such as computers or drugs, tend to use less financial leverage. Such industries also have a higher concentration of growth and startup firms. Overall, the general tendency is for firms with identifiable, tangible assets and relatively more predictable future earnings to use more debt financing. These are typically the firms with the greatest need for external financing and the greatest likelihood of benefiting from the interest tax shelter.
- 5. It's called leverage (or "gearing" in the UK) because it magnifies gains or losses.
- **6.** Homemade leverage refers to the use of borrowing on the personal level as opposed to the corporate level.
- 7. One answer is that the right to file for bankruptcy is a valuable asset, and the financial manager acts in shareholders' best interest by managing this asset in ways that maximize its value. To the extent that a bankruptcy filing prevents "a race to the courthouse steps," it would seem to be a reasonable use of the process.
- 8. As in the previous question, it could be argued that using bankruptcy laws as a sword may simply be the best use of the asset. Creditors are aware at the time a loan is made of the possibility of bankruptcy, and the interest charged incorporates it.

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- **9.** One side is that Continental was going to go bankrupt because its costs made it uncompetitive. The bankruptcy filing enabled Continental to restructure and keep flying. The other side is that Continental abused the bankruptcy code. Rather than renegotiate labor agreements, Continental simply abrogated them to the detriment of its employees. In this, and the last several, questions, an important thing to keep in mind is that the bankruptcy code is a creation of law, not economics. A strong argument can always be made that making the best use of the bankruptcy code is no different from, for example, minimizing taxes by making best use of the tax code. Indeed, a strong case can be made that it is the financial manager's duty to do so. As the case of Continental illustrates, the code can be changed if socially undesirable outcomes are a problem.
- 10. The basic goal is to minimize the value of non-marketed claims.

Solutions to Questions and Problems

Basic

1.	а.	EBIT Interest NI EPS ΔEPS%		\$6,000 <u>0</u> <u>\$6,000</u> \$ 2.40 <u></u>	\$7,800 <u>0</u> <u>\$7,800</u> \$ 3.12 +30
	b.	MV \$100,000/2,50 EBIT Interest	0 shares = \$40 p \$2,400 $\frac{2,000}{$400}$	<i>per share;</i> \$4 \$6,000 <u>2,000</u> \$4,000	0,000/\$40 = 1,000 shares bought back \$7,800 <u>2,000</u> \$5,800
		EPS ΔEPS%	\$ 0.27 -90	\$ 2.67	\$ 3.87 +45
2.	a.	EBIT Interest Taxes NI EPS ΔEPS%		\$6,000 0 <u>2,100</u> <u>\$3,900</u> \$ 1.56	$$7,800 \\ 0 \\ 2,730 \\ $5,070 \\ $ 2.03 \\ +30 \\ \$
	b.	MV \$100,000/2,50 EBIT Interest Taxes NI EPS ΔEPS%	0 shares = \$40 \$2,400 2,000 $\frac{140}{\$ 260}$ \$0.173 -90	ber share; \$40 \$6,000 2,000 <u>1,400</u> <u>\$2,600</u> \$1.733	0,000/\$40 = 1,000 shares bought back \$7,800 2,000 2,030 \$3,770 \$2.513 +45
3.	а.	market-to-book rat ROE	io = 1.0, so TE = .024	= MV = \$100,00 .060	$\begin{array}{l} \text{ROE} = \text{NI} / \$100,000 \\ .078 \end{array}$

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ΔROE% –60 –+30

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<i>b</i> .	now, $TE = $100,000 - 40,000 = $60,000;$			ROE = NI/\$60,000	
	ROE	.0067	.0667	.0967	
	$\Delta ROE\%$	-60		+30	
с.	no debt, ROE	.0156	.039	.0507	
	$\Delta ROE\%$	-60		+30	
	with debt, ROE	.0043	.0433	.0628	
	$\Delta ROE\%$	-90		+45	

- 4. Plan I: NI =\$200K ; $EPS = \frac{200K}{100K} shares = \frac{2.00}{100K}$ а. Plan II: NI =\$200K - .10(\$1.5M) =\$50K; EPS = \$50K/50K shares = \$1.00Plan I has the higher EPS when EBIT is \$200,000. Plan I: NI =\$700K; $EPS = \frac{700K}{100K} \text{ shares} = \frac{7.00}{100K}$ b. Plan II: NI =\$700K - .10(\$1.5M) =\$550K; EPS = \$550K/50K shares = \$11.00Plan II has the higher EPS when EBIT is \$700,000.
 - c. EBIT/100K = [EBIT .10(\$1.5M)]/50K; EBIT = \$300,000;
- 5. P = \$1.5M/50K shares bought with debt = \$30 per share $V_1 = \$30(100K \text{ shares}) = \$3M; \quad V_2 = \$30(50K \text{ shares}) + \$1.5M \text{ debt} = \$3M$

6.	а.		Ι	II	all-equity	
		EBIT	\$8,000	\$8,000	\$8,000	
		Interest	900	1,350	0	
		NI	<u>\$7,100</u>	<u>\$6,650</u>	<u>\$8,000</u>	
		EPS	\$8.875	\$ 9.50	\$ 8.00	
		D1 T1				_

Plan II has the highest EPS; the all-equity plan has the lowest EPS.

- b. Plan I vs. all-equity: EBIT/1,000 = [EBIT .10(\$9,000)]/800; EBIT = \$4,500Plan II vs. all-equity: EBIT/1,000 = [EBIT - .10(\$13,500)]/700; EBIT = \$4,500The break-even levels of EBIT are the same because of M&M Proposition I.
- c. [EBIT .10(\$9,000)]/800 = [EBIT .10(\$13,500)]/700; EBIT = \$4,500This break-even level of EBIT is the same as in part (b) again because of M&M Proposition I.

<i>d</i> .	Ι	II	all-equity
EBIT	\$8,000	\$8,000	\$8,000
Interest	900	1,350	0
Taxes	2,840	2,660	3,200
NI	\$4,260	<u>\$3,990</u>	<u>\$4,800</u>
EPS	\$5.325	\$ 5.70	\$ 4.80

Plan II still has the highest EPS; the all-equity plan still has the lowest EPS. Plan I vs. all-equity: EBIT(.60)/1,000 = [EBIT - .10(\$9,000)](.60)/800; EBIT = \$4,500Plan II vs. all-equity: EBIT(.60)/1,000 = [EBIT - .10(\$13,500)](.60)/700; EBIT = \$4,500[EBIT - .10(\$9,000)](.60)/800 = [EBIT - .10(\$13,500)](.60)/700; EBIT = \$4,500The break-even levels of EBIT do not change because the addition of taxes reduces the income of all three plans by the same percentage; therefore, they do not change relative to one another.

- 7. I: P = \$9,000/200 shares bought with debt = \$45 per share; II: P = \$13,500/300 shares = \$45 This shows that when there are no corporate taxes, the stockholder does not care about the capital structure decision of the firm. This is M&M Proposition I without taxes.
- 8. a. EPS = \$7,000/1,000 shares = \$7.00; cash flow = \$7.00(100 shares) = \$700
 b. V = \$70(1,000) = \$70,000; D = 0.40(\$70,000) = \$28,000
 \$28,000/\$70 = 400 shares are bought; NI = \$7,000 .07(\$28,000) = \$5,040
 EPS = \$5,040/600 shares = \$8.40; cash flow = \$8.40(100 shares) = \$840
 - *c*. Sell 40 shares of stock and lend the proceeds at 7%: interest cash flow = 40(\$70)(.07) = \$196 cash flow from shares held = \$8.40(60 shares) = \$504; total cash flow = \$700.
 - *d.* The capital structure is irrelevant because shareholders can create their own leverage or unlever the stock to create the payoff they desire, regardless of the capital structure the firm actually chooses.
- 9. a. EBIT = \$85,000 .10(\$300K) = \$55K; cash flow = \$55K(\$45K/\$300K) = \$8,250R = \$8,250/\$45,000 = 18.33%
 - b. Sell all XYZ shares: nets \$45,000. Borrow \$45,000 at 10%: interest cash flow = -\$4,500 Use the proceeds from selling shares and the borrowed funds to buy ABC shares: cash flow from ABC = \$85,000(\$90K/\$600K) = \$12,750. total cash flow = \$8,250 R = \$8,250/\$45,000 net investment = 18.33%
 - c. $R_E = R_U + (R_U R_D)(D/E)(1 t)$ ABC: $R_E = R_U = \$85,000/\$600,000 = .1417$; XYZ: $R_E = .1417 + (.1417 - .10)(1)(1) = .1833$
 - $\begin{array}{ll} d. & WACC = (E/V)R_E + (D/V)R_D(1-t) \\ & ABC: WACC = (1)(.1417) + (0)(.10) = .1417 \\ & XYZ: WACC = (1/2)(.1833) + (1/2)(.10) = .1417 \\ & When there are no corporate taxes, the cost of capital for the firm is unaffected by the capital structure; this is M&M Proposition I without taxes. \end{array}$
- **10.** V = EBIT/WACC; EBIT = .14(\$40M) = \$5.6M
- 11. $V = V_U + T_C D$; V = EBIT(.65)/.14 + 0; EBIT = \$8,615,384.62, WACC = 14%Due to taxes, EBIT for an all-equity firm would have to be higher for the firm to still be worth \$40M.
- **12.** *a*. WACC = $.11 = (1/3)R_E + (2/3)(.11)(.65)$; $R_E = .1870$
 - b. $.1870 = R_U + (R_U .11)(2)(.65)$; $R_U = .1435$
- **13.** *a.* all-equity financed: WACC = $R_U = R_E = .15$
 - b. $R_E = R_U + (R_U R_D)(D/E)(1 t) = .15 + (.15 .09)(.25/.75)(.65) = .163$
 - c. $R_E = R_U + (R_U R_D)(D/E)(1 t) = .15 + (.15 .09)(.50/.50)(.65) = .189$
 - *d*. $WACC_B = (E/V)R_E + (D/V)R_D(1 t) = .75(.163) + .25(.09)(.65) = .1369$ $WACC_C = (E/V)R_E + (D/V)R_D(1 - t) = .50(.189) + .50(.09)(.65) = .1238$

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- **14.** *a.* $V = V_U = \$80,000(.65)/.25 = \$208,000$ *b.* $V = V_U + T_C D = \$208,000 + .35(\$50,000) = \$225,500$
- **15.** $R_E = R_U + (R_U R_D)(D/E)(1 t) = .25 + (.25 .14)(\$50,000/\$175,500)(.65) = .2704$ WACC = .2704(\\$175,500/\\$225,500) + .14(.65)(\\$50,000/\\$225,500) = .2306 When there are corporate taxes, the overall cost of capital for the firm declines the more highly leveraged is the firm's capital structure. This is M&M Proposition I with taxes.

<u>Intermediate</u>

- 16. WACC = $.12 = (100/160)R_E + (60/160)(.08)(.65)$; $R_E = .1608$ $R_E = .1608 = R_U + (R_U - .08)(.6)(.65)$; $R_U = .1381$ $V_L = EBIT(1 - t)/WACC = ($26,000)(.65)/.12 = $140,833.33$ $V_U = EBIT(1 - t)/R_U = ($26,000)(.65)/.1381 = $122,348.96$ $V_L = V_U + T_C D$ \$140,833.33 = \$122,348.96 + .35D \$18,484.37 = .35D D = \$52,812.49Applying M&M Proposition I with taxes, the firm has increased its value by issuing debt. As long as M&M Proposition I holds, that is, there are no bankruptcy costs and so forth, then the company should continue to increase its debt/equity ratio to maximize the value of the firm.
- **17.** no debt: $V = V_U = \frac{6,000(.65)}{.16} = \frac{24,375}{.50\%}$ 50% debt: $V = \frac{24,375 + .35(\frac{24}{.375})}{.35(\frac{24}{.375})}; V = \frac{28,640.63}{.52}$

<u>Challenge</u>

- 18. $R_E = R_U + (R_U R_D)(D/E)(1 t)$ $WACC = (E/V)R_E + (D/V)R_D(1 - t) = (E/V)[R_U + (R_U - R_D)(D/E)(1 - t)] + (D/V)R_D(1 - t)$ $= R_U[(E/V) + (E/V)(D/E)(1 - t)] + R_D(1 - t)[(D/V) - (E/V)(D/E)]$ $= R_U[(E/V) + (D/V)(1 - t)] = R_U[\{(E+D)/V\} - t(D/V)] = R_U[1 - t(D/V)]$
- **19.** $R_E = (EBIT R_DD)(1 t)/E = [EBIT(1 t)/E] [R_D(D/E)(1 t)]$ = $R_UV_U/E - [R_D(D/E)(1 - t)] = R_U(V_L - tD)/E - \{R_D(D/E)(1 - t)\}$ = $R_U(E + D - tD)/E - \{R_D(D/E)(1 - t)\} = R_U + (R_U - R_D)(D/E)(1 - t)$

20. M&M Proposition II, with $R_D = R_f$: $R_E = R_A + (R_A - R_f)(D/E)$ CAPM: $R_E = \beta_E(R_M - R_f) + R_f$; $R_A = \beta_A(R_M - R_f) + R_f$; $R_E = \beta_E(R_M - R_f) + R_f = \{1 + (D/E)\}[\beta_A(R_M - R_f) + R_f] - R_f(D/E)$ $\beta_E = \beta_A[1 + D/E]$

21. $\beta_E = \beta_A(1 + D/E)$; $\beta_E = 1.0, 2.0, 6.0, 21.0$ The equity risk to the shareholder is composed of both business and financial risk. Even if the assets of the firm are not very risky, the risk to the shareholder can still be large if the financial leverage is high. These higher levels of risk will be reflected in the shareholder's required rate of return R_E, which will increase with higher debt/equity ratios.