Chapter 13.

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. 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 alternative to complicated and expensive litigation.

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 this possibility.
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. It is important thing to keep in mind 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. As with any management decision, the goal is to maximize the value of shareholder equity. To accomplish this with respect to the capital structure decision, management attempts to choose the capital structure with the lowest cost of capital.

**Solutions to Questions and Problems**

**Basic**

1. a. EBIT $7,000 $10,000 $12,000  
   Interest 0 0 0  
   NI $7,000 $10,000 $12,000  
   EPS $1.75 $2.50 $3.00  
   ΔEPS% – 30 — + 20

   b. MV $80,000/4,000 shares = $20 per share; $40,000/$20 = 2,000 shares bought back
   EBIT $7,000 $10,000 $12,000  
   Interest 2,000 2,000 2,000  
   NI $5,000 $8,000 $10,000  
   EPS $2.50 $4.00 $5.00  
   ΔEPS% – 37.5 — + 25.0

2. a. EBIT $7,000 $10,000 $12,000  
   Interest 0 0 0  
   EBT $7,000 $10,000 $12,000  
   Taxes 2,450 3,500 4,200  
   NI $4,550 $6,500 $7,800  
   EPS $1.14 $1.63 $1.95  
   ΔEPS% – 30 — + 20

   b. MV $80,000/4,000 shares = $20 per share; $40,000/$20 = 2,000 shares bought back
   EBIT $7,000 $10,000 $12,000  
   Interest 2,000 2,000 2,000  
   EBT $5,000 $8,000 $10,000  
   Taxes 1,750 2,800 3,500  
   NI $3,250 $5,200 $6,500  
   EPS $1.63 $2.60 $3.25  
   ΔEPS% – 37.5 — + 25.0
3.  
a.  market-to-book ratio = 1.0, so \( TE = MV = \$80,000 \);  \( ROE = \frac{NI}{MV} = \$80,000 \)

\[ \begin{align*}
\text{ROE} & = 0.0875, 0.125, 0.15 \\
\Delta \text{ROE}\% & = -30, --, +20
\end{align*} \]

b.  now, \( TE = \$80,000 - 40,000 = \$40,000 \);  \( ROE = \frac{NI}{TE} = \frac{NI}{MV - 40,000} \)

\[ \begin{align*}
\text{ROE} & = 0.125, 0.20, 0.25 \\
\Delta \text{ROE}\% & = -37.5, --, +25
\end{align*} \]

c.  No debt

\[ \begin{align*}
\text{ROE} & = 0.05688, 0.08125, 0.0975 \\
\Delta \text{ROE}\% & = -30, --, +20
\end{align*} \]

With debt

\[ \begin{align*}
\text{ROE} & = 0.08125, 0.13, 0.1625 \\
\Delta \text{ROE}\% & = -37.5, --, +25.0
\end{align*} \]

4.  
a.  Plan I:  \( NI = \$1.5M \):  
\[ \text{EPS} = \frac{NI}{600K \text{ shares}} = \$2.50 \]

Plan II:  \( NI = \$1.5M - \$0.10(\$10M) = \$500K \):  
\[ \text{EPS} = \frac{NI}{300K \text{ shares}} = \$1.67 \]

Plan I has the higher EPS when EBIT is \$600,000.

b.  Plan I:  \( NI = \$11M \):  
\[ \text{EPS} = \frac{NI}{600K \text{ shares}} = \$18.33 \]

Plan II:  \( NI = \$11M - \$0.10(\$5M) = \$10M \):  
\[ \text{EPS} = \frac{NI}{300K \text{ shares}} = \$33.33 \]

Plan II has the higher EPS when EBIT is \$2,500,000.

c.  \( \text{EBIT/600K} = \frac{\text{[EBIT} - \$0.10(\$10M)]}{300K}; \ EBIT = \$2,000,000 \)

5.  \( P = \$10M/300K \text{ shares bought with debt} = \$33.33 \text{ per share} \)
\[ \text{V}_1 = \$33.33(600K \text{ shares}) = \$20M; \ V_2 = \$33.33(300K \text{ shares}) + \$10M \text{ debt} = \$20M \]

6.  
a.  \begin{align*}
\text{I} & \\
\text{II} & \\
\text{all-equity} & \\
\text{EBIT} & \$12,000 & \$12,000 & \$12,000 \\
\text{Interest} & 3,000 & 1,500 & 0 \\
\text{NI} & \$9,000 & \$10,500 & \$12,000 \\
\text{EPS} & \$9.00 & \$5.25 & \$4.00
\end{align*} 

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

b.  Plan I vs. all-equity:  \( \frac{\text{EBIT}}{3,000} = \frac{\text{[EBIT} - \$0.10(\$30,000)]}{1,000}; \ EBIT = \$4,500 \)

Plan II vs. all-equity:  \( \frac{\text{EBIT}}{3,000} = \frac{\text{[EBIT} - \$0.10(\$15,000)]}{2,000}; \ EBIT = \$4,500 \)

The break-even levels of EBIT are the same because of M&M Proposition I.

c.  \( \frac{\text{[EBIT} - \$0.10(\$30,000)]}{1,000} = \frac{\text{[EBIT} - \$0.10(\$15,000)]}{2,000}; \ EBIT = \$4,500 \)

This break-even level of EBIT is the same as in part (b) again because of M&M Proposition I.

d.  \begin{align*}
\text{I} & \\
\text{II} & \\
\text{all-equity} & \\
\text{EBIT} & \$12,000 & \$12,000 & \$12,000 \\
\text{Interest} & 3,000 & 1,500 & 0 \\
\text{EBT} & 9,000 & 10,500 & 12,000 \\
\text{Taxes} & 3,420 & 3,990 & 4,560 \\
\text{NI} & \$5,580 & \$6,510 & \$7,440 \\
\text{EPS} & \$5.58 & \$3.26 & \$2.48
\end{align*} 

The all-equity plan still has the lowest EPS; Plan I still has the highest EPS.

Plan I vs. all-equity:  \( \frac{\text{EBIT}}{3,000} = \frac{\text{[EBIT} - \$0.10(\$30,000)]}{1,000}; \ EBIT = \$4,500 \)

Plan II vs. all-equity:  \( \frac{\text{EBIT}}{3,000} = \frac{\text{[EBIT} - \$0.10(\$15,000)]}{2,000}; \ EBIT = \$4,500 \)

[EBIT - \$0.10(\$30,000)](.62)/1,000 = [EBIT - \$0.10(\$15,000)](.62)/2,000;  \ EBIT = \$4,500

The 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: $P = \frac{15,000}{1,000} \text{ shares bought with debt } \times 15 \text{ per share}; \quad \text{II: } P = \frac{15,000}{1,000} \text{ shares} = 15$

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. \( \text{EPS} = \frac{6,000}{800} \text{ shares} = 7.50; \quad \text{Rico's cash flow} = \frac{7.50}{100} \text{ shares} = 750 \)

\( V = \frac{80(800)}{} = 64,000; \quad D = 0.30(64,000) = 19,200 \)

\( V = 19,200/800 = 240 \text{ shares are bought; } \quad NI = 6,000 - .09(19,200) = 4,272 \)

\( \text{EPS} = \frac{4,272}{560} \text{ shares} = 7.63; \quad \text{Rico's cash flow} = \frac{7.63}{100} \text{ shares} = 763 \)

c. Sell 30 shares of stock and lend the proceeds at 9%: interest cash flow = 30($80)(.09) = 216

cash flow from shares held = $7.63(70) \text{ shares} = 534; \quad \text{total cash flow} = 750.$

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. \( \text{EPS} = \frac{38,000}{1,000} \text{ shares} = 38.00; \quad \text{Rebecca's cash flow} = \frac{38.00}{100} \text{ shares} = 3,800 \)

\( V = \frac{120(1,000)}{} = 120,000; \quad D = 0.40(120,000) = 48,000 \)

\( V = 48,000/120 = 400 \text{ shares are bought; } \quad NI = 38,000 - .08(48,000) = 34,160 \)

\( \text{EPS} = \frac{34,160}{700} \text{ shares} = 56.93; \quad \text{Rebecca's cash flow} = \frac{56.93}{100} \text{ shares} = 3,416; \quad \text{total cash flow} = 3,800.$

c. Sell 40 shares of stock and lend the proceeds at 8%: interest cash flow = 40($120)(.08) = 384

cash flow from shares held = $56.93(60) \text{ shares} = 3,416; \quad \text{total cash flow} = 3,800.$

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.

10. D/E = 1 implies 50% debt; \( V_L = V_U + T_C D = 60M + 0.40(30M) = 72M \)

D/E = 2 implies 67% debt; \( V_L = V_U + T_C D = 60M + 0.40(40M) = 76M \)

11. With no debt the value is unchanged at $60M.

D/E = 1 implies 50% debt; \( V_L = V_U + T_C D = 60M + 0.30(30M) = 69M \)

D/E = 2 implies 67% debt; \( V_L = V_U + T_C D = 60M + 0.30(40M) = 72M \)

Debt will increase the value of the firm more when the corporate tax rate is higher.

12. a. \( \text{WACC} = .14 = (1/2.5)R_E + (1.5/2.5)(.09); \quad R_E = .2150 \)

b. \( .14 = (1/2)R_E + (1/2)(.09); \quad R_E = .1900 \)

\( .14 = (1/1.5)R_E + (.5/1.5)(.09); \quad R_E = .1650 \)

\( .14 = (1)R_E + (0)(.09); \quad R_E = \text{WACC} = .1400 \)

13. a. all-equity financed: \( \text{WACC} = R_E = .13 \)

b. \( R_E = R_A + (R_A - R_D)(D/E) = .13 + (.13 - .08)(.25/75) = .1467 \)

c. \( R_E = R_A + (R_A - R_D)(D/E) = .13 + (.13 - .08)(.50/50) = .1800 \)

d. \( \text{WACC}_B = (E/V)R_E + (D/V)R_D = .75(.1467) + .25(.08) = .1300 \)

\( \text{WACC}_C = (E/V)R_E + (D/V)R_D = .50(.18) + .50(.08) = .1300 \)

14. \( V = V_U + T_C D = 325,000 + 0.35(75,000) = 351,250 \)
15. Interest tax shield = $32M(.38) = $12.16M. The interest tax shield represents the tax savings in current income due to the deductibility of a firm’s qualified debt expenses.

Intermediate

16. No debt $V_U = V_L$; value of the firm is $160M
With debt: $V = V_U + TC_D = 160M + .40(50M) = 180M$

17. $E = V_L - D$
No debt: $E = 160M - 50M = 110M$, $D/E = 50M/110M = .45$
With debt: $E = 180M - 50M = 130M$, $D/E = 50M/130M = .38$

18. Initially, $R_E = WACC = R_A = .14$
After issuing debt: $R_E = .14 + (.14 - .08)(1) = .20$
$WACC = .20(.5) + .08(.5) = .14$

19. no debt: $V = V_U = 21,000(.62)/.18 = 72,333.33$
50% debt: $V = 72,333.33 + .38(V/2)$; $V = 89,300.41$
100% debt: $V = 72,333.33 + .38V$; $V = 116,666.67