

# Chapter 6

## Financial Planning and Forecasting

### Learning Objectives

After reading this chapter, students should be able to:

- ◆ Discuss the importance of strategic planning and the central role that financial forecasting plays in the overall planning process.
- ◆ Explain how firms forecast sales.
- ◆ Use the Additional Funds Needed (or AFN) equation and discuss the relationship between asset growth and the need for funds.
- ◆ Explain how spreadsheets are used in the forecasting process, starting with historical statements, ending with projected statements, and including a set of financial ratios based on those projected statements.
- ◆ Discuss how planning is an iterative process.

## Lecture Suggestions

In Chapter 4, we looked at where the firm has been and where it is now—its current strengths and weaknesses. Now, in Chapter 6, we look at where it is projected to go in the future.

What we cover, and the way we cover it, can be seen by scanning the slides and Integrated Case solution for Chapter 6, 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

- 6-1** The need for external financing depends on the following key factors:
1. Sales growth ( $\Delta S$ ). Rapidly growing companies require large increases in assets, other things held constant.
  2. Capital intensity ( $A_0^*/S_0$ ). The amount of assets required per dollar of sales, the capital intensity ratio, has a major effect on capital requirements. Companies with high assets-to-sales ratios require more assets for a given increase in sales, hence have a greater need for external financing.
  3. Spontaneous liabilities-to-sales ratio ( $L_0^*/S_0$ ). Companies that spontaneously generate a large amount of funds from accounts payable and accruals have a reduced need for external financing.
  4. Profit margin ( $M$ ). The higher the profit margin, the larger the net income available to support increases in assets, hence the lower the need for external financing.
  5. Retention ratio ( $1 - \text{Payout}$ ). Companies that retain a high percentage of their earnings rather than paying them out as dividends generate more retained earnings and thus need less external financing.
- 6-2** False. At low growth rates, internal financing will take care of the firm's needs.
- 6-3** False. The use of computerized planning models is increasing because of the information they provide.
- 6-4** Accounts payable, accrued wages, and accrued taxes increase spontaneously with sales. Retained earnings increase, but only to the extent that dividends paid do not equal 100% of net income and the profit margin is positive.
- 6-5**
- a. +.
  - b. -. The firm needs less manufacturing facilities, raw materials, and work in process.
  - c. +. It reduces spontaneous funds; however, it may eventually increase retained earnings.
  - d. +.
  - e. +.
  - f. Probably +. This should stimulate sales, so it may be offset in part by increased profits.
  - g. 0.
  - h. +.

## Solutions to End-of-Chapter Problems

**6-1**      $AFN = (A_0^*/S_0)\Delta S - (L_0^*/S_0)\Delta S - MS_1(1 - \text{Payout})$   
 $= \left(\frac{\$3,000,000}{\$5,000,000}\right)\$1,000,000 - \left(\frac{\$500,000}{\$5,000,000}\right)\$1,000,000 - 0.05(\$6,000,000)(0.3)$   
 $= (0.6)(\$1,000,000) - (0.1)(\$1,000,000) - (\$300,000)(0.3)$   
 $= \$600,000 - \$100,000 - \$90,000$   
 $= \$410,000.$

**6-2**      $AFN = \left(\frac{\$4,000,000}{\$5,000,000}\right)\$1,000,000 - (0.1)(\$1,000,000) - (\$300,000)(0.3)$   
 $= (0.8)(\$1,000,000) - \$100,000 - \$90,000$   
 $= \$800,000 - \$190,000$   
 $= \$610,000.$

The capital intensity ratio is measured as  $A_0^*/S_0$ . This firm's capital intensity ratio is higher than that of the firm in Problem 6-1; therefore, this firm is more capital intensive—it would require a large increase in total assets to support the increase in sales.

**6-3**      $AFN = (0.6)(\$1,000,000) - (0.1)(\$1,000,000) - 0.05(\$6,000,000)(1)$   
 $= \$600,000 - \$100,000 - \$300,000$   
 $= \$200,000.$

Under this scenario the company would have a higher level of retained earnings, which would reduce the amount of additional funds needed.

**6-4**     **a.**

	<u>2012</u>	<u>Forecast Basis</u>	<u>2013</u>
Sales	\$700	× 1.25	\$875.00
Operating costs	<u>500</u>	× 0.70 Sales	<u>612.50</u>
EBIT	\$200		\$262.50
Interest	<u>40</u>		<u>40.00</u>
EBT	\$160		\$222.50
Taxes (40%)	<u>64</u>		<u>89.00</u>
Net income	<u>\$ 96</u>		<u>\$133.50</u>
 Dividends (33.33%)	 <u>\$ 32</u>		 <u>\$ 44.50</u>
Addit. to R/E	<u>\$ 64</u>		<u>\$ 89.00</u>

**b.**  $\Delta \text{Dividends} = (\$44.50 - \$32.00)/\$32.00 = 39.06\%.$

**6-5**     Sales = \$5,000,000,000; FA = \$1,700,000,000; FA are operated at 90% capacity.

**a.** Full capacity sales =  $\$5,000,000,000/0.90 = \$5,555,555,556.$

**b.** Target FA/S ratio =  $\$1,700,000,000/\$5,555,555,556 = 30.6\%.$

- c. Sales increase 12%;  $\Delta FA = ?$

$$S_1 = \$5,000,000,000 \times 1.12 = \$5,600,000,000.$$

No increase in FA up to \$5,555,555,556.

$$\begin{aligned}\Delta FA &= 0.306 \times (\$5,600,000,000 - \$5,555,555,556) \\ &= 0.306 \times (\$44,444,444) \\ &= \$13,600,000.\end{aligned}$$

- 6-6 Sales = \$300,000,000;  $g_{\text{Sales}} = 12\%$ ; Inv. = \$25 + 0.125(Sales).

$$S_1 = \$300,000,000 \times 1.12 = \$336,000,000.$$

$$\begin{aligned}\text{Inv.} &= \$25 + 0.125(\$336) \\ &= \$67 \text{ million.}\end{aligned}$$

$$\text{Sales/Inv.} = \$336,000,000/\$67,000,000 \approx 5.0149 \times = 5.01 \times.$$

6-7		<u>Actual</u>	<u>Forecast Basis</u>	<u>Pro Forma</u>
	Sales	\$3,000	$\times 1.10$	\$3,300
	Oper. costs excluding depreciation	<u>2,450</u>	$\times 0.80 \text{ Sales}$	<u>2,640</u>
	EBITDA	\$ 550		\$ 660
	Depreciation	<u>250</u>	$\times 1.10$	<u>275</u>
	EBIT	\$ 300		\$ 385
	Interest	<u>125</u>		<u>125</u>
	EBT	\$ 175		\$ 260
	Taxes (40%)	<u>70</u>		<u>104</u>
	Net income	<u>\$ 105</u>		<u>\$ 156</u>

- 6-8 a. Total liabilities and equity = Accounts payable + Long-term debt + Common stock + Retained earnings  
 $\$1,200,000 = \$375,000 + \text{Long-term debt} + \$425,000 + \$295,000$   
 Long-term debt = \$105,000.

$$\begin{aligned}\text{Total debt} &= \text{Accounts payable} + \text{Long-term debt} \\ &= \$375,000 + \$105,000 = \$480,000.\end{aligned}$$

Alternatively,

$$\begin{aligned}\text{Total debt} &= \text{Total liabilities and equity} - \text{Common stock} - \text{Retained earnings} \\ &= \$1,200,000 - \$425,000 - \$295,000 = \$480,000.\end{aligned}$$

- b. Assets/Sales ( $A_0^*/S_0$ ) =  $\$1,200,000/\$2,500,000 = 48\%$ .

$$L_0^*/\text{Sales} (L_0^*/S_0) = \$375,000/\$2,500,000 = 15\%.$$

$$2013 \text{ Sales} = (1.25)(\$2,500,000) = \$3,125,000.$$

$$\Delta S = \$3,125,000 - \$2,500,000 = \$625,000.$$

$$\begin{aligned}
 \text{AFN} &= (A_0^*/S_0)(\Delta S) - (L_0^*/S_0)(\Delta S) - MS_1(1 - \text{Payout}) - \text{New common stock} \\
 &= (0.48)(\$625,000) - (0.15)(\$625,000) - (0.06)(\$3,125,000)(0.6) - \$75,000 \\
 &= \$300,000 - \$93,750 - \$112,500 - \$75,000 = \$18,750.
 \end{aligned}$$

Alternatively, using the forecasted financial statements:

	2012	Forecast Basis × 2013 Sales	Additions (New Financing, R/E)	2013 Pro Forma
Total assets	<u>\$1,200,000</u>	0.48		<u>\$1,500,000</u>
Current liabilities	\$ 375,000	0.15		\$ 468,750
Long-term debt	<u>105,000</u>			<u>105,000</u>
Total debt	<u>\$ 480,000</u>			<u>\$ 573,750</u>
Common stock	425,000		75,000*	500,000
Retained earnings	<u>295,000</u>		112,500**	<u>407,500</u>
Total common equity	<u>\$ 720,000</u>			<u>\$ 907,500</u>
Total liabilities and equity	<u>\$1,200,000</u>			<u>\$1,481,250</u>

$$\text{AFN} = \text{New long-term debt} = \$18,750$$

\*Given in problem that firm will sell new common stock = \$75,000.

\*\*PM = 6%; 1 – Payout = 60%;  $NI_{2013} = \$2,500,000 \times 1.25 \times 0.06 = \$187,500$ .

Addition to RE =  $NI \times (1 - \text{Payout}) = \$187,500 \times 0.6 = \$112,500$ .

- 6-9**  $S_{2012} = \$2,000,000$ ;  $A_{2012} = \$1,500,000$ ;  $CL_{2012} = \$500,000$ ;  $NP_{2012} = \$200,000$ ;  $A/P_{2012} = \$200,000$ ;  $\text{Accrued liabilities}_{2012} = \$100,000$ ;  $A_0^*/S_0 = 0.75$ ;  $PM = 5\%$ ;  $(1 - \text{Payout}) = 40\%$ ; so  $\text{AFN} = 0$ ,  $\Delta S = ?$

$$\begin{aligned}
 \text{AFN} &= (A_0^*/S_0)\Delta S - (L_0^*/S_0)\Delta S - MS_1(1 - \text{Payout}) \\
 \$0 &= (0.75)\Delta S - \left( \frac{\$300,000}{\$2,000,000} \right) \Delta S - (0.05)(S_1)(0.4) \\
 \$0 &= (0.75)\Delta S - (0.15)\Delta S - (0.02)S_1 \\
 \$0 &= (0.6)\Delta S - (0.02)S_1 \\
 \$0 &= 0.6(S_1 - S_0) - (0.02)S_1 \\
 \$0 &= 0.6(S_1 - \$2,000,000) - (0.02)S_1 \\
 \$0 &= 0.6S_1 - \$1,200,000 - 0.02S_1 \\
 \$1,200,000 &= 0.58S_1 \\
 \$2,068,965.52 &= S_1.
 \end{aligned}$$

Sales can increase by  $\$2,068,965.52 - \$2,000,000 = \$68,965.52$  without additional funds being needed.

- 6-10** Sales = \$320,000,000;  $g_{\text{Sales}} = 12\%$ ; Rec. =  $\$9.25 + 0.07(\text{Sales})$ .

$$S_1 = \$320,000,000 \times 1.12 = \$358,400,000.$$

$$\begin{aligned}
 \text{Rec.} &= \$9.25 + 0.07(\$358.4) \\
 &= \$34.338 \text{ million.}
 \end{aligned}$$

$$\begin{aligned}
 \text{DSO} &= \text{Rec.}/(\text{Sales}/365) \\
 &= \$34,338,000/(\$358,400,000/365) \\
 &= 34.97 \text{ days} \approx 35 \text{ days.}
 \end{aligned}$$

**6-11** Sales = \$110,000,000;  $g_{\text{Sales}} = 5\%$ ; Inv. = \$9 + 0.0875(Sales).

$$S_1 = \$110,000,000 \times 1.05 = \$115,500,000.$$

$$\begin{aligned}
 \text{Inv.} &= \$9 + 0.0875(\$115.5) \\
 &= \$19.10625 \text{ million.}
 \end{aligned}$$

$$\begin{aligned}
 \text{Sales/Inv.} &= \$115,500,000/\$19,106,250 \\
 &= 6.0451\times.
 \end{aligned}$$

**6-12 a.** Sales = \$2,000,000,000; FA = \$600,000,000; FA are operated at 80% capacity.

$$\begin{aligned}
 \text{Full capacity sales} &= \text{Actual sales}/(\% \text{ of capacity at which FA are operated}) \\
 &= \$2,000,000,000/0.80 \\
 &= \$2,500,000,000.
 \end{aligned}$$

**b.** Target FA/Sales ratio = \$600,000,000/\$2,500,000,000  
= 0.24 = 24.0%.

**c.** Sales increase 30%;  $\Delta\text{FA} = ?$

$$S_1 = \$2,000,000,000 \times 1.30 = \$2,600,000,000.$$

No increase in FA up to \$2,500,000,000.

$$\begin{aligned}
 \Delta\text{FA} &= 0.24 \times (\$2,600,000,000 - \$2,500,000,000) \\
 &= 0.24 \times \$100,000,000 \\
 &= \$24,000,000.
 \end{aligned}$$

<b>6-13 a.</b>	<u>Part II. Income Statements</u>	<u>2012</u>	<u>Change</u>	<u>2013</u>
	Sales	\$3,600,000.0	(1 + g)	\$3,960,000.0
	Operating costs (includes depreciation)	<u>3,279,720.0</u>	0.875	<u>3,465,000.0</u>
	Earnings before interest and taxes (EBIT)	\$ 320,280.0		\$ 495,000.0
	Less interest expense	<u>20,280.0</u>	See notes	<u>37,125.0</u>
	Earnings before taxes (EBT)	\$ 300,000.0		\$ 457,875.0
	Taxes	<u>120,000.0</u>	EBT(T)	<u>183,150.0</u>
	Net income (NI)	<u>\$ 180,000.0</u>		<u>\$ 274,725.0</u>
	Dividends	\$ 108,000.0	NI(Payout)	\$ 164,835.0
	Addition to retained earnings	\$ 72,000.0		\$ 109,890.0
	<u>Part III. Balance Sheets</u>	<u>2012</u>	<u>Change</u>	<u>2013</u>
	<i>Assets</i>			
	Cash	\$ 180,000.0	(1 + g)	\$ 198,000.0
	Accounts receivable	360,000.0	0.1000	396,000.0
	Inventories	720,000.0	0.2000	792,000.0
	Fixed assets (grow with sales)	<u>1,440,000.0</u>	(1 + g)	<u>1,584,000.0</u>
	Total assets	<u>\$2,700,000.0</u>		<u>\$2,970,000.0</u>
	<i>Liabilities and Equity</i>			
	Payables + accruals (both grow with sales)	\$ 540,000.0	(1 + g)	\$ 594,000.0
	Short-term bank loans	<u>56,000.0</u>	See notes	<u>89,100.0</u>
	Total current liabilities	\$ 596,000.0		\$ 683,100.0
	Long-term bonds	<u>100,000.0</u>	See notes	<u>207,900.0</u>
	Total debt	\$ 696,000.0		\$ 891,000.0
	Common stock	1,800,000.0	See notes	1,765,110.0
	Retained earnings	<u>204,000.0</u>	\$109,890.0	<u>313,890.0</u>
	Total common equity	<u>\$2,004,000.0</u>		<u>\$2,079,000.0</u>
	Total liabilities and equity	<u>\$2,700,000.0</u>		<u>\$2,970,000.0</u>
	<u>Part V. Notes on Calculations</u>			
	Assets in 2013 will change to this amount, from the balance sheet:			\$2,970,000.0
	Target debt ratio			30.00%
	Resulting total debt: (Target debt ratio)(2013 assets)			\$ 891,000.0
	Less: Payables and accruals			<u>-594,000.0</u>
	Bank loans and bonds (= Interest-bearing debt)			\$ 297,000.0
	Allocated to bank loans, based on 2012 proportion	30.00%		<u>89,100.0</u>
	Allocated to bonds, based on 2012 proportion	70.00%		\$ 207,900.0
	Interest expense: (Interest rate)(2013 Bank loans plus bonds)			37,125.0
	Target equity ratio = 1 – Target debt ratio			70%
	Required total equity: (2013 assets)(Target equity ratio)			\$2,079,000.0
	Retained earnings, from 2013 balance sheet			<u>313,890.0</u>
	Required common stock = Required total equity – Retained earnings			<u>\$1,765,110.0</u>
	Old shares outstanding			100,000
	Increase in common stock = 2013 Common stock – 2012 Common stock			-\$34,890.0
	Initial price per share			\$45.00
	Change in shares = Change in equity/Initial price per share			-775.33
	New shares outstanding = Old shares + Δ Shares			99,224.67
	Old EPS = 2012 Net income/Old shares outstanding			\$1.80
	New EPS = 2013 Net income/New shares outstanding			\$2.77



b. 
$$\begin{aligned} \text{AFN} &= \$2,700,000/\$3,600,000(\Delta\text{Sales}) - (\$360,000 + \$180,000)/\$3,600,000(\Delta\text{Sales}) \\ &\quad - (0.05)(\$3,600,000 + \Delta\text{Sales})0.4 \\ \$0 &= 0.75(\Delta\text{Sales}) - 0.15(\Delta\text{Sales}) - 0.02(\Delta\text{Sales}) - \$72,000 \\ \$0 &= 0.58(\Delta\text{Sales}) - \$72,000 \\ \$72,000 &= 0.58(\Delta\text{Sales}) \\ \Delta\text{Sales} &= \$124,138. \end{aligned}$$

$$\text{Growth rate in sales} = \frac{\Delta\text{Sales}}{\$3,600,000} = \frac{\$124,138}{\$3,600,000} = 3.45\%.$$

6-14 a. 
$$\text{Full capacity sales} = \frac{\text{Current sales}}{\% \text{ of capacity at which FA were operated}} = \frac{\$36,000}{0.75} = \$48,000.$$

$$\% \text{ increase} = \frac{\text{New sales} - \text{Old sales}}{\text{Old sales}} = \frac{\$48,000 - \$36,000}{\$36,000} = 0.33 = 33\%.$$

Therefore, sales could expand by 33% before the firm would need to add fixed assets.

b. Part II. Income Statements (in thousands)	2012	Change	2013
Sales	\$36,000.0	(1 + g)	\$45,000.0
Operating costs (includes depreciation)	30,783.0	0.820	36,900.0
Earnings before interest and taxes (EBIT)	\$ 5,217.0		\$ 8,100.0
Less interest expense	1,017.0	See notes	1,116.7
Earnings before taxes (EBT)	\$ 4,200.0		\$ 6,983.3
Taxes	1,680.0	EBT(T)	2,793.3
Net income (NI)	\$ 2,520.0		\$ 4,190.0
Dividends	\$ 1,512.0	NI(Payout)	\$ 2,514.0
Addition to retained earnings	\$ 1,008.0		\$ 1,676.0
Part III. Balance Sheets (in thousands)	2012	Change	2013
<i>Assets</i>			
Cash	\$ 1,800.0	(1 + g)	\$ 2,250.0
Accounts receivable	10,800.0	0.3000	13,500.0
Inventories	12,600.0	0.3500	15,750.0
Fixed assets	21,600.0	See notes	21,600.0
Total assets	\$46,800.0		\$53,100.0
<i>Liabilities and Equity</i>			
Payables + accruals (both grow with sales)	\$ 9,720.0	(1 + g)	\$12,150.0
Short-term bank loans	3,472.0	See notes	3,553.2
Total current liabilities	\$13,192.0		\$15,703.2
Long-term bonds	5,000.0	See notes	6,598.8
Total debt	\$18,192.0		\$22,302.0
Common stock	2,000.0	See notes	2,514.0
Retained earnings	26,608.0	\$1,676.0	28,284.0
Total common equity	\$28,608.0		\$30,798.0
Total liabilities and equity	\$46,800.0		\$53,100.0

Part V. Notes on Calculations (in thousands)

Full capacity sales	\$48,000.00
Target fixed assets/Sales	45.00%
Required level of fixed assets	\$20,250.00
Current level of fixed assets	\$21,600.00
Addition to fixed assets (= zero, if negative)	\$0.00
2013 Fixed assets	\$21,600.00

Assets in 2013 will change to this amount, from the balance sheet:	\$53,100.0
Target debt ratio	42.00%
Resulting total debt: (Target debt ratio)(2013 assets)	\$22,302.0
Less: Payables and accruals	<u>-12,150.0</u>
Bank loans and bonds (= Interest-bearing debt)	\$10,152.0
Allocated to bank loans, based on 2012 proportion	35.00% <u>3,553.2</u>
Allocated to bonds, based on 2012 proportion	65.00% \$ 6,598.8
Interest expense: (Interest rate)(2013 Bank loans plus bonds)	\$ 1,116.7
Target equity ratio = 1 – Target debt ratio	58%
Required total equity: (2013 assets)(Target equity ratio)	\$30,798.0
Retained earnings, from 2013 balance sheet	<u>28,284.0</u>
Required common stock = Required total equity – Retained earnings	<u>\$ 2,514.0</u>

Old shares outstanding (in thousands)	1,000
Increase in common stock = 2012 Common stock – 2011 Common stock	\$514.0
Initial price per share	\$40.00
Change in shares = Change in equity/Initial price per share	12.85
New shares outstanding = Old shares + $\Delta$ Shares	1,012.85
Old EPS = 2012 Net income/Old shares outstanding	\$2.52
New EPS = 2013 Net income/New shares outstanding	\$4.14

## Comprehensive/Spreadsheet Problem

### *Note to Instructors:*

The solution for 6-14 is provided at the back of the text; however, the solution to 6-13 is not. Instructors can access the *Excel* file on the textbook's website or the Instructor's Resource CD.

**6-15** Problem 6-13 reworked:

#### a. Part I. Inputs

	Adjustable Inputs			Fixed Inputs
	2012	2013		
Growth rate, g	NA	10%	Tax rate (T)	40%
Operating costs / Sales	91.10%	87.50%	Interest rate	12.50%
Receivables/Sales	10.00%	10.00%	Shares out'ing	100,000
Inventories/Sales	20.00%	20.00%	Price per share	\$45.00
Debt ratio	25.78%	30.00%	FA/Sales	40.00%
Payout ratio	60.00%	60.00%		

#### Part II. Income Statements

	2012	Change	2013
Sales	\$3,600,000.0	(1+ g)	\$3,960,000.0
Operating costs (includes depreciation)	3,279,720.0	0.875	3,465,000.0
Earnings before interest and taxes (EBIT)	\$320,280.0		\$495,000.0
Less interest expense	20,280.0	See notes	37,125.0
Earnings before taxes (EBT)	\$300,000.0		\$457,875.0
Taxes	120,000.0	EBT(T)	183,150.0
Net income (NI)	\$180,000.0		\$274,725.0
Dividends	\$108,000.0	NI(Payout)	\$164,835.0
Addition to retained earnings	\$72,000.0		\$109,890.0

#### Part III. Balance Sheets

	2012	Change	2013
<b>Assets</b>			
Cash	\$180,000	(1+ g)	\$198,000.0
Accounts receivable	360,000	0.1000	396,000.0
Inventories	720,000	0.2000	792,000.0
Fixed assets (grow with sales)	1,440,000	(1+ g)	1,584,000.0
Total assets	\$2,700,000		\$2,970,000.0
<b>Liabilities and Equity</b>			
Payables + accruals (both grow with sales)	\$540,000.0	(1+ g)	\$594,000.0
Short-term bank loans	56,000.0	See notes	89,100.0
Total current liabilities	\$596,000.0		\$683,100.0
Long-term bonds	100,000.0	See notes	207,900.0
Total debt	\$696,000.0		\$891,000.0
Common stock	1,800,000.0	See notes	1,765,110.0
Retained earnings	204,000.0	\$109,890.0	313,890.0
Total common equity	\$2,004,000.0		\$2,079,000.0
Total liabilities and equity	\$2,700,000.0		\$2,970,000.0

#### Part IV. Ratios and EPS

	2012	2013E	
Operating costs/Sales	91.10%	87.50%	
Receivables/Sales	10.00%	10.00%	
Inventory/Sales	20.00%	20.00%	
Debt ratio	25.78%	30.00%	
Payout ratio	60.00%	60.00%	
Inventory turnover	5.00 x	5.00 x	
Days sales outstanding (DSO)	36.50 days	36.50 days	
Total assets turnover	1.33 x	1.33 x	
Assets/Equity (equity multiplier)	1.35 x	1.43 x	
Times interest earned (TIE)	15.79 x	13.33 x	
Profit margin	5.00%	6.94%	
Return on assets (ROA)	6.67%	9.25%	
Return on equity (ROE)	8.98%	13.21%	
DuPont Calculations	$\left[ \begin{array}{c} \text{Profit Margin} \\ \text{(NI/S)} \end{array} \right] \left[ \begin{array}{c} \text{Total Assets} \\ \text{Turnover (S/A)} \end{array} \right] \left[ \begin{array}{c} \text{Equity} \\ \text{Multiplier} \\ \text{(Assets/} \\ \text{Equity)} \end{array} \right] = \text{ROE}$		
Actual for 2012	5.00%	1.33	1.35 9.0%
Forecasted for 2013	6.94%	1.33	1.43 13.2%

<b>Earnings per share (EPS)</b>	<b>\$1.80</b>	<b>\$2.77</b>
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#### Part V. Notes on Calculations

Assets in 2013 will change to this amount, from the balance sheet:	\$2,970,000.0
Target debt ratio	30.00%
Resulting total debt: (Target debt ratio)( 2013 Assets)	\$891,000.0
Less: Payables and accruals	-\$594,000.0
Bank loans and bonds (= Interest-bearing debt)	\$297,000.0
Allocated to bank loans, based on 2012 proportion	30.00% \$89,100.0
Allocated to bonds, based on 2012 proportion	70.00% \$207,900.0
Interest expense: (Interest rate)(2013 Bank loans plus bonds)	\$37,125.0
Target equity ratio = 1 – Target debt ratio	70%
Required total equity: (2013 Assets)(Target equity ratio)	\$2,079,000.0
Retained earnings, from 2013 balance sheet	\$313,890.0
Required common stock = Required total equity – Retained earnings	\$1,765,110.0
Old shares outstanding	100,000
Increase in common stock = 2013 Common stock – 2012 Common stock	-\$34,890.0
Initial price per share	\$45.00
Change in shares = Change in equity/Initial price per share	-775.33
New shares outstanding = Old shares + Δ Shares	99,224.67
Old EPS = 2012 Net income / Old shares outstanding	\$1.80
<b>New EPS = 2013 Net income / New shares outstanding</b>	<b>\$2.77</b>

**b. Input Data:**

$A_0^*$	\$2,700,000
$S_0$	\$3,600,000
$L_0^*$	\$540,000
M	5.00%
1 – Payout	40.00%

$$AFN = (A_0^*/S_0)\Delta S - (L_0^*/S_0)\Delta S - M(S_0 + \Delta S)(1 - \text{Payout})$$

$$AFN = (A_0^*/S_0) \Delta S - (L_0^*/S_0) \Delta S - M(S_0)(1 - \text{Payout}) - M(1 - \text{Payout}) \Delta S$$

$$AFN = 0.75 \Delta S - 0.15 \Delta S - \$72,000 - 0.02 \Delta S$$

$$\$72,000 = 0.58 \Delta S$$

$$\Delta S = \$124,138$$

$$\text{Growth rate in sales} = 3.45\%$$

Problem 6-14 reworked:

**a. Input Data:**

FA Capacity	75.00%
Current Sales	\$36,000

$$\text{Full capacity sales} = \frac{\text{Current sales}}{\text{FA Capacity}} = \frac{\$36,000}{0.75}$$

$$\text{Full capacity sales} = \$48,000$$

$$\% \text{ Sales increase} = \frac{(\text{New sales} - \text{Old sales})}{\text{Old sales}} = \frac{(\$48,000 - \$36,000)}{\$36,000}$$

$$\% \text{ Sales increase} = \frac{(\$12,000)}{\$36,000} = 33.33\%$$

$$\% \text{ Sales increase} = 33.33\%$$

Therefore, sales could expand by 33% before the firm would need to add fixed assets.

**b. Part I. Inputs**

	Adjustable Inputs			Fixed Inputs
	2012	2013		
Growth rate, g	NA	25%		Tax rate (T) 40%
Operating costs / Sales	85.51%	82.00%		Interest rate 11.00%
Receivables/Sales	30.00%	30.00%		Shares outstanding 1,000
Inventories/Sales	35.00%	35.00%		Price per share \$40.00
Debt ratio	38.87%	42.00%		Capacity utilization 75.00%
Payout ratio	60.00%	60.00%		FA/Sales 48.00%

**Part II. Income Statements**

	2012	Change	2013
Sales	\$36,000.0	(1+ g)	\$45,000.0
Operating costs (includes depreciation)	30,783.0	0.820	36,900.0
Earnings before interest and taxes (EBIT)	\$5,217.0		\$8,100.0
Less interest expense	1,017.0	See notes	1,116.7
Earnings before taxes (EBT)	\$4,200.0		\$6,983.3
Taxes	1,680.0	EBT(T)	2,793.3
Net income (NI)	\$2,520.0		\$4,190.0
Dividends	\$1,512.0	NI(Payout)	\$2,514.0
Addition to retained earnings	\$1,008.0		\$1,676.0

### Part III. Balance Sheets

	2012	Change	2013
<b>Assets</b>			
Cash	\$1,800	(1+ g)	\$2,250.0
Accounts receivable	10,800	0.3000	13,500.0
Inventories	12,600	0.3500	15,750.0
Fixed assets	21,600	See notes	21,600.0
Total assets	<u>\$46,800</u>		<u>\$53,100.0</u>
<b>Liabilities and Equity</b>			
Payables + accruals (both grow with sales)	\$9,720.0	(1+ g)	\$12,150.0
Short-term bank loans	3,472.0	See notes	3,553.2
Total current liabilities	<u>\$13,192.0</u>		<u>\$15,703.2</u>
Long-term bonds	5,000.0	See notes	6,598.8
Total debt	<u>\$18,192.0</u>		<u>\$22,302.0</u>
Common stock	2,000.0	See notes	2,514.0
Retained earnings	26,608.0	\$1,676.0	28,284.0
Total common equity	<u>\$28,608.0</u>		<u>\$30,798.0</u>
Total liabilities and equity	<u>\$46,800.0</u>		<u>\$53,100.0</u>

### Part IV. Ratios and EPS

	2012	2013E
Operating costs/Sales	85.51%	82.00%
Receivables/Sales	30.00%	30.00%
Inventory/Sales	35.00%	35.00%
Debt ratio	38.87%	42.00%
Payout ratio	60.00%	60.00%
Inventory turnover	2.86 x	2.86 x
Days sales outstanding (DSO)	109.50 days	109.50 days
Total assets turnover	0.77 x	0.85 x
Assets/Equity (equity multiplier)	1.64 x	1.72 x
Times interest earned (TIE)	5.13 x	7.25 x
Profit margin	7.00%	9.31%
Return on assets (ROA)	5.38%	7.89%
Return on equity (ROE)	8.81%	13.60%

DuPont Calculations	$\left[ \begin{array}{c} \text{Profit Margin} \\ \text{(NI/S)} \end{array} \right]$	$\left[ \begin{array}{c} \text{Total Assets} \\ \text{Turnover (S/A)} \end{array} \right]$	$\left[ \begin{array}{c} \text{Equity} \\ \text{Multiplier} \\ \text{(Assets/} \\ \text{Equity)} \end{array} \right]$	= ROE
Actual for 2012	7.00%	0.77	1.64	8.8%
Forecasted for 2013	9.31%	0.85	1.72	13.6%

<b>Earnings per share (EPS)</b>	<b>2.52</b>	<b>\$4.14</b>
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### Part V. Notes on Calculations

Full capacity sales		\$48,000.00
Target Fixed assets/Sales		45.00%
Required level of fixed assets		\$20,250.00
Current level of fixed assets		\$21,600.00
Addition to fixed assets (= zero, if negative)		\$0.00
2013 Fixed assets		\$21,600.00
Assets in 2013 will change to this amount, from the balance sheet:		\$53,100.0
Target debt ratio		42.00%
Resulting total debt: (Target debt ratio)(2013 Assets)		\$22,302.0
Less: Payables and accruals		-\$12,150.0
Bank loans and bonds (= Interest-bearing debt)		\$10,152.0
Allocated to bank loans, based on 2012 proportion	35.00%	\$3,553.2
Allocated to bonds, based on 2012 proportion	65.00%	\$6,598.8
Interest expense: (Interest rate)(2013 Bank loans plus bonds)		\$1,116.7
Target equity ratio = 1 – Target debt ratio		58%
Required total equity: (2013 Assets)(Target equity ratio)		\$30,798.0
Retained earnings, from 2013 balance sheet		\$28,284.0
Required common stock = Required total equity – Retained earnings		\$2,514.0
Old shares outstanding (thousands)		1,000
Increase in common stock = 2013 Common stock – 2012 Common stock		\$514.0
Initial price per share		\$40.00
Change in shares = Change in equity/Initial price per share		12.85
New shares outstanding = Old shares + Δ Shares		1,012.85
Old EPS = 2012 Net income / Old shares outstanding		\$2.52
<b>New EPS = 2013 Net income / New shares outstanding</b>		<b>\$4.14</b>

## Integrated Case

6-16

**New World Chemicals Inc.**

### ***Financial Forecasting***

Sue Wilson, the new financial manager of New World Chemicals (NWC), a California producer of specialized chemicals for use in fruit orchards, must prepare a formal financial forecast for 2013. NWC's 2012 sales were \$2 billion, and the marketing department is forecasting a 25% increase for 2013. Wilson thinks the company was operating at full capacity in 2012, but she is not sure. The first step in her forecast was to assume that key ratios would remain unchanged and that it would be "business as usual" at NWC. The 2012 financial statements, the 2013 initial forecast, and a ratio analysis for 2012 and the 2013 initial forecast are given in Table IC 6.1.

**Table IC 6.1. Financial Statements and Other Data on NWC (Millions of Dollars)**

#### **A. Balance Sheets**

	<u>2012</u>	<u>2013E</u>
Cash and equivalents	\$ 20	\$ 25
Accounts receivable	240	300
Inventories	<u>240</u>	<u>300</u>
Total current assets	\$ 500	\$ 625
Net fixed assets	<u>500</u>	<u>625</u>
Total assets	<u>\$1,000</u>	<u>\$1,250</u>
Accounts payable and accrued liabilities	\$ 100	\$ 125
Notes payable	<u>100</u>	<u>190</u>
Total current liabilities	\$ 200	\$ 315
Long-term debt	100	190
Common stock	500	500
Retained earnings	<u>200</u>	<u>245</u>
Total liabilities and equity	<u>\$1,000</u>	<u>\$1,250</u>



**B. Income Statements**

	<u>2012</u>	<u>2013E</u>
Sales	\$2,000.00	\$2,500.00
Variable costs	1,200.00	1,500.00
Fixed costs	<u>700.00</u>	<u>875.00</u>
Earnings before interest and taxes (EBIT)	\$ 100.00	\$ 125.00
Interest	<u>16.00</u>	<u>16.00</u>
Earnings before taxes (EBT)	\$ 84.00	\$ 109.00
Taxes (40%)	<u>33.60</u>	<u>43.60</u>
Net income	<u>\$ 50.40</u>	<u>\$ 65.40</u>
Dividends (30%)	\$ 15.12	\$ 19.62
Addition to retained earnings	\$ 35.28	\$ 45.78

**C. Key Ratios**

	<u>NWC (2012)</u>	<u>NWC (2013E)</u>	<u>Industry</u>	<u>Comment</u>
Basic earning power	10.00%	10.00%	20.00%	
Profit margin	2.52	2.62	4.00	
Return on equity	7.20	8.77	15.60	
DSO (365 days)	43.80 days	43.80 days	32.00 days	
Inventory turnover	8.33×	8.33×	11.00×	
Fixed assets turnover	4.00	4.00	5.00	
Total assets turnover	2.00	2.00	2.50	
Debt/Assets	30.00%	40.40%	36.00%	
Times interest earned	6.25×	7.81×	9.40×	
Current ratio	2.50	1.99	3.00	
Payout ratio	30.00%	30.00%	30.00%	

Assume that you were recently hired as Wilson's assistant and that your first major task is to help her develop the formal financial forecast. She asks you to begin by answering the following questions.

- A.** Assume (1) that NWC was operating at full capacity in 2012 with respect to all assets, (2) that all assets must grow at the same rate as sales, (3) that accounts payable and accrued liabilities also will grow at the same rate as sales, and (4) that the 2012 profit margin and dividend payout will be maintained. Under those conditions, what would the AFN equation predict the company's financial requirements to be for the coming year?

**Answer:** [Show S6-1 through S6-7 here.] NWC will need \$180.9 million.

Here is the AFN equation:

$$\begin{aligned}\text{AFN} &= (A_0^*/S_0)\Delta S - (L_0^*/S_0)\Delta S - M(S_1)(1 - \text{Payout}) \\ &= (A_0^*/S_0)(g)(S_0) - (L_0^*/S_0)(g)(S_0) - M(S_0)(1 + g)(1 - \text{Payout}) \\ &= (\$1,000/\$2,000)(0.25)(\$2,000) - (\$100/\$2,000)(0.25)(\$2,000) \\ &\quad - 0.0252(\$2,000)(1.25)(0.7) \\ &= \$250 - \$25 - \$44.1 = \$180.9 \text{ million.}\end{aligned}$$

- B.** Consultations with several key managers within NWC, including production, inventory, and receivable managers, have yielded some very useful information.
- (1) NWC's high DSO is largely due to one significant customer who battled through some hardships the past 2 years but who appears to be financially healthy again and is generating strong cash flow. As a result, NWC's accounts receivable manager expects the firm to lower receivables enough for a calculated DSO of 34 days without adversely affecting sales.
  - (2) NWC was operating slightly below capacity; but its forecasted growth will require a new facility, which is expected to increase NWC's net fixed assets to \$700 million.
  - (3) A relatively new inventory management system (installed last year) has taken some time to catch on and to operate efficiently. NWC's inventory turnover improved slightly last year, but this year NWC expects even more improvement as inventories decrease and inventory turnover is expected to rise to 10x.
- Incorporate that information into the 2013 initial forecast results, as these adjustments to the initial forecast represent the final forecast for 2013. (Hint: Total assets do not change from the initial forecast.)

Answer: [Show S6-8 through S6-10 here.]

**Balance Sheets (In Millions of Dollars)**

	<u>2012</u>	<u>1<sup>st</sup> Pass 2013</u>	<u>Final Forecast 2013</u>
Cash and equivalents	\$ 20	\$ 25	\$ 67 <sup>e</sup>
Accounts receivable	240	300	233 <sup>a</sup>
Inventories	<u>240</u>	<u>300</u>	<u>250<sup>c</sup></u>
Total current assets	\$ 500	\$ 625	\$ 550 <sup>d</sup>
Net fixed assets	<u>500</u>	<u>625</u>	<u>700<sup>b</sup></u>
Total assets	<u>\$1,000</u>	<u>\$1,250</u>	<u>\$1,250</u>
Accounts payable and accr. liab.	\$ 100	\$ 125	\$ 125
Notes payable	<u>100</u>	<u>190</u>	<u>190</u>
Total current liabilities	\$ 200	\$ 315	\$ 315
Long-term debt	100	190	190
Common stock	500	500	500
Retained earnings	<u>200</u>	<u>245</u>	<u>245</u>
Total liabilities and equity	<u>\$1,000</u>	<u>\$1,250</u>	<u>\$1,250</u>

Notes:

<sup>a</sup> DSO will be reduced to 34 days, without adversely affecting sales. Sales = \$2,500;  
DSO = 34; AR = ?

$$\begin{aligned} \text{DSO} &= \text{AR} / \text{Sales} / 365 \\ 34 &= \text{AR} / \$2,500 / 365 \\ 34 &= \text{AR} / \$6.8493 \\ \text{AR} &= \$232.8767 \approx \$233. \end{aligned}$$

<sup>b</sup> Given in problem that forecasted growth will require a new facility, which will increase the firm's net fixed assets to \$700 million.

<sup>c</sup> A new inventory management system will increase its inventory turnover to 10x.  
Sales = \$2,500; Inv. TO = 10x; Inv. = ?

$$\begin{aligned} \text{Inv. TO} &= \text{Sales} / \text{Inv.} \\ 10 &= \$2,500 / \text{Inv.} \\ \text{Inv.} &= \$250. \end{aligned}$$

<sup>d</sup> Total assets do not change; TA = \$1,250.

$$\begin{aligned} \text{Total CA} &= \text{Total assets} - \text{Net FA} \\ &= \$1,250 - \$700 \\ &= \$550. \end{aligned}$$

<sup>e</sup> Cash and equivalents = Total CA – AR – Inv.  
= \$550 – \$233 – \$250  
= \$67.

The final forecasted Income Statement is the same as the initial forecast.

**C.** Calculate NWC's forecasted ratios based on its final forecast and compare them with the company's 2012 historical ratios, the 2013 initial forecast ratios, and the industry averages. How does NWC compare with the average firm in its industry, and is the company's financial position expected to improve during the coming year? Explain.

**Answer:** [Show S6-11 here.]

Key Ratios	1 <sup>st</sup> Pass		Final	Industry	Comment
	2012	2013			
Basic earning power	10.00%	10.00%	10.00%	20.00%	Low
Profit margin	2.52	2.62	2.62	4.00	Low
Return on equity	7.20	8.77	8.77	15.60	Low
DSO (365 days)	43.80 days	43.80 days	34.00 days	32.00 days	OK
Inventory turnover	8.33×	8.33×	10.00×	11.00×	Slightly low
Fixed assets turnover	4.00	4.00	3.57	5.00	Low
Total assets turnover	2.00	2.00	2.00	2.50	Slightly low
Debt/Assets	30.00%	40.40%	40.40%	36.00%	High
Times interest earned	6.25×	7.81×	7.81×	9.40×	Low
Current ratio	2.50	1.98	1.98	3.00	Low
Payout ratio	30.00%	30.00%	30.00%	30.00%	OK

Compared with industry averages, the firm's inventory turnover and total assets turnover are slightly low. Its payout ratio is identical to the industry average. The firm's DSO is close to the industry average. All other ratios compare poorly to industry averages.

As far as trend analysis, the firm's basic earning power, total assets turnover, and payout ratio are identical to 2012 ratios. The firm's profit margin, ROE, and TIE ratio have improved slightly from 2012, but they are still below the industry average. The firm's DSO and inventory turnover have improved somewhat from 2012. The firm's DSO is close to the industry average, while its inventory turnover is still slightly below the industry average. The firm's FA

turnover and current ratio are below the 2012 ratios, and are low compared to the industry average. The firm's debt/assets ratio has increased from 2012 and is high for the industry; thus, it should try to reduce its use of debt.

**D.** Based on the final forecast, calculate NWC's free cash flow for 2013. How does this FCF differ from the FCF forecasted by NWC's initial "business as usual" forecast?

**Answer:** [Show S6-12 and S6-13 here.]

$$\begin{aligned} \text{FCF} &= \text{EBIT}(1 - T) + \text{Depreciation} - \left( \frac{\Delta \text{Gross capital expenditures}}{\text{expenditures}} + \Delta \text{NOWC} \right) \\ &= \text{EBIT}(1 - T) - \left( \frac{\Delta \text{Gross capital expenditures}}{\text{expenditures}} - \text{Depreciation} + \Delta \text{NOWC} \right). \end{aligned}$$

However,

$$\left( \frac{\Delta \text{Gross capital expenditures}}{\text{expenditures}} - \text{Depreciation} + \Delta \text{NOWC} \right) = \text{Net investment in capital}.$$

$$\frac{\Delta \text{Gross capital expenditures}}{\text{expenditures}} - \text{Depreciation} = \Delta \text{Net fixed assets}.$$

$$\text{Net investment in capital} = \Delta \text{NOWC} + \Delta \text{Net fixed assets}.$$

So, you can rewrite the FCF equation as:

$$\text{FCF} = \text{EBIT}(1 - T) - \text{Net investment in capital}.$$

	<u>2012</u>	<u>1<sup>st</sup> Pass 2013</u>	<u>Final 2013</u>
EBIT(1 - T)	\$60	\$75	\$75
NOWC = CA - (CL - NP)	\$400	\$500	\$425
Net FA	\$500	\$625	\$700

$$\begin{aligned} \text{FCF}_{\text{Initial 2013}} &= \$75 - (\$1,125 - \$900) \\ &= \$75 - \$225 \\ &= -\$150. \end{aligned}$$

$$\begin{aligned}
 \text{FCF}_{\text{Final 2013}} &= \$75 - (\$1,125 - \$900) \\
 &= \$75 - \$225 \\
 &= -\$150.
 \end{aligned}$$

It is exactly the same, because only the composition of NOWC and net FA are different.

- E. Initially, some NWC managers questioned whether the new facility expansion was necessary, especially since it results in increasing net fixed assets from \$500 million to \$700 million (a 40% increase). However, after extensive discussions about NWC needing to position itself for future growth and being flexible and competitive in today's marketplace, NWC's top managers agreed that the expansion was necessary. Among the issues raised by opponents was that NWC's fixed assets were operating at only 85% of capacity. Assuming that its fixed assets were being operated at only 85% of capacity, by how much could sales have increased, both in dollar terms and in percentage terms, before NWC reached full capacity?

Answer: [Show S6-14 and S6-15 here.]

$$\begin{aligned}
 \text{Full capacity sales} &= \frac{\text{Actual sales}}{\% \text{ of capacity at which FA were operated}} \\
 &= \frac{\$2,000}{0.85} \\
 &= \$2,352.94 \text{ million} \approx \$2,353 \text{ million.}
 \end{aligned}$$

$$\$ \text{ Increase in sales} = \$2,353 - \$2,000 = \$353 \text{ million.}$$

$$\% \text{ Increase in sales} = \frac{\$2,353 - \$2,000}{\$2,000} = 17.65\%.$$

**F.            How would changes in the following items affect the AFN?**  
**(Consider each item separately and hold all other things constant.)**  
**(1) The dividend payout ratio.**

**Answer:**    [Show S6-16 here.] If the payout ratio were reduced, then more earnings would be retained, and this would reduce the need for external financing, or AFN. Note that if the firm is profitable and has any payout ratio less than 100%, it will have some retained earnings, so if the growth rate were zero, AFN would be negative, i.e., the firm would have surplus funds. As the growth rate rose above zero, these surplus funds would be used to finance growth. At some growth rate the surplus AFN would be completely exhausted. This growth rate where  $AFN = \$0$  is called the "sustainable growth rate," and it is the maximum growth rate that can be financed without outside funds, holding the debt ratio and other ratios constant.

**F.            (2) The profit margin.**

**Answer:**    If the profit margin increases, then both total and additions to retained earnings will increase, and this will reduce the amount of AFN.

**F.            (3) The capital intensity ratio.**

**Answer:**    The capital intensity ratio is defined as the ratio of required assets to total sales, or  $A_0^*/S_0$ . Put another way, it represents the dollars of assets required per dollar of sales. The higher the capital intensity ratio, the more new money will be required to support an additional dollar of sales. Thus, the higher the capital intensity ratio, the greater the AFN, other things held constant.

**F. (4) NWC beginning to buy from its suppliers on terms that permit it to pay after 60 days rather than after 30 days.**

**Answer:** If NWC's payment terms were increased from 30 to 60 days, accounts payable would double, in turn increasing current and total liabilities. This would reduce the amount of AFN due to a decreased need for working capital on hand to pay short-term creditors, such as suppliers.