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Balance Sheet at	December 31, 2014	December 31, 2015
Property, plant and equipment (cost)	182,000	?
Accumulated depreciation	?	(63,000)
Land	15,000	?
Goodwill	?	7,000
Total assets.	<u>\$258,000</u>	<u>\$342,000</u>
<i>Current liabilities</i>		
Accounts payable.	\$ 12,000	\$ 23,000
Wages payable.	?	18,000
Interest payable	6,000	5,000
Dividends payable	3,000	?
Taxes payable.	17,000	12,000
Total current liabilities.	<u>43,000</u>	<u>60,000</u>
Long-term debt	?	86,000
Shareholders' equity		
Common stock.	150,000	172,000
Retained earnings	23,000	32,000
Treasury stock	(10,000)	?
Total liabilities and shareholders' equity. . .	<u>\$258,000</u>	<u>\$342,000</u>

Income Statement for Period Ending	December 31, 2015
Sales revenue.	\$?
Cost of sales.	123,000
Gross profit.	<u>162,000</u>
Expenses:	
Wages.	15,000
Advertising	18,000
Depreciation	?
Goodwill amortization.	4,000
Total expenses	<u>65,000</u>
Operating profit	<u>97,000</u>
Interest	?
Income (loss) before taxes	<u>88,000</u>
Tax expense	35,000
Net income.	<u>\$ 53,000</u>

Statement of Cash Flows for the Year Ended	December 31, 2015
<i>Cash flow from operating activities</i>	
Cash collections from customers	\$260,000
Cash payments for:	
Inventory	?
Wages	(2,000)
Taxes	?
Interest	(10,000)
Advertising	?
Net cash provided by operations	104,000
<i>Cash flow from investing activities</i>	
(Purchases) sale of property, plant, and equipment	(111,000)
(Purchase) sale of marketable securities	?
(Purchase) sale of land	11,000
Net cash provided by investing activities	(102,000)
<i>Cash flow from financing activities</i>	
Issue (repayment) long-term debt	34,000
Payment of dividend	(45,000)
Issuance (repurchase) of common stock	?
(Purchase) sale of treasury stock	2,000
Net cash provided by financing activities	13,000
Change in cash	\$?

E1-8. Key Financial Statement Relationships: Balance Sheet, Income Statement, and Statement of Cash Flows. Compute the missing amounts in the following financial statements. You may assume that accounts receivable relate only to credit sales and that accounts payable relate only to credit purchases of inventory. There were no sales of property and equipment during 2015 and any purchases of property and equipment were made using cash.

Balance Sheet at	December 31, 2014	December 31, 2015
<i>Current assets</i>		
Cash	\$ 18,000	\$?
Marketable securities	2,000	5,000
Accounts receivable	8,000	10,000
Merchandise inventory	41,000	58,000
Prepaid advertising	13,000	16,000
Total current assets	82,000	104,000
Property, plant, and equipment (cost)	?	213,000
Accumulated depreciation	(41,000)	?
Land	12,000	19,000
Goodwill	12,000	?
Total assets	\$227,000	\$282,000

continued

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Balance Sheet at	December 31, 2014	December 31, 2015
<i>Current liabilities</i>		
Accounts payable	\$ 18,000	\$?
Wages payable	15,000	18,000
Interest payable	?	6,000
Dividends payable	2,000	4,000
Taxes payable	5,000	1,000
Total current liabilities	48,000	50,000
Long-term debt	46,000	?
<i>Shareholders' equity</i>		
Common stock	121,000	160,000
Retained earnings	22,000	32,000
Treasury stock	?	(12,000)
Total liabilities and shareholders' equity . .	<u>\$227,000</u>	<u>\$282,000</u>

Income Statement for Period Ending	December 31, 2015
Sales revenue	\$140,000
Cost of sales	87,000
Gross profit	53,000
Expenses:	
Wages	?
Advertising	5,000
Depreciation	?
Goodwill amortization	2,000
Total expenses	24,000
Operating profit	29,000
Interest	3,000
Income (loss) before taxes	26,000
Tax expense	?
Net income	<u>\$ 18,000</u>

Statement Of Cash Flows for the Year Ended	December 31, 2015
<i>Cash flow from operating activities</i>	
Cash collections from customers	\$?
Cash payments for:	
Inventory	(101,000)
Wages	(3,000)
Taxes	(12,000)
Interest	(5,000)
Advertising	(8,000)
Net cash provided by operations	9,000

continued

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Statement Of Cash Flows for the Year Ended	December 31, 2015
<i>Cash flow from investing activities</i>	
(Purchases) sale of property, plant, and equipment.	(39,000)
(Purchase) sale of marketable securities	(3,000)
(Purchase) sale of land	?
Net cash provided by investing activities.	(49,000)
<i>Cash flow from financing activities.</i>	
Issue (repayment) long-term debt	6,000
Payment of dividend	(6,000)
Issuance (repurchase) of common stock	39,000
(Purchase) sale of treasury stock	(2,000)
Net cash provided by financing activities.	37,000
Net cash flow	\$ (3,000)
Change in cash.	\$ (3,000)

- E1-9. Preparing the Basic Financial Statements.** Katharina Vick began her business by obtaining an equity investment of \$12,000 from her family and by borrowing an additional \$10,000 from a local bank. She used some of this cash to purchase equipment costing \$16,000. During the year, she leased the equipment to MaryAnn Stagg for \$6,000 in cash. By year-end, her expenses had amounted to \$5,000, which she paid in cash. Since it had been a good year, Katharina decided to pay her equity investors a dividend of \$1,600.

Analyze the above economic events and prepare an income statement, a balance sheet, and a statement of cash flows for the year. Do you agree with Katharina's decision to pay her investors a \$1,600 dividend? Explain.

- E1-10. Preparing the Basic Financial Statements.** Debra Newby opened a floral shop using \$5,000 of her own savings and \$15,000 borrowed from her parents. She signed a lease on a small store for one year, agreeing to pay \$350 per month in rent. During the first year of operations, Debra purchased fresh flowers from a local nursery for \$2,500, paid \$1,200 for utilities, and generated floral sales totaling \$12,000. (Assume all transactions were cash transactions.) Debra was hoping to be able to pay her parents back one-half of the borrowed money at the end of the first year of operations.

Prepare an income statement, balance sheet, and statement of cash flows for the floral shop. Can Debra achieve her goal of repaying one-half of the \$15,000 loan at the end of the first year of operations?

- E1-11. Other Components of the Annual Report.** Identify where the following items will appear in a company's annual report: Management Discussion and Analysis (MD&A), Notes to the financial statements, or the Auditor's Report, or not disclosed.
- A comment that the financial statements appear to be fairly presented.
 - A discussion about new competition likely to occur next year.
 - A quantitative summary of notes payable appearing on the balance sheet.
 - The "secret" ingredients in the company's special sauce.

EXHIBIT 3-8 Zipped Tunes Cash Flows—Made to Order Inventory

	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.
Cash forward		\$292,500	\$260,000	\$221,250	\$176,250	\$146,250	\$131,250	\$131,250
Collection		42,500	63,750	85,000	127,500	170,000	212,500	255,000
Outflows		75,000	102,500	130,000	157,500	185,000	212,500	240,000
Operating cash flow . . .		<u>\$(32,500)</u>	<u>\$(38,750)</u>	<u>\$(45,000)</u>	<u>\$(30,000)</u>	<u>\$(15,000)</u>	<u>\$ 0</u>	<u>\$ 15,000</u>
Income Statement								
Sales	\$ 63,750	\$ 85,000	\$127,500	\$170,000	\$212,500	\$255,000	\$297,500	\$340,000
COGS	41,250	55,000	82,500	110,000	137,500	165,000	192,500	220,000
Gross profit	22,500	30,000	45,000	60,000	75,000	90,000	105,000	120,000
Other	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Net Income	<u>\$ 2,500</u>	<u>\$ 10,000</u>	<u>\$ 25,000</u>	<u>\$ 40,000</u>	<u>\$ 55,000</u>	<u>\$ 70,000</u>	<u>\$ 85,000</u>	<u>\$100,000</u>
Balance Sheet								
Cash	\$292,500	\$260,000	\$221,250	\$176,250	\$146,250	\$131,250	\$131,250	\$146,250
Accounts receivable . . .	137,500	180,000	243,750	328,750	413,750	498,750	583,750	668,750
Inventory	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000

The moral of this story is quite simple; managers must always be aware of their cash flows. This means a careful management of working capital is essential. While growth is important, it must be managed properly. A careful management of working capital means more than just attempting to collect receivables sooner and keeping reasonable inventory levels, it also means forecasting working capital financing needs. With a reasonable forecast like the one in **Exhibit 3-5**, Zipped Tunes can easily see how revenue growth will impact cash flows and the need for interim financing. With proper management, Zipped Tunes can keep growing without the ensuing crises.

YOUR TURN! 3.4

Forward Inc. is experiencing significant growth due to its ability to deliver a great product at a reasonable price. Current sales of \$1,000, which increased from \$833 the previous month, are expected to grow at a 25 percent rate. Cost of sales are a stable 70 percent of sales revenue, yielding a 30 percent gross profit. Forward's sales are 10 percent for cash with the remaining 90 percent collected the following month. Inventory-on-hand is maintained at a level to support the following month's sales. Inventory is paid for at the time of receipt.

Required:

- For the next 4 months, determine Forward's
 - Revenue
 - Cost of sales
 - Gross profit
 - Accounts receivable
 - Inventory
 - Cash collections
 - Cash disbursements.
- Is Forward's gross profit increasing or declining?
- Is Forward's cash flow increasing or declining?

The solution is on page 107.

ESTIMATING SUSTAINABLE GROWTH

The basic accounting equation that we first saw in Chapter 1 requires that total assets must equal the sum of liabilities and stockholders' equity. In essence, this means that any growth in assets, including not only long-term assets like equipment and buildings, but also working capital assets like receivables and inventory, must be financed by either liabilities or equity. In general, new equity issuance is far more expensive than debt or internally generated funds, and is therefore the least desirable option for anything but large, long-term asset purchases. This leaves financing the growth in operating assets with debt and/or internally generated funds as the options preferred by most managers. Of course, financing with debt requires that the lenders buy-in to the firm's growth strategies such that they are willing to assume the possible risk of failure. Therefore, internally generated funds are the only source of funding for future revenue growth that does not involve external financing. Under the assumption that a manager wishes to expand as quickly as market conditions permit, the manager should follow an approach to estimate the firm's maximum desired rate of growth, called the **sustainable growth rate** (SGR), where:

$$\text{Sustainable Growth Rate} = \text{Return on Equity} \times \text{Dividend Retention Rate}$$

What this formula states is that a sustainable growth rate, one without external funding sources, is equal to the amount of funds generated by the firm and not paid out to the shareholders as dividends. The **dividend retention rate** (DRR) is equal to the percentage of net income not paid to shareholders in the form of dividends, and thus, retained in the business. The dividend payout ratio was discussed in Chapter 2. The dividend payout ratio is the percentage of net income paid out to shareholders as dividends (i.e., dividends paid ÷ net income). The dividend retention ratio is thus 1 minus the dividend payout ratio.

Therefore, a business' SGR is the rate of return on shareholders' equity available to be reinvested in the business. Since, as we saw in Chapter 2, a firm's ROE can be decomposed into its three component ratios of return on sales (ROS), asset turnover (AT), and financial leverage (LEV), we can identify the key drivers of a firm's SGR as follows:

$$\text{SGR} = \text{ROS} \times \text{AT} \times \text{LEV} \times \text{DRR}$$

The decomposition of SGR provides further insight into the management of growth. Notice there are really two types of drivers, operating and financing. ROS and AT are each driven by operating choices, whereas LEV and DRR are each driven by financing choices. Altering any of these four drivers will alter the companies SGR. There are, however, limits as to what can be accomplished, especially in the short-run.

Everything else being equal, managers should always look to increase both ROS and AT. We should therefore assume that these two drivers are not really items to control for the purposes of controlling the company's SGR. This leaves us with the financing terms LEV and **DRR**.

As we saw from the Zipped Tunes example, if revenue growth will be outpacing the company SGR, the company must either borrow additional funds (increase LEV) or retain more cash for use in financing its growth (increase DRR). If growth opportunities are no longer available, such as in a mature industry, then the company may wish to pay down its debt (lower LEV), or increase its dividend payout (reduce DRR).

Altering LEV or DRR carries its own risks. Increasing LEV means adding more debt, which in turn makes the company riskier. We will have more to say about this in Chapter 9. Decreasing dividend payouts in order to increase DRR may send a negative signal to the market about a firm's future prospects. We will have more to say about this in Chapter 10.

A firm's SGR should be used as a long-term planning measure. A firm's growth may deviate from its SGR in the short-run without negative consequences; however the SGR does provide a manager with a measure for planning sustainable levels of long-term growth.²

YOUR TURN! 3.5

The following data was taken from the financial records of the Whitney Lumber Company:

	2013	2014	2015	2016
Sales revenue	\$1,500	\$1,725	\$1,967	\$2,261
Net income	135	154	192	217
Total assets	1,300	1,430	1,645	1,727
Stockholders' equity	800	931	1,100	1,290
Dividends	20	23	23	27

Required:

1. Compute the growth in sales revenue each year from 2013 through 2016.
2. How does this growth rate correspond to Whitney's sustainable growth rate for the same period?

The solution is on page 107.

Sustainable Growth at Home Depot

To illustrate the use of SGR, let's apply the concept to **The Home Depot, Inc.** Data for Home Depot for the period 2000 through 2010 is shown in **Exhibit 3-9**.

The Home Depot operates as a home improvement retailer. The company was founded in 1978, and has grown to become the largest company in its retail space, operating over 2,200 stores. The company has displayed steady growth, only slowing in recent years as the economic impact of the slowdown in construction and the recession decreased demand for its products.

²A company's optimal capital structure will be discussed in Chapter 12. In order to maintain a constant capital structure, additional debt will need to be acquired as equity is being increased. Therefore, the SGR actually provides a lower bound since it only considers internally generated equity, and not additional debt financing, including vendor financing in the form of accounts payable.

As can be seen in **Exhibit 3-9**, Home Depot's revenue growth pretty well tracked its SGR until 2007, when the effects of the economy took a large toll on Home Depot's growth. So how does it appear that Home Depot was able to manage its growth so well?

We see that Home Depot's return on sales has been very consistent, averaging between 6 and 7 percent until 2008 where it showed a large decline. Asset turnover, in contrast, has steadily declined over the period shown. This is not uncommon as retail firms like Home Depot grow and begin saturating markets with more stores. In order to counteract this decrease in AT, Home Depot steadily increased its leverage through 2007, adding more debt to its capital structure. Home Depot maintained a pretty consistent dividend retention rate through 2005, only increasing its dividend payout once growth started slowing.

EXHIBIT 3-9 Home Depot Sustainable Growth and Revenue Growth							
Year	ROS	AT	LEV	DRR	ROE	SGR	Revenue Growth
2000	0.06	2.14	1.43	0.86	0.17	0.15	0.19
2001	0.06	2.03	1.46	0.87	0.17	0.15	0.17
2002	0.06	1.94	1.52	0.87	0.19	0.16	0.09
2003	0.07	1.88	1.54	0.86	0.19	0.17	0.11
2004	0.07	1.88	1.61	0.86	0.21	0.18	0.13
2005	0.07	1.83	1.65	0.85	0.22	0.19	0.12
2006	0.06	1.74	2.09	0.76	0.23	0.17	0.11
2007	0.06	1.75	2.50	0.61	0.25	0.15	(0.15)
2008	0.03	1.73	2.32	0.33	0.13	0.04	(0.08)
2009	0.04	1.61	2.11	0.43	0.14	0.06	(0.07)
2010	0.05	1.69	2.12	0.53	0.18	0.09	0.03

Beginning in 2007, growth took a drastic downward turn, with revenues actually decreasing until 2010. Home Depot responded to this change in growth prospects by decreasing its reliance on debt (lowering LEV) and increasing its dividend payout (decreasing **DRR**). It appears revenue growth is back, beginning in 2010. Home Depot appears to have increased its **DRR** in response.

COMPREHENSIVE PROBLEM

The Emerald Company reports the following financial data for its first year of operations:

THE EMERALD COMPANY
Income Statement
For the Year Ended December 31, 2015

Sales revenue	\$2,000
Cost of goods sold	1,500
Gross profit	500
Other expenses	285
Net income	\$ 215

THE EMERALD COMPANY Balance Sheet December 31, 2015	
Assets	
Cash	\$ 400
Accounts receivable	1,600
Inventory	1,300
Other assets	900
Total assets	<u>\$4,200</u>
Liabilities and Equity	
Total liabilities	\$2,800
Total equity	<u>1,400</u>
Total liabilities and equity	<u>\$4,200</u>

The following assumptions apply to the forecast of the next five months operations for The Emerald Company:

- Sales revenues will grow at a constant 12 percent each month.
- Cost of goods sold will be a constant 75 percent of sales revenue.
- Other expenses will grow at a constant rate of 5 percent.
- Dividends will be paid out monthly at a rate of 20 percent of net income.
- Cash will be collected at a rate of 80 percent of current month sales and the remaining 20 percent will be collected the following month.
- Payments will be made in the month supplies are delivered. The Emerald Company requires supplies one month ahead of sales; hence cash disbursements are estimated to be equal to the following month's cost of goods sold, plus the current month's other expenses and dividends.
- Other assets grow at a 12 percent monthly rate.
- There will be no additional equity additions. Total equity will increase by the amount of retained earnings increases.
- Total liabilities will increase by an amount needed to keep total liabilities plus total equity equal to total assets.

Required:

- Prepare the following for The Emerald Company's next four months:
 - A budgeted income statement
 - A budgeted balance sheet
 - A cash flow budget
- Compute the sustainable growth rate for The Emerald Company for the next four months.
- Comment on the company's SGR relative to its growth in sales revenue.

Solution:

1. a.

THE EMERALD COMPANY Budgeted Income Statement For the Months January through April 2016				
	Jan.	Feb.	Mar.	Apr.
Sales revenue.....	\$2,240	\$2,509	\$2,810	\$3,147
Cost of goods sold.....	1,680	1,882	2,108	2,360
Gross profit.....	560	627	702	787
Other expenses.....	299	314	330	347
Net income.....	<u>\$ 261</u>	<u>\$ 313</u>	<u>\$ 372</u>	<u>\$ 440</u>

b.

THE EMERALD COMPANY Budgeted Balance Sheet For the Months January through April 2016				
	Jan.	Feb.	Mar.	Apr.
Assets				
Cash.....	\$ 359	\$ 329	\$ 315	\$ 316
Accounts receivable.....	1,648	1,702	1,762	1,829
Inventory.....	1,502	1,728	1,980	2,264
Other assets.....	1,008	1,129	1,264	1,416
Total assets.....	<u>\$4,517</u>	<u>\$4,888</u>	<u>\$5,321</u>	<u>\$5,825</u>
Liabilities and Equity				
Total liabilities.....	\$2,908	\$3,029	\$3,164	\$3,316
Total equity.....	1,609	1,859	2,157	2,509
Total liabilities and equity.....	<u>\$4,517</u>	<u>\$4,888</u>	<u>\$5,321</u>	<u>\$5,825</u>

c.

THE EMERALD COMPANY Cash Flow Budget For the Months January through April 2016				
	Jan.	Feb.	Mar.	Apr.
Cash Collections:				
From current month's sales.....	\$1,792	\$2,007	\$2,248	\$2,518
From prior month's sales.....	400	448	502	562
Total cash collections.....	<u>\$2,192</u>	<u>2,455</u>	<u>2,750</u>	<u>3,080</u>
Cash disbursements:				
For next month's sales.....	\$1,882	\$2,108	\$2,360	\$2,644
For other expenses.....	299	314	330	347
For dividends.....	52	63	74	88
Total cash disbursements.....	<u>\$2,233</u>	<u>\$2,485</u>	<u>\$2,764</u>	<u>\$3,079</u>
Net cash flow.....	\$ (41)	\$ (30)	\$ (14)	\$ 1
Beginning of month cash.....	400	359	329	315
End of month cash.....	<u>\$ 359</u>	<u>\$ 329</u>	<u>\$ 315</u>	<u>\$ 316</u>

2.

THE EMERALD COMPANY Sustainable Growth Rate For the Months January through April 2016				
	Jan.	Feb.	Mar.	Apr.
Return on equity	0.16	0.17	0.17	0.18
Dividend retention rate	0.80	0.80	0.80	0.80
Sustainable growth rate	0.128	0.136	0.136	0.144

3. The Emerald Company is able to fund all of its budgeted growth with internally generated funds since the SGR exceeds the 12 percent growth in revenues each month. The SGR ranges from a low of 12.8 percent to a high of 14.4 percent.

EXECUTIVE SUMMARY

- Revenue growth is a key success factor for many companies and is of high interest to financial statement users.
- Revenue growth includes several hidden costs such as the required increase in operating assets including accounts receivable, inventory, and property, plant, and equipment needed to support the growth.
- Cash flow budgets are critical to the successful management of cash flow needs. Cash flow budgets include forecasts of cash collections and cash disbursements. Together these forecasts provide a picture of future financing needs to support revenue growth.
- Methods to manage working capital financing include quicker collections of accounts receivable, holding less inventory, and slowing payments to vendors.
- In order to determine how quickly a firm can grow without the need for external financing, a manager should calculate the firm's sustainable growth rate. The sustainable growth rate is a function of the firm's return on equity and its dividend retention rate.

KEY TERMS

Additional working capital financing period The period of time for which financing is needed for working capital needs. Computed as the cash collection period less the days' payable period.

Cash budget A schedule that provides estimated cash collections and cash disbursements for the budget period.

Cash collections budget A schedule of estimated cash collections for the budget period.

Cash collection period The summation of the inventory-on-hand period and the receivable collection period

Cash disbursements budget A schedule of estimated cash disbursements for the budget period.

Dividend retention rate The proportion of net income that is not paid out as dividends; computed as 1 minus the dividend payout ratio.

Sustainable growth rate The maximum growth rate a company can maintain without additional external funding.

- d. Dividends will be paid out monthly at a rate of 18 percent of net income.
- e. Cash will be collected at a rate of 65 percent of current month sales and the remaining 35 percent will be collected the following month. December sales were \$300.
- f. Payments will be made in the month supplies are delivered. The Pacific Company requires supplies two months ahead of sales; hence cash disbursements are estimated to be equal to the following two months' cost of goods sold, plus the current month's other expenses and dividends.
- g. Other assets grow at a 5 percent monthly rate.
- h. There will be no additional equity additions. Total equity will increase by the amount of retained earnings increases.
- i. Total liabilities will increase by an amount needed to keep total liabilities plus total equity equal to total assets.

Required:

1. Prepare the following for The Pacific Company's next four months:
 - a. A budgeted income statement
 - b. A budgeted balance sheet
 - c. A cash flow budget
2. Compute the sustainable growth rate for The Pacific Company for the next four months.
3. Comment on the company's SGR relative to its growth in sales revenue.

YOUR TURN! SOLUTIONS

3.1

$$\text{Inventory-on-hand period} = \frac{365}{(\$200,000/\$35,000)} = 64 \text{ days}$$

$$\text{Receivable collection period} = \frac{365}{(\$300,000/\$37,000)} = 45 \text{ days}$$

$$\text{Days' payable period} = \frac{365}{(\$200,000/\$16,000)} = 29 \text{ days}$$

$$\text{Additional working capital financing period} = 64 \text{ days} + 45 \text{ days} - 29 \text{ days} = 80 \text{ days}$$

3.2

	Jan.	Feb.	Mar.	Apr.
Sales in month	\$100,000	\$120,000	\$110,000	\$130,000
Collections from current month sales . . .	\$20,000	\$24,000	\$22,000	\$26,000
Collections from prior month sales	0	80,000	96,000	88,000
Total collections in month.	\$20,000	\$104,000	\$118,000	\$114,000

3.3

	Jan.	Feb.	Mar.	Apr.
Purchases in month	\$75,000	\$90,000	\$85,000	\$110,000
Payments for current month purchases . . .	\$22,500	\$27,000	\$25,500	\$ 33,000
Payments for prior month purchases	0	52,500	63,000	59,500
Total payments in month	\$22,500	\$79,500	\$88,500	\$ 92,500

3.4

1.

	Month 1	Month 2	Month 3	Month 4
a. Revenue	\$1,250	\$1,563	\$1,953	\$2,441
b. Cost of sales	875	1,094	1,367	1,709
c. Gross profit	375	469	586	732
d. Accounts receivable	1,125	1,406	1,758	2,197
e. Inventory	1,094	1,367	1,709	2,136
f. Cash collections	1,025	1,281	1,602	2,002
g. Cash disbursements	1,094	1,367	1,709	2,136

2. Forward's gross profit is steadily increasing from \$375 to \$732.
3. Forward's cash flow is steadily declining from (69) to (134).

3.5

	2014	2015	2016
Growth in sales	15.0%	14.0%	15.0%
Return on equity	16.5%	17.5%	16.8%
Dividend retention rate	0.851	0.880	0.876
Sustainable growth rate	14.0%	15.4%	14.7%

Whitney's growth in sales and its SGR are quite close each year. This suggests that the company's growth will be able to be financed without the need to seek external financing.

ANNUITIES

When a project or an asset has a repeated cash flow and a constant discount rate for many years we call it an **annuity**. This is a common term in insurance and related areas such as retirement planning, where many of the investments that are used are annuities. One of the most common annuities that one encounters is in the payoffs for a lottery. The lottery advertises a \$20 million prize but the fine print says you will get \$1 million per year for the next twenty years. Applying our present value intuition, we know that this prize is not actually worth \$20 million. Let's see what it is worth.

What is the present value of \$1 million per year for 20 years if the discount rate is $r = 5$ percent each year?

$$PV = \frac{\$1m}{1.05} + \dots + \frac{\$1m}{1.05^{20}}$$

While it isn't impossible to do this long-hand, it would take a long time. Luckily there is a shortcut. The shortcut is related to the **perpetuity** calculation that we described in Chapter 7. A twenty-year annuity of \$1 million per year can be described as a perpetuity of \$1 million, a constant cash flow that lasts forever, minus another perpetuity of \$1 million that starts after twenty years (a perpetuity that subtracts Years 21 through infinity). Let's calculate the present value of an annuity using this approach:

$$PV = \frac{\$1\text{million}}{0.05} - \left(\frac{1}{(1.05)^{20}} \times \frac{\$1\text{million}}{0.05} \right) = \$12.4622 \text{ million}$$

The first term in the parentheses is a perpetuity starting this year. The second term is the present value of another perpetuity starting after twenty years. This formula is easier than the original present value calculation. It can also be generalized for pricing any annuity. Again, consider a repeated cash flow (CF) every year and a constant discount rate (r):

$$PV = \frac{CF}{r} - \left(\frac{1}{(1+r)^x} \cdot \frac{CF}{r} \right)$$

And factoring out the cash flow we get

$$PV = CF \left[\frac{1}{r} - \left(\frac{1}{(1+r)^x} \cdot \frac{1}{r} \right) \right]$$

The term in the parentheses is sometimes called the annuity factor. It is the present value of \$1 for X years at r percent. Every finance calculator and spreadsheet program incorporates this annuity factor when calculating the present value of a constant cash flow for many years at a constant discount rate. Our previous calculation (using a finance calculator or Excel) of an annuity of \$1 million each year for twenty years, is actually \$1 million times an annuity factor of 12.4622 or \$12.4622 million.

There are many uses of annuities and the annuity factor in finance. We can even use them to calculate things other than the present value of an annuity! Recall from the last section, we discussed a project's internal rate of return (IRR). This is the discount

So Lufthansa will pay \$500,000 and get an annual tax flow of 150,000 for the next five years. Using the same 10 percent discount rate, the net present value of this acquisition is:

$$NPV = -\$500,000 + \$150,000(3.7908) = +\$68,620$$

Both firms actually benefit from Delta selling the plane to Lufthansa.

This tax-based reason does depend on the acquiring company, Lufthansa, buying Delta's assets for cash, not merging with them. If these companies merged, Lufthansa would have to keep the book value of the plane at zero. But if Lufthansa buys the plane for cash, it has reset the book value and can take a new depreciation deduction.

A tax-based reason that can explain mergers is that profitable companies might merge with companies that are in the development stage in order to take a contemporaneous tax deduction for the development company's losses.

As a second example, suppose **Pfizer** is developing a new wonder drug but needs three years to complete that process. Projected taxable earnings (in millions of dollars) over the next three years are:

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Pfizer Taxable Earnings	-5	-5	-5	10	10	10

The **IRS** allows a business to carry losses forward and deduct them from future taxable earnings so the losses in Years 1 and 2 will completely eliminate the taxable earnings from Year 4, and the loss from Year 3 will eliminate half of the earnings in Year 5. Applying a 50 percent tax rate to the remaining earnings, Pfizer's taxes (in millions of dollars) over the next six years will be:

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Pfizer Taxes (TxRt 50%)	0	0	0	0	2.5	5

The present value of these taxes using a 10 percent discount rate is:

$$PV(\text{Pfizer's Taxes}) = \$2.5 \text{ million}/(1.1)^5 + \$5 \text{ million}/(1.1)^6 = \$4.4 \text{ million}$$

Further suppose DeLaet Inc. is a currently profitable company that makes steady taxable earnings of \$5 million every year. DeLaet also pay taxes every year of 50 percent of its earnings, or \$2.5 million:

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
DeLaet Taxable Earnings	5	5	5	5	5	5
DeLaet Taxes (50%)	2.5	2.5	2.5	2.5	2.5	2.5

The present value of DeLaet's taxes using a 10 percent discount rate is:

$$PV(\text{DeLaet's Taxes}) = \$2.5 \text{ million}/(1.1) + \dots + \$2.5 \text{ million}/(1.1)^6 = \$10.9 \text{ million}$$