■ Solutions to Problems

P7-1. LG 2: Authorized and available shares

Basic

a. Maximum shares available for sale

Authorized shares	2,000,000
Less: Shares outstanding	1,400,000
Available shares	600,000

b. $$\text{Total shares needed} = \frac{\$48{,}000{,}000}{\$60} = 800{,}000 \text{ shares}$$

The firm requires an additional 200,000 authorized shares to raise the necessary funds at $60 per share.

c. Aspin must amend its corporate charter to authorize the issuance of additional shares.

P7-2. LG 2: Preferred dividends

Intermediate

a. $8.80 per year or $2.20 per quarter

b. $2.20 For a noncumulative preferred only the latest dividend has to be paid before dividends can be paid on common stock.

c. $8.80 For cumulative preferred all dividends in arrears must be paid before dividends can be paid on common stock. In this case the board must pay the three dividends missed plus the current dividend.

P7-3. LG 2: Preferred dividends

I**ntermediate**

A	$15.000	quarters in arrears plus the latest quarter
B	$ 8.80	only the latest quarter
C	$ 11.00	only the latest quarter
D	$25.500	quarters in arrears plus the latest quarter
E	$ 8.10	only the latest quarter

P7-4. LG 2: Convertible preferred stock

Challenge

a. Conversion value = conversion ratio × stock price = 5 × $20 = $100

b. Based on comparison of the preferred stock price versus the conversion value the investor should convert. If converted, the investor has $100 of value versus only $96 if she keeps ownership of the preferred stock.

c. If the investor converts to common stock she will begin receiving $1.00 per share per year of dividends. Conversion will generate $5.00 per year of total dividends. If the investor keeps the preferred they will receive $10.00 per year of dividends. This additional $5.00 per year in dividends may cause the investor to keep the preferred until forced to convert through use of the call feature. Furthermore, while common stock dividends may be cut or eliminated all together with no protection, preferred dividends are typically fixed and cumulative provision.

P7-5. LG 2: Personal finance: Stock quotation

Basic

a. Wednesday, December 13

b. $81.75

c. $81.75

d. The price increased by $1.63. This increase tells us that the previous close was $80.12.

P7-6. LG 4: Common stock valuation–zero growth: $P_0 = D_1 \div r_s$

Basic

a. $P_0 = \$2.40 \div 0.12 = \$20$

b. $P_0 = \$2.40 \div 0.20 = \$12$

c. As perceived risk increases, the required rate of return also increases, causing the stock price to fall.

P7-7. LG 4: Personal finance: common stock valuation–zero growth

Intermediate

$$\text{Value of stock when purchased} = \frac{\$5.00}{0.16} = \$31.25$$

$$\text{Value of stock when sold} = \frac{\$5.00}{0.12} = \$41.67$$

Sally's capital gain is $10.42 ($41.67 – $31.25) per share.

Sally's total capital gain is $100 \times \$1042.00$

P7-8. LG 4: Preferred stock valuation: $PS_0 = D_p \div r_p$

Intermediate

a. $PS_0 = \$6.40 \div 0.093$

$PS_0 = \$68.82$

b. $PS_0 = \$6.40 \div 0.105$

$PS_0 = \$60.95$

The investor would lose $7.87 per share ($68.82 – $60.95) because, as the required rate of return on preferred stock issues increases above the 9.3% return she receives, the value of her stock declines.

P7-9. LG 4: Common stock value–constant growth: $P_0 = D_1 \div (r_s - g)$

Basic

Firm	$P_0 = D_1 \div (r_s - g)$		Share Price
A	$P_0 = \$1.20 \div (0.13 - 0.08)$	=	$ 24.00
B	$P_0 = \$4.00 \div (0.15 - 0.05)$	=	$ 40.00
C	$P_0 = \$0.65 \div (0.14 - 0.10)$	=	$ 16.25
D	$P_0 = \$6.00 \div (0.09 - 0.08)$	=	$600.00
E	$P_0 = \$2.25 \div (0.20 - 0.08)$	=	$ 18.75

P7-10. LG 4: Common stock value–constant growth

Intermediate

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

$r_s = \frac{\$1.20 \times (1.05)}{\$28} + 0.05$

$r_s = \frac{\$1.26}{\$28} + 0.05 = 0.045 + 0.05 = 0.095 = 9.5\%$

b. $r_s = \frac{\$1.20 \times (1.10)}{\$28} + 0.10$

$r_s = \frac{\$1.32}{\$28} + 0.10 = 0.047 + 0.10 = 0.147 = 14.7\%$

P7-11. LG 4: Personal finance: Common stock value–constant growth: $P_0 = D_1 \div (r_s - g)$

Intermediate

Computation of growth rate:

FV = PV × $(1 + r)^n$

\$2.87 = \$2.25 × $(1 + r)^5$

\$2.87 ÷ \$2.25 = $FVIF_{r\%,5}$

1.276 = $FVIF_{k\%,5}$

g = r at 5%

a. Value at 13% required rate of return:

$P_0 = \frac{\$3.02}{0.13 - 0.05} = \$37.75$

b. Value at 10% required rate of return:

$P_0 = \frac{\$3.02}{0.10 - 0.05} = \$60.40$

c. As risk increases, the required rate of return increases, causing the share price to fall.

P7-12. LG 4: Personal finance: Common stock value–all growth models

Challenge

a. $P_0 = (CF_0 \div r)$

$P_0 = \$42{,}500 \div 0.18$

$P_0 = \$236{,}111$

b. $P_0 = (CF_1 \div (r - g))$

$P_0 = (\$45{,}475^* \div (0.18 - 0.07)$

$P_0 = \$413{,}409.10$

Calculator solution: \$413,409.09

$^*CF_1 = \$42{,}500(1.07) = \$45{,}475$

P7-13. LG 5: Free cash flow (FCF) valuation

Challenge

a. The value of the total firm is accomplished in three steps.

1. Calculate the PV of FCF from 2015 to infinity.

$$FCF_{2115\to\infty} = \frac{\$390,000(1.03)}{0.11-0.03} = \frac{\$401,700}{0.08} = \$5,021,250$$

2. Add the PV of the cash flow obtained in (1) to the cash flow for 2014.

$FCF_{2014} = \$5,021,250 + 390,000 = \$5,411,250$

3. Find the PV of the cash flows for 2010 through 2014.

Year	FCF	$PVIF_{11\%,n}$	PV
2010	\$200,000	0.901	\$ 180,200
2011	250,000	0.812	203,000
2012	310,000	0.731	226,610
2013	350,000	0.659	230,650
2014	5,411,250	0.593	3,208,871
	Value of entire company, V_c =		\$ 4,049,331
		Calculator solution:	\$ 4,051,624

b. Calculate the value of the common stock.

$V_S = V_C - V_D - V_P$

$V_S = \$4,049,331 - \$1,500,000 - \$400,000 = \$2,149,331$

c. Value per share $= \frac{\$2,149,331}{200,000} = \$10.75$ Calculator solution: \$10.76

P7-14. LG 5: Personal finance: Using the free cash flow valuation model to price an IPO

Challenge

a. The value of the firm's common stock is accomplished in four steps.

1. Calculate the PV of FCF from 2011 to infinity.

$$FCF_{2014\to\infty} = \frac{\$1,100,000(1.02)}{0.08-0.02} = \frac{\$1,122,000}{0.06} = \$18,700,000$$

2. Add the PV of the cash flow obtained in (1) to the cash flow for 2013.

$FCF_{2013} = \$18,700,000 + 1,100,000 = \$19,800,000$

3. Find the PV of the cash flows for 2010 through 2013.

Year	FCF	$PVIF_{8\%,n}$	PV
2010	\$700,000	0.926	\$ 648,200
2011	800,000	0.857	685,600
2012	950,000	0.794	754,300
2013	19,800,000	0.735	14,533,000
	Value of entire company, V_c =		\$16,621,100

4. Calculate the value of the common stock using Equation 7.8.

   $V_S = V_C - V_D - V_P$

   $V_S = \$16{,}621{,}100 - \$2{,}700{,}000 - \$1{,}000{,}000 = \$12{,}921{,}100$

   $$\text{Value per share} = \frac{\$12{,}921{,}100}{1{,}100{,}000} = \$11.75$$

   Calculator solution: $10.77

b. Based on this analysis the IPO price of the stock is over valued by $0.75 ($12.50 – $11.75) and you should not buy the stock.

c. The value of the firm's common stock is accomplished in four steps.

1. Calculate the PV of FCF from 2014 to infinity.

$$\text{FCF}_{2014\to\infty} = \frac{\$1{,}100{,}000(1.03)}{0.08 - 0.03} = \frac{\$1{,}133{,}000}{0.05} = \$22{,}660{,}000$$

2. Add the PV of the cash flow obtained in (1) to the cash flow for 2013.

   $\text{FCF}_{2013} = \$22{,}660{,}000 + 1{,}100{,}000 = \$23{,}760{,}000$

3. Find the PV of the cash flows for 2010 through 2013.

Year	**FCF**	**PVIF$_{8\%,n}$**	**PV**
2010	$ 700,000	0.926	$ 648,200
2011	800,000	0.857	685,600
2012	950,000	0.794	754,300
2013	23,760,000	0.735	17,463,000
	Value of entire company, V_C =		$19,551,700

4. Calculate the value of the common stock using Equation 7.8.

   $V_S = V_C - V_D - V_P$

   $V_S = \$19{,}551{,}700 - \$2{,}700{,}000 - \$1{,}000{,}000 = \$15{,}851{,}700$

   $$\text{Value per share} = \frac{\$15{,}851{,}700}{1{,}100{,}000} = \$14.41$$

   If the growth rate is changed to 3% the IPO price of the stock is under valued by $1.91 ($14.41 – $12.50) and you should buy the stock.

P7-15. LG 5: Book and liquidation value

Intermediate

a. Book value per share:

$$\frac{\text{Book value of assets} - (\text{liabilities + preferred stock at book value})}{\text{number of shares outstanding}}$$

$$\text{Book value per share} = \frac{\$780{,}000 - \$420{,}000}{10{,}000} = \$36 \text{ per share}$$

b. Liquidation value:

Cash	$40,000	Liquidation value of assets	722,000
Marketable Securities	60,000	Less: Current Liabilities	(160,000)
Accounts Rec.		Long-term debt	(180,000)
(0.90 × $120,000)	108,000	Preferred Stock	(80,000)
Inventory		Available for *CS*	$302,000
(0.90 × $160,000)	144,000		
Land and Buildings			
(1.30 × $150,000)	195,000		
Machinery & Equip.			
(0.70 × $250,000)	175,000		
Liq. Value of Assets	$722,000		

$$\text{Liquidation value per share} = \frac{\text{Liquidation value of assets}}{\text{Number of shares outstanding}}$$

$$\text{Liquidation value per share} = \frac{\$302,000}{10,000} = \$30.20 \text{ per share}$$

c. Liquidation value is below book value per share and represents the minimum value for the firm. It is possible for liquidation value to be greater than book value if assets are undervalued. Generally, they are overvalued on a book value basis, as is the case here.

P7-16. LG 5: Valuation with price/earnings multiples

Basic

Firm	EPS × P/E	=	Stock Price
A	3.0 × (6.2)	=	$18.60
B	4.5 × (10.0)	=	$45.00
C	1.8 × (12.6)	=	$22.68
D	2.4 × (8.9)	=	$21.36
E	5.1 × (15.0)	=	$76.50

P7-17. LG 6: Management action and stock value: $P_0 = D_1 \div (r_s - g)$

Intermediate

a. $P_0 = \$3.15 \div (0.15 - 0.05) = \$31.50$

b. $P_0 = \$3.18 \div (0.14 - 0.06) = \$39.75$

c. $P_0 = \$3.21 \div (0.17 - 0.07) = \$32.10$

d. $P_0 = \$3.12 \div (0.16 - 0.04) = \$26.00$

e. $P_0 = \$3.24 \div (0.17 - 0.08) = \$36.00$

The best alternative in terms of maximizing share price is (b).

P7-18. LG 4, 6: Integrative–valuation and CAPM formulas

Intermediate

$P_0 = D_1 \div (r_s - g)$ $\qquad$ $r_s = R_F + [b \times (r_m - R_F)]$

$\$50 = \$3.00 \div (r_s - 0.09)$ $\qquad$ $0.15 = 0.07 + [b \times (0.10 - 0.07)]$

$r_s = 0.15$ $\qquad$ $b = 2.67$

P7-19. LG 4: 6: Integrative–risk and valuation

Challenge

a. $r_s = R_F + [b \times (r_m - R_F)]$

$r_s = 0.10 + [1.20 \times (0.14 - 0.10)]$

$r_s = 0.148$

b. g: $\text{FV} = \text{PV} \times (1 + r)^n$

$\$2.45 = \$1.73 \times (1 + r)^6$

$\dfrac{\$2.45}{\$1.73} = \text{FVIF}_{k\%,6}$

$1.416 = \text{FVIF}_{6\%,6}$

g = approximately 6%

$P_0 = D_1 \div (r_s - g)$

$P_0 = \$2.60 \div (0.148 - 0.06)$

$P_0 = \$29.55$

Calculator solution: $29.45

c. A decrease in beta would decrease the required rate of return, which in turn would increase the price of the stock.

P7-20 LG 4, 6: Integrative–valuation and CAPM

Challenge

a. g: $\text{FV} = \text{PV} \times (1 + r)^n$

$\$3.44 = \$2.45 \times (1 + r)^5$

$\$3.44 = \$2.45 \times (1 + r)^5$

$\$3.44 \div \$2.45 = \text{FVIF}_{k\%,5}$

$1.404 = \text{FVIF}_{7\%,5}$

r = approximately 7%

$r_s = 0.09 + [1.25 \times (0.13 - 0.10)]$

$r_s = 0.14$

$D_1 = (\$3.44 \times 1.07) = \$3.68$

$P_0 = \$3.68 \div (0.14 - 0.07)$

$P_0 = \$52.57$ per share $\qquad$ Calculator solution: $52.77

b. 1. $r_s = 0.09 + [1.25 \times (0.13 - 0.09)]$

$D_1 = \$3.61(\$3.44 \times 1.05)$

$P_0 = \$3.61 \div (0.14 - 0.05)$

$P_0 = \$40.11$ per share $\qquad$ Calculator solution: $40.25

2. $r_s = 0.09 + [1.00 \times (0.13 - 0.09)]$
   $r_s = 0.13$
   $D_1 = \$3.68$
   $P_0 = \$3.68 \div (0.13 - 0.07)$
   $P_0 = \$61.33$ per share Calculator solution: \$61.60

The CAPM supplies an estimate of the required rate of return for common stock. The resulting price per share is a result of the interaction of the risk-free rate, the risk level of the security, and the required rate of return on the market. For Craft, the lowering of the dividend growth rate reduced future cash flows resulting in a reduction in share price. The decrease in the beta reflected a reduction in risk leading to an increase in share price.

P7-21. Ethics problem

Intermediate

a. This is a zero-growth dividend valuation problem, so:

$P_0 = D/r = \$5/0.11 = \$45.45$

b. Using the new discount rate of 12% (11% + 1% credibility risk premium), we have:

$P_0 = D/r = \$5/0.12 = \$41.67$

The value decline is the difference between Problems **a** and **b**:

Value decline = \$41.67 – \$45.45
= –\$3.78

The stock sells for almost \$4 less because of company's financial reports cannot be fully trusted. Lack of integrity is seen to hurt stock prices because of the credibility premium.

■ Case

Assessing the Impact of Suarez Manufacturing's Proposed Risky Investment on Its Stock Values

This case demonstrates how a risky investment can affect a firm's value. First, students must calculate the current value of Suarez's stock, rework the calculations assuming that the firm makes the risky investment, and then draw some conclusions about the value of the firm in this situation. In addition to gaining experience in valuation of stock, students will see the relationship between risk and valuation.

1. Current per share value of common stock growth rate of dividends:

   g can be solved for by using the geometric growth equation as shown below in (a) or by finding the PVIF for the growth as shown in (b).

   a. $g = \sqrt[4]{\frac{1.90}{1.30}} = (1.46154)^{1/4} - 1 = 1.0995 - 1 = 0.0995 = 10.0\%$

   b. $g = \frac{1.30}{1.90} = 0.6842$

   PV factor for 4 years closest to 0.6842 is 10% (0.683).
   Use the constant growth rate model to calculate the value of the firm's common stock.

$$P_0 = \frac{D_1}{r_s - g} = \frac{\$1.90(1.10)}{0.14 - 0.10} = \frac{\$2.09}{0.04} = \$52.25$$

2. Value of common stock if risky investment is made:

$$P_0 = \frac{D_1}{r_s - g} = \frac{\$1.90(1.13)}{0.16 - 0.13} = \frac{\$2.15}{0.03} = \$71.67$$

The higher growth rate associated with undertaking the investment increases the market value of the stock.

3. The firm should undertake the proposed project. The price per share increases by $19.42 (from $52.25 to $71.67). Although risk increased and increased the required return, the higher dividend growth offsets this higher risk resulting in a net increase in value.

4. $D_{2010} = 2.15$(stated in case)

$D_{2011} = 2.15(1 + 0.13) = 2.43$

$D_{2012} = 2.43(1 + 0.13) = 2.75$

$D_{2013} = 2.75(1 + 0.10) = 3.02$

$$P_{2012} = \frac{D_{2013}}{r_s - g} = \frac{\$3.02}{0.16 - 0.10} = \frac{\$3.02}{0.06} = \$50.33$$

Year	Cash Flow	$PVIF_{16\%,n}$	PV
2010	2.15	0.862	$ 1.85
2011	2.43	0.743	1.81
2012	2.75 + 50.33	0.641	34.02
			P_0 = $37.67

Now the firm should not undertake the proposed project. The price per share decreases by $14.58 (from $52.25 to $37.67). Now the increase in risk and increased the required return is not offset by the increase in cash flows. The longer term of the growth is an important factor in this decision.

■ Spreadsheet Exercise

The answer to Chapter 7's Azure Corporation spreadsheet problem is located in the Instructor's Resource Center at *www.prenhall.com/irc*.

■ A Note on Web Exercises

A series of chapter-relevant assignments requiring Internet access can be found at the book's Companion Website at *http://www.prenhall.com/gitman*. In the course of completing the assignments students access information about a firm, its industry, and the macro economy, and conduct analyses consistent with those found in each respective chapter.