
CHAPTER 2

FINANCIAL STATEMENTS, TAXES AND CASH FLOW

Answers to Concepts Review and Critical Thinking Questions

1. Liquidity measures how quickly and easily an asset can be converted to cash without significant loss in value. It's desirable for firms to have high liquidity so that they have a large factor of safety in meeting short-term creditor demands. However, since liquidity also has an opportunity cost associated with it—namely that higher returns can generally be found by investing the cash into productive assets—low liquidity levels are also desirable to the firm. It's up to the firm's financial management staff to find a reasonable compromise between these opposing needs.
2. The recognition and matching principles in financial accounting call for revenues, and the costs associated with producing those revenues, to be “booked” when the revenue process is essentially complete, not necessarily when the cash is collected or bills are paid. Note that this way is not necessarily correct; it's the way accountants have chosen to do it.
3. Historical costs can be objectively and precisely measured whereas market values can be difficult to estimate, and different analysts would come up with different numbers. Thus, there is a tradeoff between relevance (market values) and objectivity (book values).
4. Depreciation is a non-cash deduction that reflects adjustments made in asset book values in accordance with the matching principle in financial accounting. Interest expense is a cash outlay, but it's a financing cost, not an operating cost.
5. Market values can never be negative. Imagine a share of stock selling for $-\$20$. This would mean that if you placed an order for 100 shares, you would get the stock along with a check for \$2,000. How many shares do you want to buy? More generally, because of corporate and individual bankruptcy laws, net worth for a person or a corporation cannot be negative, implying that liabilities cannot exceed assets in market value.
6. For a successful company that is rapidly expanding, for example, capital outlays will be large, possibly leading to negative cash flow from assets. In general, what matters is whether the money is spent wisely, not whether cash flow from assets is positive or negative.
7. It's probably not a good sign for an established company, but it would be fairly ordinary for a start-up, so it depends.
8. For example, if a company were to become more efficient in inventory management, the amount of inventory needed would decline. The same might be true if it becomes better at collecting its receivables. In general, anything that leads to a decline in ending NWC relative to beginning would have this effect. Negative net capital spending would mean more long-lived assets were liquidated than purchased.

B-4 SOLUTIONS

9. If a company raises more money from selling stock than it pays in dividends in a particular period, its cash flow to stockholders will be negative. If a company borrows more than it pays in interest, its cash flow to creditors will be negative.
10. The adjustments discussed were purely accounting changes; they had no cash flow or market value consequences unless the new accounting information caused stockholders to revalue the derivatives.

Solutions to Questions and Problems

NOTE: All end of chapter problems were solved using a spreadsheet. Many problems require multiple steps. Due to space and readability constraints, when these intermediate steps are included in this solutions manual, rounding may appear to have occurred. However, the final answer for each problem is found without rounding during any step in the problem.

Basic

1. To find owner's equity, we must construct a balance sheet as follows:

<u>Balance Sheet</u>			
CA	\$5,000	CL	\$4,300
NFA	<u>23,000</u>	LTD	13,000
		OE	<u>??</u>
TA	<u>\$28,000</u>	TL & OE	<u>\$28,000</u>

We know that total liabilities and owner's equity (TL & OE) must equal total assets of \$28,000. We also know that TL & OE is equal to current liabilities plus long-term debt plus owner's equity, so owner's equity is:

$$OE = \$28,000 - 13,000 - 4,300 = \$10,700$$

$$NWC = CA - CL = \$5,000 - 4,300 = \$700$$

2. The income statement for the company is:

<u>Income Statement</u>	
Sales	\$527,000
Costs	280,000
Depreciation	<u>38,000</u>
EBIT	\$209,000
Interest	<u>15,000</u>
EBT	\$194,000
Taxes(35%)	<u>67,900</u>
Net income	<u>\$126,100</u>

3. One equation for net income is:

$$\text{Net income} = \text{Dividends} + \text{Addition to retained earnings}$$

Rearranging, we get:

$$\text{Addition to retained earnings} = \text{Net income} - \text{Dividends} = \$126,100 - 48,000 = \$78,100$$

4. $EPS = \text{Net income} / \text{Shares} = \$126,100 / 30,000 = \$4.20 \text{ per share}$

$DPS = \text{Dividends} / \text{Shares} = \$48,000 / 30,000 = \$1.60 \text{ per share}$

5. To find the book value of current assets, we use: $NWC = CA - CL$. Rearranging to solve for current assets, we get:

$CA = NWC + CL = \$900K + 2.2M = \$3.1M$

The market value of current assets and fixed assets is given, so:

Book value CA = \$3.1M	Market value CA = \$2.8M
Book value NFA = \$4.0M	Market value NFA = \$3.2M
Book value assets = \$3.1M + 4.0M = \$7.1M	Market value assets = \$2.8M + 3.2M = \$6.0M

6. $\text{Taxes} = 0.15(\$50K) + 0.25(\$25K) + 0.34(\$25K) + 0.39(\$273K - 100K) = \$89,720$

7. The average tax rate is the total tax paid divided by net income, so:

$\text{Average tax rate} = \$89,720 / \$273,000 = 32.86\%$.

The marginal tax rate is the tax rate on the next \$1 of earnings, so the marginal tax rate = 39%.

8. To calculate OCF, we first need the income statement:

<u>Income Statement</u>	
Sales	\$13,500
Costs	5,400
Depreciation	<u>1,200</u>
EBIT	\$6,900
Interest	<u>680</u>
Taxable income	\$6,220
Taxes (35%)	<u>2,177</u>
Net income	<u>\$4,043</u>

$OCF = EBIT + \text{Depreciation} - \text{Taxes} = \$6,900 + 1,200 - 2,177 = \$5,923$

9. $\text{Net capital spending} = NFA_{\text{end}} - NFA_{\text{beg}} + \text{Depreciation} = \$4.7M - 4.2M + 925K = \$1.425M$

10. $\text{Change in NWC} = NWC_{\text{end}} - NWC_{\text{beg}}$
 $\text{Change in NWC} = (CA_{\text{end}} - CL_{\text{end}}) - (CA_{\text{beg}} - CL_{\text{beg}})$
 $\text{Change in NWC} = (\$1,720 - 1,180) - (\$1,600 - 940)$
 $\text{Change in NWC} = \$540 - 660 = -\120

11. $\text{Cash flow to creditors} = \text{Interest paid} - \text{Net new borrowing} = \$340K - (LTD_{\text{end}} - LTD_{\text{beg}})$
 $\text{Cash flow to creditors} = \$340K - (\$3.1M - 2.8M) = \$340K - 300K = \$40K$

B-6 SOLUTIONS

12. Cash flow to stockholders = Dividends paid – Net new equity
 Cash flow to stockholders = \$600K – [(Common_{end} + APIS_{end}) – (Common_{beg} + APIS_{beg})]
 Cash flow to stockholders = \$600K – [(\$820K + 6.8M) – (\$855K + 7.6M)]
 Cash flow to stockholders = \$600K – [\$7.62M – 8.455M] = –\$235K

Note, APIS is the additional paid-in surplus.

13. Cash flow from assets = Cash flow to creditors + Cash flow to stockholders
 = \$40K – 235K = –\$195K

Cash flow from assets = –\$195K = OCF – Change in NWC – Net capital spending
 = OCF – (–\$165K) – 760K = –\$195K

Operating cash flow = –\$195K – 165K + 760K = \$400K

Intermediate

14. To find the OCF, we first calculate net income.

<u>Income Statement</u>	
Sales	\$145,000
Costs	86,000
Depreciation	7,000
Other expenses	<u>4,900</u>
EBIT	\$47,100
Interest	<u>15,000</u>
Taxable income	\$32,100
Taxes (34%)	<u>12,840</u>
Net income	<u>\$19,260</u>
Dividends	\$8,700
Additions to RE	\$10,560

- a. OCF = EBIT + Depreciation – Taxes = \$47,100 + 7,000 – 12,840 = \$41,260
 b. CFC = Interest – Net new LTD = \$15,000 – \$6,500 = \$21,500.

Note that the net new long-term debt is negative because the company repaid part of its long-term debt.

- c. CFS = Dividends – Net new equity = \$8,700 – 6,450 = \$2,250

d. We know that $CFA = CFC + CFS$, so:

$$CFA = \$21,500 + 2,250 = \$23,750$$

CFA is also equal to $OCF - \text{Net capital spending} - \text{Change in NWC}$. We already know OCF. Net capital spending is equal to:

$$\text{Net capital spending} = \text{Increase in NFA} + \text{Depreciation} = \$5,000 + 7,000 = \$12,000.$$

Now we can use:

$$CFA = OCF - \text{Net capital spending} - \text{Change in NWC}$$

$$\$23,750 = \$41,260 - 12,000 - \text{Change in NWC}.$$

Solving for the change in NWC gives \$5,510, meaning the company increased its NWC by \$5,510.

15. The solution to this question works the income statement backwards. Starting at the bottom:

$$\text{Net income} = \text{Dividends} + \text{Addition to ret. earnings} = \$900 + 4,500 = \$5,400$$

Now, looking at the income statement:

$$\text{EBT} - \text{EBT} \times \text{Tax rate} = \text{Net income}$$

Recognize that $\text{EBT} \times \text{tax rate}$ is simply the calculation for taxes. Solving this for EBT yields:

$$\text{EBT} = \text{NI} / (1 - \text{tax rate}) = \$5,400 / 0.65 = \$8,308$$

Now you can calculate:

$$\text{EBIT} = \text{EBT} + \text{interest} = \$8,308 + 1,600 = \$9,908.$$

The last step is to use:

$$\text{EBIT} = \text{Sales} - \text{Costs} - \text{Depreciation}$$

$$\text{EBIT} = \$29,000 - 13,000 - \text{Depreciation} = \$9,908.$$

Solving for depreciation, we find that depreciation = \$6,092.

B-8 SOLUTIONS

16. The balance sheet for the company looks like this:

<u>Balance Sheet</u>			
Cash	\$175,000	Accounts payable	\$430,000
Accounts receivable	140,000	Notes payable	<u>80,000</u>
Inventory	<u>265,000</u>	Current liabilities	\$610,000
Current assets	\$580,000	Long-term debt	<u>1,430,000</u>
		Total liabilities	\$2,040,000
Tangible net fixed assets	2,900,000	Common stock	??
Intangible net fixed assets	<u>720,000</u>	Accumulated ret. earnings	<u>1,240,000</u>
Total assets	<u>\$4,200,000</u>	Total liab. & owners' equity	<u>\$4,200,000</u>

Total liabilities and owners' equity is:

$$TL \text{ \& } OE = CL + LTD + \text{Common stock}$$

Solving for this equation for equity gives us:

$$\text{Common stock} = \$4,200,000 - 1,240,000 - 2,040,000 = \$920,000$$

17. The market value of shareholders' equity cannot be zero. A negative market value in this case would imply that the company would pay you to own the stock. The market value of shareholders' equity can be stated as: Shareholders' equity = Max [(TA - TL), 0]. So, if TA is \$4,300, equity is equal to \$800, and if TA is \$3,200, equity is equal to \$0. We should note here that the book value of shareholders' equity can be negative.

18. a. Taxes Growth = $0.15(\$50K) + 0.25(\$25K) + 0.34(\$10K) = \$17,150$
 Taxes Income = $0.15(\$50K) + 0.25(\$25K) + 0.34(\$25K) + 0.39(\$235K) + 0.34(\$8.165M)$
 = \$2,890,000

- b. Each firm has a marginal tax rate of 34% on the next \$10,000 of taxable income, despite their different average tax rates, so both firms will pay an additional \$3,400 in taxes.

19. Income Statement

Sales	\$850,000
COGS	630,000
A&S expenses	120,000
Depreciation	<u>130,000</u>
EBIT	(\$30,000)
Interest	<u>85,000</u>
Taxable income	(\$115,000)
Taxes (35%)	<u>0</u>
a. Net income	<u>(\$115,000)</u>

b. $OCF = EBIT + \text{Depreciation} - \text{Taxes} = (\$30,000) + 130,000 - 0 = \$100,000$

- c. Net income was negative because of the tax deductibility of depreciation and interest expense. However, the actual cash flow from operations was positive because depreciation is a non-cash expense and interest is a financing expense, not an operating expense.

20. A firm can still pay out dividends if net income is negative; it just has to be sure there is sufficient cash flow to make the dividend payments.

Change in NWC = Net capital spending = Net new equity = 0. (Given)

Cash flow from assets = OCF – Change in NWC – Net capital spending

Cash flow from assets = \$100K – 0 – 0 = \$100K

Cash flow to stockholders = Dividends – Net new equity = \$30K – 0 = \$30K

Cash flow to creditors = Cash flow from assets – Cash flow to stockholders = \$100K – 30K = \$70K

Cash flow to creditors = Interest – Net new LTD

Net new LTD = Interest – Cash flow to creditors = \$85K – 70K = \$15K

21. a.

<u>Income Statement</u>	
Sales	\$12,800
Cost of good sold	10,400
Depreciation	<u>1,900</u>
EBIT	\$ 500
Interest	<u>450</u>
Taxable income	\$ 50
Taxes (34%)	<u>17</u>
Net income	<u><u>\$33</u></u>

b. $OCF = EBIT + Depreciation - Taxes$
 $= \$500 + 1,900 - 17 = \$2,383$

c. $Change\ in\ NWC = NWC_{end} - NWC_{beg}$
 $= (CA_{end} - CL_{end}) - (CA_{beg} - CL_{beg})$
 $= (\$3,850 - 2,100) - (\$3,200 - 1,800)$
 $= \$1,750 - 1,400 = \350

Net capital spending $= NFA_{end} - NFA_{beg} + Depreciation$
 $= \$9,700 - 9,100 + 1,900 = \$2,500$

CFA $= OCF - Change\ in\ NWC - Net\ capital\ spending$
 $= \$2,383 - 350 - 2,500 = -\467

The cash flow from assets can be positive or negative, since it represents whether the firm raised funds or distributed funds on a net basis. In this problem, even though net income and OCF are positive, the firm invested heavily in both fixed assets and net working capital; it had to raise a net \$467 in funds from its stockholders and creditors to make these investments.

B-10 SOLUTIONS

$$\begin{aligned}d. \text{ Cash flow to creditors} &= \text{Interest} - \text{Net new LTD} = \$450 - 0 = \$450 \\ \text{Cash flow to stockholders} &= \text{Cash flow from assets} - \text{Cash flow to creditors} \\ &= -\$467 - 450 = -\$917\end{aligned}$$

We can also calculate the cash flow to stockholders as:

$$\begin{aligned}\text{Cash flow to stockholders} &= \text{Dividends} - \text{Net new equity} \\ \text{Solving for net new equity, we get:}\end{aligned}$$

$$\text{Net new equity} = \$500 - (-917) = \$1,417$$

The firm had positive earnings in an accounting sense ($NI > 0$) and had positive cash flow from operations. The firm invested \$350 in new net working capital and \$2,500 in new fixed assets. The firm had to raise \$467 from its stakeholders to support this new investment. It accomplished this by raising \$1,417 in the form of new equity. After paying out \$500 of this in the form of dividends to shareholders and \$450 in the form of interest to creditors, \$467 was left to meet the firm's cash flow needs for investment.

$$\begin{aligned}22. \quad a. \text{ Total assets 2004} &= \$650 + 2,900 = \$3,550; \\ \text{Total liabilities 2004} &= \$265 + 1,500 = \$1,765 \\ \text{Owners' equity 2004} &= \$3,550 - 1,765 = \$1,785\end{aligned}$$

$$\begin{aligned}\text{Total assets 2005} &= \$705 + 3,400 = \$4,105 \\ \text{Total liabilities 2005} &= \$290 + 1,720 = \$2,010 \\ \text{Owners' equity 2005} &= \$4,105 - 2,010 = \$2,095\end{aligned}$$

$$\begin{aligned}b. \text{ NWC 2004} &= \text{CA04} - \text{CL04} = \$650 - 265 = \$385 \\ \text{NWC 2005} &= \text{CA05} - \text{CL05} = \$705 - 290 = \$415 \\ \text{Change in NWC} &= \text{NWC05} - \text{NWC04} = \$415 - 385 = \$30\end{aligned}$$

c. We can calculate net capital spending as:

$$\begin{aligned}\text{Net capital spending} &= \text{Net fixed assets 2005} - \text{Net fixed assets 2004} + \text{Depreciation} \\ \text{Net capital spending} &= \$3,400 - 2,900 + 800 = \$1,300\end{aligned}$$

So, the company had a net capital spending cash flow of \$1,300. We also know that net capital spending is:

$$\begin{aligned}\text{Net capital spending} &= \text{Fixed assets bought} - \text{Fixed assets sold} \\ \$1,300 &= \$1,500 - \text{Fixed assets sold} \\ \text{Fixed assets sold} &= \$1,500 - 1,300 = \$200\end{aligned}$$

To calculate the cash flow from assets, we must first calculate the operating cash flow. The operating cash flow is calculated as follows (you can also prepare a traditional income statement):

$$\begin{aligned}
 \text{EBIT} &= \text{Sales} - \text{Costs} - \text{Depreciation} = \$8,600 - 4,150 - 800 = \$3,650 \\
 \text{EBT} &= \text{EBIT} - \text{Interest} = \$3,650 - 216 = \$3,434; \\
 \text{Taxes} &= \text{EBT} \times .35 = \$3,434 \times .35 = \$1,202 \\
 \text{OCF} &= \text{EBIT} + \text{Depreciation} - \text{Taxes} = \$3,650 + 800 - 1,202 = \$3,248 \\
 \text{Cash flow from assets} &= \text{OCF} - \text{Change in NWC} - \text{Net capital spending.} \\
 &= \$3,248 - 30 - 1,300 = \$1,918
 \end{aligned}$$

d. Net new borrowing = LTD05 – LTD04 = \$1,720 – 1,500 = \$220
Cash flow to creditors = Interest – Net new LTD = \$216 – 220 = –\$4
Net new borrowing = \$220 = Debt issued – Debt retired
Debt retired = \$300 – 220 = \$80

Challenge

23. Net capital spending = $\text{NFA}_{\text{end}} - \text{NFA}_{\text{beg}} + \text{Depreciation}$
 $= (\text{NFA}_{\text{end}} - \text{NFA}_{\text{beg}}) + (\text{Depreciation} + \text{AD}_{\text{beg}}) - \text{AD}_{\text{beg}}$
 $= (\text{NFA}_{\text{end}} - \text{NFA}_{\text{beg}}) + \text{AD}_{\text{end}} - \text{AD}_{\text{beg}}$
 $= (\text{NFA}_{\text{end}} + \text{AD}_{\text{end}}) - (\text{NFA}_{\text{beg}} + \text{AD}_{\text{beg}}) = \text{FA}_{\text{end}} - \text{FA}_{\text{beg}}$

24. a. The tax bubble causes average tax rates to catch up to marginal tax rates, thus eliminating the tax advantage of low marginal rates for high income corporations.

b. Taxes = $0.15(\$50\text{K}) + 0.25(\$25\text{K}) + 0.34(\$25\text{K}) + 0.39(\$235\text{K}) = \$113.9\text{K}$

$$\text{Average tax rate} = \$113.9\text{K} / \$335\text{K} = 34\%$$

The marginal tax rate on the next dollar of income is 34 percent.

For corporate taxable income levels of \$335K to \$10M, average tax rates are equal to marginal tax rates.

$$\text{Taxes} = 0.34(\$10\text{M}) + 0.35(\$5\text{M}) + 0.38(\$3.333\text{M}) = \$6,416,667$$

$$\text{Average tax rate} = \$6,416,667 / \$18,333,334 = 35\%$$

The marginal tax rate on the next dollar of income is 35 percent. For corporate taxable income levels over \$18,333,334, average tax rates are again equal to marginal tax rates.

c. Taxes = $0.34(\$200\text{K}) = \$68\text{K} = 0.15(\$50\text{K}) + 0.25(\$25\text{K}) + 0.34(\$25\text{K}) + X(\$100\text{K});$
 $X(\$100\text{K}) = \$68\text{K} - 22.25\text{K} = \45.75K
 $X = \$45.75\text{K} / \100K
 $X = 45.75\%$

B-12 SOLUTIONS

25.

<u>Balance sheet as of Dec. 31, 2004</u>			
Cash	\$2,107	Accounts payable	\$2,213
Accounts receivable	2,789	Notes payable	<u>407</u>
Inventory	<u>4,959</u>	Current liabilities	\$2,620
Current assets	\$9,855		
		Long-term debt	\$7,056
Net fixed assets	<u>\$17,669</u>	Owners' equity	<u>\$17,848</u>
Total assets	<u>\$27,524</u>	Total liab. & equity	<u>\$27,524</u>

<u>Balance sheet as of Dec. 31, 2005</u>			
Cash	\$2,155	Accounts payable	\$2,146
Accounts receivable	3,142	Notes payable	<u>382</u>
Inventory	<u>5,096</u>	Current liabilities	\$2,528
Current assets	\$10,393		
		Long-term debt	\$8,232
Net fixed assets	<u>\$18,091</u>	Owners' equity	<u>\$17,724</u>
Total assets	<u>\$28,484</u>	Total liab. & equity	<u>\$28,484</u>

<u>2004 Income Statement</u>		<u>2005 Income Statement</u>	
Sales	\$4,018.00	Sales	\$4,312.00
COGS	1,382.00	COGS	1,569.00
Other expenses	328.00	Other expenses	274.00
Depreciation	<u>577.00</u>	Depreciation	<u>578.00</u>
EBIT	\$1,731.00	EBIT	\$1,891.00
Interest	<u>269.00</u>	Interest	<u>309.00</u>
EBT	\$1,462.00	EBT	\$1,582.00
Taxes (34%)	<u>497.08</u>	Taxes (34%)	<u>537.88</u>
Net income	<u>\$ 964.92</u>	Net income	<u>\$1,044.12</u>
Dividends	\$490.00	Dividends	\$539.00
Additions to RE	\$474.92	Additions to RE	\$505.12

26. $OCF = EBIT + Depreciation - Taxes = \$1,891 + 578 - 537.88 = \$1,931.12$

$$\begin{aligned} \text{Change in NWC} &= NWC_{\text{end}} - NWC_{\text{beg}} = (CA - CL)_{\text{end}} - (CA - CL)_{\text{beg}} \\ &= (\$10,393 - 2,528) - (\$9,855 - 2,620) \\ &= \$7,865 - 7,235 = \$630 \end{aligned}$$

$$\begin{aligned} \text{Net capital spending} &= NFA_{\text{end}} - NFA_{\text{beg}} + \text{Depreciation} \\ &= \$18,091 - 17,669 + 578 = \$1,000 \end{aligned}$$

$$\begin{aligned} \text{Cash flow from assets} &= OCF - \text{Change in NWC} - \text{Net capital spending} \\ &= \$1,931.12 - 630 - 1,000 = \$301.12 \end{aligned}$$

Cash flow to creditors = Interest – Net new LTD

Net new LTD = $LTD_{\text{end}} - LTD_{\text{beg}}$

Cash flow to creditors = $\$309 - (\$8,232 - 7,056) = -\$867$

Net new equity = $\text{Common stock}_{\text{end}} - \text{Common stock}_{\text{beg}}$

Common stock + Retained earnings = Total owners' equity

Net new equity = $(OE - RE)_{\text{end}} - (OE - RE)_{\text{beg}}$

$= OE_{\text{end}} - OE_{\text{beg}} + RE_{\text{beg}} - RE_{\text{end}}$

$RE_{\text{end}} = RE_{\text{beg}} + \text{Additions to RE}$

\therefore Net new equity = $OE_{\text{end}} - OE_{\text{beg}} + RE_{\text{beg}} - (RE_{\text{beg}} + \text{Additions to RE})$

$= OE_{\text{end}} - OE_{\text{beg}} - \text{Additions to RE}$

Net new equity = $\$17,724 - 17,848 - 505.12 = -\629.12

CFS = Dividends – Net new equity

CFS = $\$539 - (-\$629.12) = \$1,168.12$

As a check, cash flow from assets is \$301.12.

CFA = Cash flow from creditors + Cash flow to stockholders

CFA = $-\$867 + 1,168.12 = \301.12

CHAPTER 3

WORKING WITH FINANCIAL STATEMENTS

Answers to Concepts Review and Critical Thinking Questions

1.
 - a. If inventory is purchased with cash, then there is no change in the current ratio. If inventory is purchased on credit, then there is a decrease in the current ratio if it was initially greater than 1.0.
 - b. Reducing accounts payable with cash increases the current ratio if it was initially greater than 1.0.
 - c. Reducing short-term debt with cash increases the current ratio if it was initially greater than 1.0.
 - d. As long-term debt approaches maturity, the principal repayment and the remaining interest expense become current liabilities. Thus, if debt is paid off with cash, the current ratio increases if it was initially greater than 1.0. If the debt has not yet become a current liability, then paying it off will reduce the current ratio since current liabilities are not affected.
 - e. Reduction of accounts receivables and an increase in cash leaves the current ratio unchanged.
 - f. Inventory sold at cost reduces inventory and raises cash, so the current ratio is unchanged.
 - g. Inventory sold for a profit raises cash in excess of the inventory recorded at cost, so the current ratio increases.
2. The firm has increased inventory relative to other current assets; therefore, assuming current liability levels remain unchanged, liquidity has potentially decreased.
3. A current ratio of 0.50 means that the firm has twice as much in current liabilities as it does in current assets; the firm potentially has poor liquidity. If pressed by its short-term creditors and suppliers for immediate payment, the firm might have a difficult time meeting its obligations. A current ratio of 1.50 means the firm has 50% more current assets than it does current liabilities. This probably represents an improvement in liquidity; short-term obligations can generally be met completely with a safety factor built in. A current ratio of 15.0, however, might be excessive. Any excess funds sitting in current assets generally earn little or no return. These excess funds might be put to better use by investing in productive long-term assets or distributing the funds to shareholders.
4.
 - a. Quick ratio provides a measure of the short-term liquidity of the firm, after removing the effects of inventory, generally the least liquid of the firm's current assets.
 - b. Cash ratio represents the ability of the firm to completely pay off its current liabilities with its most liquid asset (cash).
 - c. Total asset turnover measures how much in sales is generated by each dollar of firm assets.
 - d. Equity multiplier represents the degree of leverage for an equity investor of the firm; it measures the dollar worth of firm assets each equity dollar has a claim to.
 - e. Long-term debt ratio measures the percentage of total firm capitalization funded by long-term debt.

- f.* Times interest earned ratio provides a relative measure of how well the firm's operating earnings can cover current interest obligations.
 - g.* Profit margin is the accounting measure of bottom-line profit per dollar of sales.
 - h.* Return on assets is a measure of bottom-line profit per dollar of total assets.
 - i.* Return on equity is a measure of bottom-line profit per dollar of equity.
 - j.* Price-earnings ratio reflects how much value per share the market places on a dollar of accounting earnings for a firm.
5. Common size financial statements express all balance sheet accounts as a percentage of total assets and all income statement accounts as a percentage of total sales. Using these percentage values rather than nominal dollar values facilitates comparisons between firms of different size or business type. Common-base year financial statements express each account as a ratio between their current year nominal dollar value and some reference year nominal dollar value. Using these ratios allows the total growth trend in the accounts to be measured.
6. Peer group analysis involves comparing the financial ratios and operating performance of a particular firm to a set of peer group firms in the same industry or line of business. Comparing a firm to its peers allows the financial manager to evaluate whether some aspects of the firm's operations, finances, or investment activities are out of line with the norm, thereby providing some guidance on appropriate actions to take to adjust these ratios if appropriate. An aspirant group would be a set of firms whose performance the company in question would like to emulate. The financial manager often uses the financial ratios of aspirant groups as the target ratios for his or her firm; some managers are evaluated by how well they match the performance of an identified aspirant group.
7. Return on equity is probably the most important accounting ratio that measures the bottom-line performance of the firm with respect to the equity shareholders. The Du Pont identity emphasizes the role of a firm's profitability, asset utilization efficiency, and financial leverage in achieving an ROE figure. For example, a firm with ROE of 20% would seem to be doing well, but this figure may be misleading if it were marginally profitable (low profit margin) and highly levered (high equity multiplier). If the firm's margins were to erode slightly, the ROE would be heavily impacted.
8. The book-to-bill ratio is intended to measure whether demand is growing or falling. It is closely followed because it is a barometer for the entire high-tech industry where levels of revenues and earnings have been relatively volatile.
9. If a company is growing by opening new stores, then presumably total revenues would be rising. Comparing total sales at two different points in time might be misleading. Same-store sales control for this by only looking at revenues of stores open within a specific period.
10. *a.* For an electric utility such as Con Ed, expressing costs on a per kilowatt hour basis would be a way to compare costs with other utilities of different sizes.
- b.* For a retailer such as Sears, expressing sales on a per square foot basis would be useful in comparing revenue production against other retailers.
- c.* For an airline such as Southwest, expressing costs on a per passenger mile basis allows for comparisons with other airlines by examining how much it costs to fly one passenger one mile.

B-16 SOLUTIONS

- d. For an on-line service provider such as AOL, using a per call basis for costs would allow for comparisons with smaller services. A per subscriber basis would also make sense.
- e. For a hospital such as Holy Cross, revenues and costs expressed on a per bed basis would be useful.
- f. For a college textbook publisher such as McGraw-Hill/Irwin, the leading publisher of finance textbooks for the college market, the obvious standardization would be per book sold.

Solutions to Questions and Problems

NOTE: All end of chapter problems were solved using a spreadsheet. Many problems require multiple steps. Due to space and readability constraints, when these intermediate steps are included in this solutions manual, rounding may appear to have occurred. However, the final answer for each problem is found without rounding during any step in the problem.

Basic

1. Using the formula for NWC, we get:

$$\text{NWC} = \text{CA} - \text{CL}$$

$$\text{CA} = \text{CL} + \text{NWC} = \$1,320 + 4,460 = \$5,780$$

So, the current ratio is:

$$\text{Current ratio} = \text{CA} / \text{CL} = \$5,780 / \$4,460 = 1.30 \text{ times}$$

And the quick ratio is:

$$\text{Quick ratio} = (\text{CA} - \text{Inventory}) / \text{CL} = (\$5,780 - 1,875) / \$4,460 = 0.88 \text{ times}$$

2. We need to find net income first. So:

$$\text{Profit margin} = \text{Net income} / \text{Sales}$$

$$\text{Net income} = \text{Sales}(\text{Profit margin})$$

$$\text{Net income} = (\$29\text{M})(0.09) = \$2,610,000$$

$$\text{ROA} = \text{Net income} / \text{TA} = \$2.61\text{M} / \$37\text{M} = 7.05\%$$

To find ROE, we need to find total equity.

$$\text{TL \& OE} = \text{TD} + \text{TE}$$

$$\text{TE} = \text{TL \& OE} - \text{TD}$$

$$\text{TE} = \$37\text{M} - 13\text{M} = \$24\text{M}$$

$$\text{ROE} = \text{Net income} / \text{TE} = \text{Net income} / \text{TE} = \$2.61\text{M} / \$24\text{M} = 10.88\%$$

3. Receivables turnover = Sales / Receivables
Receivables turnover = \$2,873,150 / \$421,865 = 6.81 times

$$\text{Days' sales in receivables} = 365 \text{ days} / \text{Receivables turnover} = 365 / 6.81 = 53.59 \text{ days}$$

The average collection period for an outstanding accounts receivable balance was 53.59 days.

4. Inventory turnover = COGS / Inventory
 Inventory turnover = $\$2,532,095 / \$386,500 = 6.55$ times

Days' sales in inventory = $365 \text{ days} / \text{Inventory turnover} = 365 / 6.55 = 55.71$ days

On average, a unit of inventory sat on the shelf 55.71 days before it was sold.

5. Total debt ratio = $0.44 = \text{TD} / \text{TA}$

Substituting total debt plus total equity for total assets, we get:

$$0.44 = \text{TD} / (\text{TD} + \text{TE})$$

Solving this equation yields:

$$0.44(\text{TE}) = 0.56(\text{TE})$$

$$\text{Debt/equity ratio} = \text{TD} / \text{TE} = 0.44 / 0.56 = 0.79$$

$$\text{Equity multiplier} = 1 + \text{D/E} = 1.79$$

6. Net income = Addition to RE + Dividends = $\$310\text{K} + 160\text{K} = \470K
 Earnings per share = NI / Shares = $\$470\text{K} / 180\text{K} = \2.61 per share
 Dividends per share = Dividends / Shares = $\$160\text{K} / 180\text{K} = \0.89 per share
 Book value per share = TE / Shares = $\$6.5\text{M} / 180\text{K} = \36.11 per share
 Market-to-book ratio = Share price / BVPS = $\$78 / \$36.11 = 2.16$ times
 P/E ratio = Share price / EPS = $\$78 / \$2.61 = 29.87$ times

7. ROE = (PM)(TAT)(EM)
 ROE = $(.085)(1.30)(1.75) = 19.34\%$

8. This question gives all of the necessary ratios for the DuPont Identity except the equity multiplier, so, using the DuPont Identity:

$$\text{ROE} = (\text{PM})(\text{TAT})(\text{EM})$$

$$\text{ROE} = .1867 = (.092)(1.63)(\text{EM})$$

$$\text{EM} = .1867 / (.092)(1.63) = 1.24$$

$$\text{D/E} = \text{EM} - 1 = 1.24 - 1 = 0.24$$

B-18 SOLUTIONS

9. Increase in inventory is a use of cash
Increase in accounts payable is a source of cash
Decrease in notes payable is a use of cash
Increase in accounts receivable is a use of cash
Changes in cash = sources – uses = $\$330 - (\$600 + 790 + 950) = -\$2,010$
Cash decreased by \$2,010

10. Payables turnover = COGS / Accounts payable
Payables turnover = $\$13,168 / \$2,965 = 4.44$ times

Days' sales in payables = 365 days / Payables turnover
Days' sales in payables = $365 / 4.44 = 82.19$ days

The company left its bills to suppliers outstanding for 82.19 days on average. A large value for this ratio could imply that either (1) the company is having liquidity problems, making it difficult to pay off its short-term obligations, or (2) that the company has successfully negotiated lenient credit terms from its suppliers.

11. New investment in fixed assets is found by:

Net investment in FA = $(NFA_{\text{end}} - NFA_{\text{beg}}) + \text{Depreciation}$
Net investment in FA = $\$580 + 165 = \745

The company bought \$745 in new fixed assets; this is a use of cash.

12. The equity multiplier is:

$EM = 1 + D/E$
 $EM = 1 + 1.40 = 2.40$

One formula to calculate return on equity is:

$ROE = (ROA)(EM)$
 $ROE = .087(2.40) = 20.88\%$

ROE can also be calculated as:

$ROE = NI / TE$

So, net income is:

$NI = ROE(TE)$
 $NI = (.2088)(\$520,000) = \$108,576$

13. through 15:

	2004	#13	2005	#13	#14	#15
Assets						
Current assets						
Cash	\$ 10,168	2.54%	\$ 10,683	2.37%	1.0506	0.9331
Accounts receivable	27,145	6.77%	28,613	6.34%	1.0541	0.9361
Inventory	59,324	14.80%	64,853	14.37%	1.0932	0.9708
Total	\$ 96,637	24.11%	\$104,419	23.08%	1.0777	0.9571
Fixed assets						
Net plant and equipment	304,165	75.89%	347,168	76.92%	1.1414	1.0136
Total assets	<u>\$400,802</u>	<u>100%</u>	<u>\$451,317</u>	<u>100%</u>	<u>1.1260</u>	<u>1.0000</u>
Liabilities and Owners' Equity						
Current liabilities						
Accounts payable	\$ 73,185	18.26%	\$ 59,309	13.14%	0.8104	0.7197
Notes payable	39,125	9.76%	48,168	10.67%	1.2311	1.0933
Total	\$112,310	28.02%	\$107,477	23.81%	0.9570	0.8499
Long-term debt	\$ 50,000	12.47%	\$ 62,000	13.74%	1.2400	1.0102
Owners' equity						
Common stock and paid-in surplus	\$ 80,000	19.96%	\$ 80,000	17.73%	1.0000	0.8881
Accumulated retained earnings	158,492	39.54%	201,840	44.72%	1.2735	1.1310
Total	<u>\$238,492</u>	<u>59.50%</u>	<u>\$281,840</u>	<u>62.45%</u>	<u>1.1818</u>	<u>1.0495</u>
Total liabilities and owners' equity	<u>\$400,802</u>	<u>100%</u>	<u>\$451,317</u>	<u>100%</u>	<u>1.1260</u>	<u>1.0000</u>

The common-size balance sheet answers are found by dividing each category by total assets. For example, the cash percentage for 2004 is:

$$\$10,168 / \$400,802 = .0254 \text{ or } 2.54\%$$

This means that cash is 2.54% of total assets.

The common-base year answers for Question 14 are found by dividing each category value for 2005 by the same category value for 2004. For example, the cash common-base year number is found by:

$$\$10,683 / \$10,168 = 1.0506$$

This means the cash balance in 2005 is 1.0506 times as large as the cash balance in 2004.

The common-size, common-base year answers for Question 15 are found by dividing the common-size percentage for 2005 by the common-size percentage for 2004. For example, the cash calculation is found by:

$$2.37\% / 2.54\% = 0.9331$$

This tells us that cash, as a percentage of assets, fell by:

$$1 - .9331 = .0669 \text{ or } 6.69 \text{ percent.}$$

B-20 SOLUTIONS

16.	<u>2004</u>	<u>Sources/Uses</u>	<u>2005</u>
<u>Assets</u>			
Current assets			
Cash	\$ 10,168	+515 U	\$ 10,683
Accounts receivable	27,145	+1,468 U	28,613
Inventory	<u>59,324</u>	<u>+5,529 U</u>	<u>64,853</u>
Total	\$ 96,637	<u>+7,512 U</u>	\$104,149
Fixed assets			
Net plant and equipment	<u>304,165</u>	<u>+43,003 U</u>	<u>347,168</u>
Total assets	<u>\$400,802</u>	<u>+50,515 U</u>	<u>\$451,317</u>
<u>Liabilities and owners' equity</u>			
Current liabilities			
Accounts payable	\$ 73,185	-13,876 U	\$ 59,309
Notes payable	<u>39,125</u>	<u>+9,043 S</u>	<u>48,168</u>
Total	\$112,310	- 4,833 U	\$107,477
Long-term debt	<u>50,000</u>	<u>+12,000 S</u>	<u>62,000</u>
Owners' equity			
Common stock and paid-in surplus	\$ 80,000	0	\$ 80,000
Accumulated retained earnings	<u>158,492</u>	<u>+43,348 S</u>	<u>201,840</u>
Total	<u>\$238,492</u>	<u>+43,348 S</u>	<u>\$281,840</u>
Total liabilities and owners' equity	<u>\$400,802</u>	<u>+50,515 S</u>	<u>\$451,317</u>

The firm used \$50,515 in cash to acquire new assets. It raised this amount of cash by increasing liabilities and owners' equity by \$50,515. In particular, the needed funds were raised by internal financing (on a net basis), out of the additions to retained earnings and by an issue of long-term debt.

17. a. Current ratio = Current assets / Current liabilities
 Current ratio 2004 = \$96,637 / \$112,310 = 0.86 times
 Current ratio 2005 = \$104,149 / \$107,477 = 0.97 times
- b. Quick ratio = (Current assets – Inventory) / Current liabilities
 Quick ratio 2004 = (\$96,637 – 59,324) / \$112,310 = 0.33 times
 Quick ratio 2005 = (\$104,149 – 64,853) / \$104,477 = 0.37 times
- c. Cash ratio = Cash / Current liabilities
 Cash ratio 2004 = \$10,168 / \$112,310 = 0.09 times
 Cash ratio 2005 = \$10,683 / \$107,477 = 0.10 times
- d. NWC ratio = NWC / Total assets
 NWC ratio 2004 = (\$96,637 – 112,310) / \$400,802 = -3.91%
 NWC ratio 2005 = (\$104,149 – 107,477) / \$451,317 = -0.74%
- e. Debt-equity ratio = Total debt / Total equity
 Debt-equity ratio 2004 = (\$112,310 + 50,000) / \$238,492 = 0.68 times
 Debt-equity ratio 2005 = (\$107,477 + 62,000) / \$281,840 = 0.60 times
- Equity multiplier = 1 + D/E
 Equity multiplier 2004 = 1 + 0.68 = 1.68
 Equity multiplier 2005 = 1 + 0.60 = 1.60

$$\begin{aligned}
 f. \quad \text{Total debt ratio} &= (\text{Total assets} - \text{Total equity}) / \text{Total assets} \\
 \text{Total debt ratio 2004} &= (\$400,802 - 238,492) / \$400,802 = 0.40 \\
 \text{Total debt ratio 2005} &= (\$451,317 - 281,840) / \$451,317 = 0.38
 \end{aligned}$$

$$\begin{aligned}
 \text{Long-term debt ratio} &= \text{Long-term debt} / (\text{Long-term debt} + \text{Total equity}) \\
 \text{Long-term debt ratio 2004} &= \$50,000 / (\$50,000 + 238,492) = 0.17 \\
 \text{Long-term debt ratio 2005} &= \$62,000 / (\$62,000 + 281,840) = 0.18
 \end{aligned}$$

Intermediate

18. This is a multi-step problem involving several ratios. The ratios given are all part of the DuPont Identity. The only DuPont Identity ratio not given is the profit margin. If we know the profit margin, we can find the net income since sales are given. So, we begin with the DuPont Identity:

$$\text{ROE} = 0.16 = (\text{PM})(\text{TAT})(\text{EM}) = (\text{PM})(\text{S} / \text{TA})(1 + \text{D/E})$$

Solving the DuPont Identity for profit margin, we get:

$$\begin{aligned}
 \text{PM} &= [(\text{ROE})(\text{TA})] / [(1 + \text{D/E})(\text{S})] \\
 \text{PM} &= [(0.16)(\$1,185)] / [(1 + 1)(\$2,700)] = .0351
 \end{aligned}$$

Now that we have the profit margin, we can use this number and the given sales figure to solve for net income:

$$\begin{aligned}
 \text{PM} &= .0351 = \text{NI} / \text{S} \\
 \text{NI} &= .0351(\$2,700) = \$94.80
 \end{aligned}$$

19. This is a multi-step problem involving several ratios. It is often easier to look backward to determine where to start. We need receivables turnover to find days' sales in receivables. To calculate receivables turnover, we need credit sales, and to find credit sales, we need total sales. Since we are given the profit margin and net income, we can use these to calculate total sales as:

$$\text{PM} = 0.086 = \text{NI} / \text{Sales} = \$173,000 / \text{Sales}; \text{Sales} = \$2,011,628$$

Credit sales are 75 percent of total sales, so:

$$\text{Credit sales} = \$2,011,628(0.75) = \$1,508,721$$

Now we can find receivables turnover by:

$$\text{Receivables turnover} = \text{Sales} / \text{Accounts receivable} = \$1,508,721 / \$143,200 = 10.54 \text{ times}$$

$$\text{Days' sales in receivables} = 365 \text{ days} / \text{Receivables turnover} = 365 / 10.54 = 34.64 \text{ days}$$

20. The solution to this problem requires a number of steps. First, remember that CA + NFA = TA. So, if we find the CA and the TA, we can solve for NFA. Using the numbers given for the current ratio and the current liabilities, we solve for CA:

$$\begin{aligned}
 \text{CR} &= \text{CA} / \text{CL} \\
 \text{CA} &= \text{CR}(\text{CL}) = 1.20(\$850) = \$1,020
 \end{aligned}$$

B-22 SOLUTIONS

To find the total assets, we must first find the total debt and equity from the information given. So, we find the sales using the profit margin:

$$PM = NI / \text{Sales}$$

$$NI = PM(\text{Sales}) = .095(\$4,310) = \$409.45$$

We now use the sales figure as an input into ROE to find the total equity:

$$ROE = NI / TE$$

$$TE = NI / ROE = \$409.45 / .215 = \$1,904.42$$

Next, we need to find the long-term debt. The long-term debt ratio is:

$$\text{Long-term debt ratio} = 0.70 = LTD / (LTD + TE)$$

Inverting both sides gives:

$$1 / 0.70 = (LTD + TE) / LTD = 1 + (TE / LTD)$$

Substituting the total equity into the equation and solving for long-term debt gives the following:

$$1 + \$1,904.42 / LTD = 1.429$$

$$LTD = \$1,904.42 / .429 = \$4,443.64$$

Now, we can find the total debt of the company:

$$TD = CL + LTD = \$850 + 4,443.64 = \$5,293.64$$

And, with the total debt, we can find the TD&E, which is equal to TA:

$$TA = TD + TE = \$5,293.64 + 1,904.43 = \$7,198.06$$

And finally, we are ready to solve the balance sheet identity as:

$$NFA = TA - CA = \$7,198.06 - 1,020 = \$6,178.06$$

21. Child: Profit margin = $NI / S = \$1.00 / \$50 = 2\%$

Store: Profit margin = $NI / S = \$7.7M / \$770M = 1\%$

The advertisement is referring to the store's profit margin, but a more appropriate earnings measure for the firm's owners is the return on equity.

$$ROE = NI / TE = NI / (TA - TD)$$

$$ROE = \$7.7M / (\$196M - 130M) = 11.67\%$$

22. The solution requires substituting two ratios into a third ratio. Rearranging D/TA:

Firm A

$$D / TA = .60$$

$$(TA - E) / TA = .60$$

$$(TA / TA) - (E / TA) = .60$$

$$1 - (E / TA) = .60$$

$$E / TA = .40$$

$$E = .40(TA)$$

Firm B

$$D / TA = .40$$

$$(TA - E) / TA = .40$$

$$(TA / TA) - (E / TA) = .40$$

$$1 - (E / TA) = .40$$

$$E / TA = .60$$

$$E = .60(TA)$$

Rearranging ROA, we find:

$$NI / TA = .20$$

$$NI = .20(TA)$$

$$NI / TA = .30$$

$$NI = .30(TA)$$

Since $ROE = NI / E$, we can substitute the above equations into the ROE formula, which yields:

$$ROE = .20(TA) / .40(TA) = .20 / .40 = 50\%$$

$$ROE = .30(TA) / .60(TA) = .30 / .60 = 50\%$$

23. This problem requires you to work backward through the income statement. First, recognize that Net income = $(1 - t)EBT$. Plugging in the numbers given and solving for EBT, we get:

$$EBT = \$7,850 / 0.66 = \$11,893.94$$

Now, we can add interest to EBIT to get EBIT as follows:

$$EBIT = EBT + \text{Interest paid} = \$11,893.94 + 2,108 = \$14,001.94$$

To get EBITD (earnings before interest, taxes, and depreciation), the numerator in the cash coverage ratio, add depreciation to EBIT:

$$EBITD = EBIT + \text{Depreciation} = \$14,001.94 + 1,687 = \$15,688.94$$

Now, simply plug the numbers into the cash coverage ratio and calculate:

$$\text{Cash coverage ratio} = EBITD / \text{Interest} = \$15,688.94 / \$2,108 = 7.44 \text{ times}$$

24. The only ratio given which includes cost of goods sold is the inventory turnover ratio, so it is the last ratio used. Since current liabilities is given, we start with the current ratio:

$$\text{Current ratio} = 3.3 = CA / CL = CA / \$340,000$$

$$CA = \$1,122,000$$

B-24 SOLUTIONS

Using the quick ratio, we solve for inventory:

$$\text{Quick ratio} = 1.8 = (\text{CA} - \text{Inventory}) / \text{CL} = (\$1,122,000 - \text{Inventory}) / \$340,000$$

$$\text{Inventory} = \text{CA} - (\text{Quick ratio} \times \text{CL})$$

$$\text{Inventory} = \$1,122,000 - (1.8 \times \$340,000)$$

$$\text{Inventory} = \$510,000$$

$$\text{Inventory turnover} = 4.2 = \text{COGS} / \text{Inventory} = \text{COGS} / \$510,000$$

$$\text{COGS} = \$2,142,000$$

25. $\text{PM} = \text{NI} / \text{S} = -\text{£}13,156 / \text{£}147,318 = -8.93\%$

As long as both net income and sales are measured in the same currency, there is no problem; in fact, except for some market value ratios like EPS and BVPS, none of the financial ratios discussed in the text are measured in terms of currency. This is one reason why financial ratio analysis is widely used in international finance to compare the business operations of firms and/or divisions across national economic borders. The net income in dollars is:

$$\text{NI} = \text{PM} \times \text{Sales}$$

$$\text{NI} = -0.0893(\$267,661) = -\$23,903$$

26. *Short-term solvency ratios:*

$$\text{Current ratio} = \text{Current assets} / \text{Current liabilities}$$

$$\text{Current ratio 2004} = \$7,828 / \$1,808 = 4.33 \text{ times}$$

$$\text{Current ratio 2005} = \$8,322 / \$2,320 = 3.59 \text{ times}$$

$$\text{Quick ratio} = (\text{Current assets} - \text{Inventory}) / \text{Current liabilities}$$

$$\text{Quick ratio 2004} = (\$7,828 - 4,608) / \$1,808 = 1.78 \text{ times}$$

$$\text{Quick ratio 2005} = (\$8,322 - 4,906) / \$2,320 = 1.47 \text{ times}$$

$$\text{Cash ratio} = \text{Cash} / \text{Current liabilities}$$

$$\text{Cash ratio 2004} = \$815 / \$1,808 = 0.45 \text{ times}$$

$$\text{Cash ratio 2005} = \$906 / \$2,320 = 0.39 \text{ times}$$

Asset utilization ratios:

$$\text{Total asset turnover} = \text{Sales} / \text{Total assets}$$

$$\text{Total asset turnover} = \$33,500 / \$27,489 = 1.22 \text{ times}$$

$$\text{Inventory turnover} = \text{Cost of goods sold} / \text{Inventory}$$

$$\text{Inventory turnover} = \$18,970 / \$4,906 = 3.87 \text{ times}$$

$$\text{Receivables turnover} = \text{Sales} / \text{Accounts receivable}$$

$$\text{Receivables turnover} = \$33,500 / \$2,510 = 13.35 \text{ times}$$

Long-term solvency ratios:

$$\text{Total debt ratio} = (\text{Total assets} - \text{Total equity}) / \text{Total assets}$$

$$\text{Total debt ratio 2004} = (\$22,992 - 16,367) / \$22,992 = 0.29$$

$$\text{Total debt ratio 2005} = (\$27,489 - 20,209) / \$27,489 = 0.26$$

Debt-equity ratio	= Total debt / Total equity
Debt-equity ratio 2004	= $(\$1,808 + 4,817) / \$16,367 = 0.40$
Debt-equity ratio 2005	= $(\$2,320 + 4,960) / \$20,209 = 0.36$
Equity multiplier	= $1 + D/E$
Equity multiplier 2004	= $1 + 0.40 = 1.40$
Equity multiplier 2005	= $1 + 0.36 = 1.36$
Times interest earned	= EBIT / Interest
Times interest earned	= $\$12,550 / \$486 = 25.82$ times
Cash coverage ratio	= $(EBIT + Depreciation) / Interest$
Cash coverage ratio	= $(\$12,550 + 1,980) / \$486 = 29.90$ times

Profitability ratios:

Profit margin	= Net income / Sales
Profit margin	= $\$7,842 / \$33,500 = 23.41\%$
Return on assets	= Net income / Total assets
Return on assets	= $\$7,842 / \$27,489 = 28.53\%$
Return on equity	= Net income / Total equity
Return on equity	= $\$7,842 / \$20,209 = 38.80\%$

27. The DuPont identity is:

$$\begin{aligned} \text{ROE} &= (\text{PM})(\text{TAT})(\text{EM}) \\ \text{ROE} &= (0.2341)(1.22)(1.36) = 0.3880 \text{ or } 38.80\% \end{aligned}$$

28. The number of days a company can operate if cash inflows were suspended is found by the interval measure. The interval measure is calculated as:

$$\text{Interval measure} = \text{Current assets} / \text{Average daily operating costs}$$

We can find the average daily operating costs as follows:

$$\begin{aligned} \text{Average daily operating costs} &= \text{Cost of goods sold} / 365 \text{ days} \\ \text{Average daily operating costs} &= \$18,970 / 365 = \$51.97 \text{ per day} \end{aligned}$$

So, the number of days the company can operate if cash inflows are suspended, or the interval measure, is:

$$\text{Interval measure} = \$8,322 / \$51.97 \text{ per day} = 160 \text{ days}$$

29.

SMOLIRA GOLF CORP.
Statement of Cash Flows
For 2005

Cash, beginning of the year	\$ 815
 <i>Operating activities</i>	
Net income	\$ 7,842
Plus:	
Depreciation	\$ 1,980
Increase in accounts payable	309
Increase in other current liabilities	83
Less:	
Increase in accounts receivable	\$ (105)
Increase in inventory	(298)
	\$ 9,811
 <i>Investment activities</i>	
Fixed asset acquisition	\$ (5,983)
<i>Net cash from investment activities</i>	\$ (5,983)
 <i>Financing activities</i>	
Increase in notes payable	\$ 120
Dividends paid	(4,000)
Decrease in long-term debt	143
<i>Net cash from financing activities</i>	\$ (3,737)
 <i>Net increase in cash</i>	 \$ 91
 Cash, end of year	 \$ 906

- 30.** Earnings per share = Net income / Shares
Earnings per share = $\$7,842 / 2,500 = \3.14 per share
- P/E ratio = Shares price / Earnings per share
P/E ratio = $\$67 / \$3.14 = 21.36$ times
- Dividends per share = Dividends / Shares
Dividends per share = $\$4,000 / 2,500 = \1.60 per share
- Book value per share = Total equity / Shares
Book value per share = $\$20,209 / 2,500 \text{ shares} = \8.08 per share
- Market-to-book ratio = Share price / Book value per share
Market-to-book ratio = $\$67.00 / \$8.08 = 8.29$ times

CHAPTER 4

LONG-TERM FINANCIAL PLANNING AND GROWTH

Answers to Concepts Review and Critical Thinking Questions

1. The reason is that, ultimately, sales are the driving force behind a business. A firm's assets, employees, and, in fact, just about every aspect of its operations and financing exist to directly or indirectly support sales. Put differently, a firm's future need for things like capital assets, employees, inventory, and financing are determined by its future sales level.
2. Two assumptions of the sustainable growth formula are that the company does not want to sell new equity, and that financial policy is fixed. If the company raises outside equity, or increases its debt-equity ratio it can grow at a higher rate than the sustainable growth rate. Of course the company could also grow faster than its profit margin increases, if it changes its dividend policy by increasing the retention ratio, or its total asset turnover increases.
3. The internal growth rate is greater than 15%, because at a 15% growth rate the negative EFN indicates that there is excess internal financing. If the internal growth rate is greater than 15%, then the sustainable growth rate is certainly greater than 15%, because there is additional debt financing used in that case (assuming the firm is not 100% equity-financed). As the retention ratio is increased, the firm has more internal sources of funding, so the EFN will decline. Conversely, as the retention ratio is decreased, the EFN will rise. If the firm pays out all its earnings in the form of dividends, then the firm has no internal sources of funding (ignoring the effects of accounts payable); the internal growth rate is zero in this case and the EFN will rise to the change in total assets.
4. The sustainable growth rate is greater than 20%, because at a 20% growth rate the negative EFN indicates that there is excess financing still available. If the firm is 100% equity financed, then the sustainable and internal growth rates are equal and the internal growth rate would be greater than 20%. However, when the firm has some debt, the internal growth rate is always less than the sustainable growth rate, so it is ambiguous whether the internal growth rate would be greater than or less than 20%. If the retention ratio is increased, the firm will have more internal funding sources available, and it will have to take on more debt to keep the debt/equity ratio constant, so the EFN will decline. Conversely, if the retention ratio is decreased, the EFN will rise. If the retention rate is zero, both the internal and sustainable growth rates are zero, and the EFN will rise to the change in total assets.
5. Presumably not, but, of course, if the product had been *much* less popular, then a similar fate would have awaited due to lack of sales.
6. Since customers did not pay until shipment, receivables rose. The firm's NWC, but not its cash, increased. At the same time, costs were rising faster than cash revenues, so operating cash flow declined. The firm's capital spending was also rising. Thus, all three components of cash flow from assets were negatively impacted.

B-28 SOLUTIONS

7. Apparently not! In hindsight, the firm may have underestimated costs and also underestimated the extra demand from the lower price.
8. Financing possibly could have been arranged if the company had taken quick enough action. Sometimes it becomes apparent that help is needed only when it is too late, again emphasizing the need for planning.
9. All three were important, but the lack of cash or, more generally, financial resources ultimately spelled doom. An inadequate cash resource is usually cited as the most common cause of small business failure.
10. Demanding cash up front, increasing prices, subcontracting production, and improving financial resources via new owners or new sources of credit are some of the options. When orders exceed capacity, price increases may be especially beneficial.

Solutions to Questions and Problems

NOTE: All end of chapter problems were solved using a spreadsheet. Many problems require multiple steps. Due to space and readability constraints, when these intermediate steps are included in this solutions manual, rounding may appear to have occurred. However, the final answer for each problem is found without rounding during any step in the problem.

Basic

1. It is important to remember that equity will not increase by the same percentage as the other assets. If every other item on the income statement and balance sheet increases by 10 percent, the pro forma income statement and balance sheet will look like this:

<u>Pro forma income statement</u>		<u>Pro forma balance sheet</u>			
Sales	\$17,600	Assets	\$ 9,790	Debt	\$ 5,610
Costs	<u>13,750</u>			Equity	<u>4,180</u>
Net income	<u>\$ 3,850</u>	Total	<u>\$ 9,790</u>	Total	<u>\$ 9,790</u>

In order for the balance sheet to balance, equity must be:

$$\text{Equity} = \text{Total liabilities and equity} - \text{Debt}$$

$$\text{Equity} = \$9,790 - 5,610$$

$$\text{Equity} = \$4,180$$

Equity increased by:

$$\text{Equity increase} = \$4,180 - 3,800$$

$$\text{Equity increase} = \$380$$

Net income is \$3,850 but equity only increased by \$380; therefore, a dividend of:

$$\begin{aligned} \text{Dividend} &= \$3,850 - 380 \\ \text{Dividend} &= \$3,470 \end{aligned}$$

must have been paid. Dividends paid is the plug variable.

2. Here we are given the dividend amount, so dividends paid is not a plug variable. If the company pays out one-half of its net income as dividends, the pro forma income statement and balance sheet will look like this:

<u>Pro forma income statement</u>		<u>Pro forma balance sheet</u>			
Sales	\$17,600	Assets	\$ 9,790	Debt	\$ 5,100
Costs	<u>13,750</u>			Equity	<u>5,725</u>
Net income	<u>\$ 3,850</u>	Total	<u>\$ 9,790</u>	Total	<u>\$10,825</u>
Dividends	\$ 1,925				
Add. to RE	1,925				

Note that the balance sheet does not balance. This is due to EFN. The EFN for this company is:

$$\begin{aligned} \text{EFN} &= \text{Total assets} - \text{Total liabilities and equity} \\ \text{EFN} &= \$9,790 - 10,825 \\ \text{EFN} &= -\$1,035 \end{aligned}$$

3. An increase of sales to \$5,192 is an increase of:

$$\begin{aligned} \text{Sales increase} &= (\$5,192 - 4,400) / \$4,400 \\ \text{Sales increase} &= .18 \text{ or } 18\% \end{aligned}$$

Assuming costs and assets increase proportionally, the pro forma financial statements will look like this:

<u>Pro forma income statement</u>		<u>Pro forma balance sheet</u>			
Sales	\$ 5,192	Assets	\$ 15,812	Debt	\$ 9,100
Costs	<u>3,168</u>			Equity	<u>6,324</u>
Net income	<u>\$ 2,024</u>	Total	<u>\$ 15,812</u>	Total	<u>\$ 15,424</u>

If no dividends are paid, the equity account will increase by the net income, so:

$$\begin{aligned} \text{Equity} &= \$4,300 + 2,024 \\ \text{Equity} &= \$6,324 \end{aligned}$$

So the EFN is:

$$\begin{aligned} \text{EFN} &= \text{Total assets} - \text{Total liabilities and equity} \\ \text{EFN} &= \$15,812 - 15,424 = \$388 \end{aligned}$$

B-30 SOLUTIONS

4. An increase of sales to \$23,040 is an increase of:

$$\text{Sales increase} = (\$23,040 - 19,200) / \$19,200$$

$$\text{Sales increase} = .20 \text{ or } 20\%$$

Assuming costs and assets increase proportionally, the pro forma financial statements will look like this:

<u>Pro forma income statement</u>		<u>Pro forma balance sheet</u>			
Sales	\$23,040.00	Assets	\$ 111,600	Debt	\$ 20,400.00
Costs	<u>18,660.00</u>			Equity	<u>74,334.48</u>
EBIT	4,380.00	Total	<u>\$ 111,600</u>	Total	<u>\$ 94,734.48</u>
Taxes(34%)	<u>1,489.20</u>				
Net income	<u>\$ 2,890.80</u>				

The payout ratio is constant, so the dividends paid this year is the payout ratio from last year times net income, or:

$$\text{Dividends} = (\$963.60 / \$2,409)(\$2,890.80)$$

$$\text{Dividends} = \$1,156.32$$

The addition to retained earnings is:

$$\text{Addition to retained earnings} = \$2,890.80 - 1,156.32$$

$$\text{Addition to retained earnings} = \$1,734.48$$

And the new equity balance is:

$$\text{Equity} = \$72,600 + 1,734.48$$

$$\text{Equity} = \$74,334.48$$

So the EFN is:

$$\text{EFN} = \text{Total assets} - \text{Total liabilities and equity}$$

$$\text{EFN} = \$111,600 - 94,734.48$$

$$\text{EFN} = \$16,865.52$$

5. Assuming costs and assets increase proportionally, the pro forma financial statements will look like this:

<u>Pro forma income statement</u>		<u>Pro forma balance sheet</u>			
Sales	\$4,140.00	CA	\$5,175.00	CL	\$1,058.00
Costs	<u>3,335.00</u>	FA	4,485.00	LTD	1,840.00
Taxable income	805.00			Equity	<u>5,905.65</u>
Taxes (34%)	<u>273.70</u>	Total	<u>\$9,660.00</u>	Total	<u>\$8,803.65</u>
Net income	<u>\$ 531.30</u>				

The payout ratio is 50 percent, so dividends will be:

$$\begin{aligned}\text{Dividends} &= 0.50(\$531.30) \\ \text{Dividends} &= \$265.65\end{aligned}$$

The addition to retained earnings is:

$$\begin{aligned}\text{Addition to retained earnings} &= \$531.30 - 265.65 \\ \text{Addition to retained earnings} &= \$265.65\end{aligned}$$

So the EFN is:

$$\begin{aligned}\text{EFN} &= \text{Total assets} - \text{Total liabilities and equity} \\ \text{EFN} &= \$9,660.00 - 8,803.65 \\ \text{EFN} &= \$856.35\end{aligned}$$

6. To calculate the internal growth rate, we first need to calculate the ROA, which is:

$$\begin{aligned}\text{ROA} &= \text{NI} / \text{TA} \\ \text{ROA} &= \$2,327 / \$38,000 \\ \text{ROA} &= .0612 \text{ or } 6.12\%\end{aligned}$$

The plowback ratio, b , is one minus the payout ratio, so:

$$\begin{aligned}b &= 1 - .20 \\ b &= .80\end{aligned}$$

Now we can use the internal growth rate equation to get:

$$\begin{aligned}\text{Internal growth rate} &= (\text{ROA} \times b) / [1 - (\text{ROA} \times b)] \\ \text{Internal growth rate} &= [0.0612(.80)] / [1 - 0.0612(.80)] \\ \text{Internal growth rate} &= .0515 \text{ or } 5.15\%\end{aligned}$$

7. To calculate the sustainable growth rate, we first need to calculate the ROE, which is:

$$\begin{aligned}\text{ROE} &= \text{NI} / \text{TE} \\ \text{ROE} &= \$2,327 / \$16,000 \\ \text{ROE} &= .1454\end{aligned}$$

The plowback ratio, b , is one minus the payout ratio, so:

$$\begin{aligned}b &= 1 - .20 \\ b &= .80\end{aligned}$$

Now we can use the sustainable growth rate equation to get:

$$\begin{aligned}\text{Sustainable growth rate} &= (\text{ROE} \times b) / [1 - (\text{ROE} \times b)] \\ \text{Sustainable growth rate} &= [0.1454(.80)] / [1 - 0.1454(.80)] \\ \text{Sustainable growth rate} &= .1317 \text{ or } 13.17\%\end{aligned}$$

B-32 SOLUTIONS

8. The maximum percentage sales increase is the sustainable growth rate. To calculate the sustainable growth rate, we first need to calculate the ROE, which is:

$$\text{ROE} = \text{NI} / \text{TE}$$

$$\text{ROE} = \$12,672 / \$73,000$$

$$\text{ROE} = .1736$$

The plowback ratio, b , is one minus the payout ratio, so:

$$b = 1 - .30$$

$$b = .70$$

Now we can use the sustainable growth rate equation to get:

$$\text{Sustainable growth rate} = (\text{ROE} \times b) / [1 - (\text{ROE} \times b)]$$

$$\text{Sustainable growth rate} = [.1736(.70)] / [1 - .1736(.70)]$$

$$\text{Sustainable growth rate} = .1383 \text{ or } 13.83\%$$

So, the maximum dollar increase in sales is:

$$\text{Maximum increase in sales} = \$54,000(.1383)$$

$$\text{Maximum increase in sales} = \$7,469.27$$

9. Assuming costs vary with sales and a 20 percent increase in sales, the pro forma income statement will look like this:

HEIR JORDAN CORPORATION	
Pro Forma Income Statement	
Sales	\$34,800.00
Costs	<u>13,440.00</u>
Taxable income	\$21,360.00
Taxes (34%)	<u>7,262.40</u>
Net income	<u>\$ 14,097.60</u>

The payout ratio is constant, so the dividends paid this year is the payout ratio from last year times net income, or:

$$\text{Dividends} = (\$4,935 / \$11,748)(\$14,097.60)$$

$$\text{Dividends} = \$5,921.68$$

And the addition to retained earnings will be:

$$\text{Addition to retained earnings} = \$14,097.60 - 5,921.68$$

$$\text{Addition to retained earnings} = \$8,175.92$$

10. Below is the balance sheet with the percentage of sales for each account on the balance sheet. Notes payable, total current liabilities, long-term debt, and all equity accounts do not vary directly with sales.

HEIR JORDAN CORPORATION					
Balance Sheet					
(\$)			(%)		
Assets			Liabilities and Owners' Equity		
Current assets			Current liabilities		
Cash	\$ 3,525	12.16	Accounts payable	\$ 3,000	10.34
Accounts receivable	7,500	25.86	Notes payable	<u>7,500</u>	n/a
Inventory	<u>6,000</u>	<u>20.69</u>	Total	<u>\$10,500</u>	n/a
Total	<u>\$17,025</u>	<u>58.71</u>	Long-term debt	<u>19,500</u>	n/a
Fixed assets			Owners' equity		
Net plant and equipment	<u>30,000</u>	<u>103.45</u>	Common stock and paid-in surplus	\$15,000	n/a
			Retained earnings	<u>2,025</u>	n/a
			Total	<u>\$17,025</u>	n/a
Total assets	<u>\$47,025</u>	<u>162.16</u>	Total liabilities and owners' equity	<u>\$47,025</u>	n/a

11. Assuming costs vary with sales and a 20 percent increase in sales, the pro forma income statement will look like this:

HEIR JORDAN CORPORATION	
Pro Forma Income Statement	
Sales	\$33,350.00
Costs	<u>12,880.00</u>
Taxable income	\$20,470.00
Taxes (34%)	<u>6,959.80</u>
Net income	<u>\$ 13,510.20</u>

The payout ratio is constant, so the dividends paid this year is the payout ratio from last year times net income, or:

$$\text{Dividends} = (\$4,935/\$11,748)(\$13,510.20)$$

$$\text{Dividends} = \$5,674.94$$

And the addition to retained earnings will be:

$$\text{Addition to retained earnings} = \$13,240.20 - 5,674.94$$

$$\text{Addition to retained earnings} = \$7,835.26$$

The new total addition to retained earnings on the pro forma balance sheet will be:

$$\text{New total addition to retained earnings} = \$2,025 + 7,835.26$$

$$\text{New total addition to retained earnings} = \$9,860.26$$

B-34 SOLUTIONS

The pro forma balance sheet will look like this:

HEIR JORDAN CORPORATION
Pro Forma Balance Sheet

Assets		Liabilities and Owners' Equity	
Current assets		Current liabilities	
Cash	\$ 4,053.75	Accounts payable	\$ 3,450.00
Accounts receivable	8,625.00	Notes payable	<u>7,500.00</u>
Inventory	<u>6,900.00</u>	Total	\$ 10,950.00
Total	<u>\$ 19,578.75</u>	Long-term debt	<u>19,500.00</u>
Fixed assets		Owners' equity	
Net plant and equipment	<u>34,500.00</u>	Common stock and paid-in surplus	\$ 15,000.00
		Retained earnings	<u>9,860.26</u>
		Total	<u>\$ 24,860.26</u>
Total assets	<u>\$ 54,078.75</u>	Total liabilities and owners' equity	<u>\$ 55,310.26</u>

So the EFN is:

$$\text{EFN} = \text{Total assets} - \text{Total liabilities and equity}$$

$$\text{EFN} = \$54,078.75 - 55,310.26$$

$$\text{EFN} = -\$1,231.51$$

- 12.** We need to calculate the retention ratio to calculate the internal growth rate. The retention ratio is:

$$b = 1 - .20$$

$$b = .80$$

Now we can use the internal growth rate equation to get:

$$\text{Internal growth rate} = (\text{ROA} \times b) / [1 - (\text{ROA} \times b)]$$

$$\text{Internal growth rate} = [.10(.80)] / [1 - .10(.80)]$$

$$\text{Internal growth rate} = .0870 \text{ or } 8.70\%$$

- 13.** We need to calculate the retention ratio to calculate the sustainable growth rate. The retention ratio is:

$$b = 1 - .25$$

$$b = .75$$

Now we can use the sustainable growth rate equation to get:

$$\text{Sustainable growth rate} = (\text{ROE} \times b) / [1 - (\text{ROE} \times b)]$$

$$\text{Sustainable growth rate} = [.19(.75)] / [1 - .19(.75)]$$

$$\text{Sustainable growth rate} = .1662 \text{ or } 16.62\%$$

14. We first must calculate the ROE to calculate the sustainable growth rate. To do this we must realize two other relationships. The total asset turnover is the inverse of the capital intensity ratio, and the equity multiplier is $1 + D/E$. Using these relationships, we get:

$$\begin{aligned} \text{ROE} &= (\text{PM})(\text{TAT})(\text{EM}) \\ \text{ROE} &= (.089)(1/.55)(1 + .60) \\ \text{ROE} &= .2589 \text{ or } 25.89\% \end{aligned}$$

The plowback ratio is one minus the dividend payout ratio, so:

$$\begin{aligned} b &= 1 - (\$15,000 / \$29,000) \\ b &= .4828 \end{aligned}$$

Now we can use the sustainable growth rate equation to get:

$$\begin{aligned} \text{Sustainable growth rate} &= (\text{ROE} \times b) / [1 - (\text{ROE} \times b)] \\ \text{Sustainable growth rate} &= [.2589(.4828)] / [1 - .2589(.4828)] \\ \text{Sustainable growth rate} &= .1428 \text{ or } 14.28\% \end{aligned}$$

15. We must first calculate the ROE using the DuPont ratio to calculate the sustainable growth rate. The ROE is:

$$\begin{aligned} \text{ROE} &= (\text{PM})(\text{TAT})(\text{EM}) \\ \text{ROE} &= (.076)(1.40)(1.50) \\ \text{ROE} &= 15.96\% \end{aligned}$$

The plowback ratio is one minus the dividend payout ratio, so:

$$\begin{aligned} b &= 1 - .40 \\ b &= .60 \end{aligned}$$

Now we can use the sustainable growth rate equation to get:

$$\begin{aligned} \text{Sustainable growth rate} &= (\text{ROE} \times b) / [1 - (\text{ROE} \times b)] \\ \text{Sustainable growth rate} &= [.1596(.60)] / [1 - .1596(.60)] \\ \text{Sustainable growth rate} &= 10.59\% \end{aligned}$$

Intermediate

16. To determine full capacity sales, we divide the current sales by the capacity the company is currently using, so:

$$\begin{aligned} \text{Full capacity sales} &= \$510,000 / .85 \\ \text{Full capacity sales} &= \$600,000 \end{aligned}$$

The maximum sales growth is the full capacity sales divided by the current sales, so:

$$\begin{aligned} \text{Maximum sales growth} &= (\$600,000 / \$510,000) - 1 \\ \text{Maximum sales growth} &= .1765 \text{ or } 17.65\% \end{aligned}$$

B-36 SOLUTIONS

17. To find the new level of fixed assets, we need to find the current percentage of fixed assets to full capacity sales. Doing so, we find:

$$\text{Fixed assets} / \text{Full capacity sales} = \$415,000 / \$600,000$$

$$\text{Fixed assets} / \text{Full capacity sales} = .6917$$

Next, we calculate the total dollar amount of fixed assets needed at the new sales figure.

$$\text{Total fixed assets} = .6917(\$680,000)$$

$$\text{Total fixed assets} = \$470,333.33$$

The new fixed assets necessary is the total fixed assets at the new sales figure minus the current level of fixed assets.

$$\text{New fixed assets} = \$470,333.33 - 415,000$$

$$\text{New fixed assets} = \$55,333.33$$

18. We have all the variables to calculate ROE using the DuPont identity except the profit margin. If we find ROE, we can solve the DuPont identity for profit margin. We can calculate ROE from the sustainable growth rate equation. For this equation we need the retention ratio, so:

$$b = 1 - .50$$

$$b = .50$$

Using the sustainable growth rate equation and solving for ROE, we get:

$$\text{Sustainable growth rate} = (\text{ROE} \times b) / [1 - (\text{ROE} \times b)]$$

$$.08 = [\text{ROE}(.50)] / [1 - \text{ROE}(.50)]$$

$$\text{ROE} = .1481 \text{ or } 14.81\%$$

Now we can use the DuPont identity to find the profit margin as:

$$\text{ROE} = \text{PM}(\text{TAT})(\text{EM})$$

$$.1481 = \text{PM}(1 / 1.30)(1 + .40)$$

$$\text{PM} = (.1481)(1.30) / 1.40$$

$$\text{PM} = .1376 \text{ or } 13.76\%$$

19. We have all the variables to calculate ROE using the DuPont identity except the equity multiplier. Remember that the equity multiplier is one plus the debt-equity ratio. If we find ROE, we can solve the DuPont identity for equity multiplier, then the debt-equity ratio. We can calculate ROE from the sustainable growth rate equation. For this equation we need the retention ratio, so:

$$b = 1 - .60$$

$$b = .40$$

Using the sustainable growth rate equation and solving for ROE, we get:

$$\text{Sustainable growth rate} = (\text{ROE} \times b) / [1 - (\text{ROE} \times b)]$$

$$.11 = [\text{ROE}(.40)] / [1 - \text{ROE}(.40)]$$

$$\text{ROE} = .2477 \text{ or } 24.77\%$$

Now we can use the DuPont identity to find the equity multiplier as:

$$\begin{aligned} \text{ROE} &= \text{PM}(\text{TAT})(\text{EM}) \\ .2477 &= (.095)(1 / .9)\text{EM} \\ \text{EM} &= (.2477)(.9) / .095 \\ \text{EM} &= 2.35 \end{aligned}$$

So, the D/E ratio is:

$$\begin{aligned} \text{D/E} &= \text{EM} - 1 \\ \text{D/E} &= 2.35 - 1 \\ \text{D/E} &= 1.35 \end{aligned}$$

- 20.** We are given the profit margin. Remember that:

$$\text{ROA} = \text{PM}(\text{TAT})$$

We can calculate the ROA from the internal growth rate formula, and then use the ROA in this equation to find the total asset turnover. The retention ratio is:

$$\begin{aligned} b &= 1 - .30 \\ b &= .70 \end{aligned}$$

Using the internal growth rate equation to find the ROA, we get:

$$\begin{aligned} \text{Internal growth rate} &= (\text{ROA} \times b) / [1 - (\text{ROA} \times b)] \\ .09 &= [\text{ROA}(.70)] / [1 - \text{ROA}(.70)] \\ \text{ROA} &= .1180 \text{ or } 11.80\% \end{aligned}$$

Plugging ROA and PM into the equation we began with and solving for TAT, we get:

$$\begin{aligned} \text{ROA} &= (\text{PM})(\text{TAT}) \\ .1180 &= .08(\text{PM}) \\ \text{TAT} &= .1180 / .08 \\ \text{TAT} &= 1.47 \text{ times} \end{aligned}$$

- 21.** We should begin by calculating the D/E ratio. We calculate the D/E ratio as follows:

$$\text{Total debt ratio} = .60 = \text{TD} / \text{TA}$$

Inverting both sides we get:

$$1 / .60 = \text{TA} / \text{TD}$$

Next, we need to recognize that

$$\text{TA} / \text{TD} = 1 + \text{TE} / \text{TD}$$

Substituting this into the previous equation, we get:

$$1 / .60 = 1 + \text{TE} / \text{TD}$$

B-38 SOLUTIONS

Subtract 1 (one) from both sides and inverting again, we get:

$$\begin{aligned} D/E &= 1 / [(1 / .60) - 1] \\ D/E &= 1.5 \end{aligned}$$

With the D/E ratio, we can calculate the EM and solve for ROE using the DuPont identity:

$$\begin{aligned} ROE &= (PM)(TAT)(EM) \\ ROE &= (.064)(1.80)(1 + 1.5) \\ ROE &= .2880 \text{ or } 28.80\% \end{aligned}$$

Now, we use the ROE equation:

$$\begin{aligned} ROE &= ROA(EM) \\ .2880 &= ROA(2.5) \\ ROA &= .1152 \text{ or } 11.52\% \end{aligned}$$

Now we can calculate the retention ratio as:

$$\begin{aligned} b &= 1 - .60 \\ b &= .40 \end{aligned}$$

Finally, putting all the numbers we have calculated into the sustainable growth rate equation, we get:

$$\begin{aligned} \text{Sustainable growth rate} &= (ROE \times b) / [1 - (ROE \times b)] \\ \text{Sustainable growth rate} &= [.2880(.40)] / [1 - .2880(.40)] \\ \text{Sustainable growth rate} &= .1302 \text{ or } 13.02\% \end{aligned}$$

- 22.** To calculate the sustainable growth rate, we first must calculate the retention ratio and ROE. The retention ratio is:

$$\begin{aligned} b &= 1 - \$12,000 / \$21,000 \\ b &= .4286 \end{aligned}$$

And the ROE is:

$$\begin{aligned} ROE &= \$21,000 / \$49,000 \\ ROE &= .4286 \text{ or } 42.86\% \end{aligned}$$

So, the sustainable growth rate is:

$$\begin{aligned} \text{Sustainable growth rate} &= (ROE \times b) / [1 - (ROE \times b)] \\ \text{Sustainable growth rate} &= [.4286(.4286)] / [1 - .4286(.4286)] \\ \text{Sustainable growth rate} &= 22.50\% \end{aligned}$$

If the company grows at the sustainable growth rate, the new level of total assets is:

$$\text{New TA} = 1.2250(\$134,000) = \$164,150$$

To find the new level of debt in the company's balance sheet, we take the percentage of debt in the capital structure times the new level of total assets. The additional borrowing will be the new level of debt minus the current level of debt. So:

$$\begin{aligned}\text{New TD} &= [D / (D + E)](TA) \\ \text{New TD} &= [\$85,000 / (\$85,000 + 49,000)](\$164,150) \\ \text{New TD} &= \$104,125\end{aligned}$$

And the additional borrowing will be:

$$\begin{aligned}\text{Additional borrowing} &= \$104,125 - 85,000 \\ \text{Additional borrowing} &= \$19,125\end{aligned}$$

The growth rate that can be supported with no outside financing is the internal growth rate. To calculate the internal growth rate, we first need the ROA, which is:

$$\begin{aligned}\text{ROA} &= \$21,000 / \$134,000 \\ \text{ROA} &= .1567 \text{ or } 15.67\%\end{aligned}$$

This means the internal growth rate is:

$$\begin{aligned}\text{Internal growth rate} &= (\text{ROA} \times b) / [1 - (\text{ROA} \times b)] \\ \text{Internal growth rate} &= [.1567(.4286)] / [1 - .1567(.4286)] \\ \text{Internal growth rate} &= 7.20\%\end{aligned}$$

- 23.** Since the company issued no new equity, shareholders' equity increased by retained earnings. Retained earnings for the year were:

$$\begin{aligned}\text{Retained earnings} &= \text{NI} - \text{Dividends} \\ \text{Retained earnings} &= \$80,000 - 49,000 \\ \text{Retained earnings} &= \$31,000\end{aligned}$$

So, the equity at the end of the year was:

$$\begin{aligned}\text{Ending equity} &= \$165,000 + 31,000 \\ \text{Ending equity} &= \$196,000\end{aligned}$$

The ROE based on the end of period equity is:

$$\begin{aligned}\text{ROE} &= \$80,000 / \$196,000 \\ \text{ROE} &= 40.82\%\end{aligned}$$

The plowback ratio is:

$$\begin{aligned}\text{Plowback ratio} &= \text{Addition to retained earnings} / \text{NI} \\ \text{Plowback ratio} &= \$31,000 / \$80,000 \\ \text{Plowback ratio} &= .3875 \text{ or } 38.75\%\end{aligned}$$

B-40 SOLUTIONS

Using the equation presented in the text for the sustainable growth rate, we get:

$$\begin{aligned}\text{Sustainable growth rate} &= (\text{ROE} \times b) / [1 - (\text{ROE} \times b)] \\ \text{Sustainable growth rate} &= [.4082(.3875)] / [1 - .4082(.3875)] \\ \text{Sustainable growth rate} &= .1879 \text{ or } 18.79\%\end{aligned}$$

The ROE based on the beginning of period equity is

$$\begin{aligned}\text{ROE} &= \$80,000 / \$165,000 \\ \text{ROE} &= .4848 \text{ or } 48.48\%\end{aligned}$$

Using the shortened equation for the sustainable growth rate and the beginning of period ROE, we get:

$$\begin{aligned}\text{Sustainable growth rate} &= \text{ROE} \times b \\ \text{Sustainable growth rate} &= .4848 \times .3875 \\ \text{Sustainable growth rate} &= .1879 \text{ or } 18.79\%\end{aligned}$$

Using the shortened equation for the sustainable growth rate and the end of period ROE, we get:

$$\begin{aligned}\text{Sustainable growth rate} &= \text{ROE} \times b \\ \text{Sustainable growth rate} &= .4082 \times .3875 \\ \text{Sustainable growth rate} &= .1582 \text{ or } 15.82\%\end{aligned}$$

Using the end of period ROE in the shortened sustainable growth rate results in a growth rate that is too low. This will always occur whenever the equity increases. If equity increases, the ROE based on end of period equity is lower than the ROE based on the beginning of period equity. The ROE (and sustainable growth rate) in the abbreviated equation is based on equity that did not exist when the net income was earned.

24. The ROA using end of period assets is:

$$\begin{aligned}\text{ROA} &= \$80,000 / \$250,000 \\ \text{ROA} &= .3200 \text{ or } 32.00\%\end{aligned}$$

The beginning of period assets had to have been the ending assets minus the addition to retained earnings, so:

$$\begin{aligned}\text{Beginning assets} &= \text{Ending assets} - \text{Addition to retained warnings} \\ \text{Beginning assets} &= \$250,000 - (\$80,000 - 49,000) \\ \text{Beginning assets} &= \$219,000\end{aligned}$$

And the ROA using beginning of period assets is:

$$\begin{aligned}\text{ROA} &= \$80,000 / \$219,000 \\ \text{ROA} &= .3653 \text{ or } 36.53\%\end{aligned}$$

Using the internal growth rate equation presented in the text, we get:

$$\begin{aligned}\text{Internal growth rate} &= (\text{ROA} \times b) / [1 - (\text{ROA} \times b)] \\ \text{Internal growth rate} &= [.3200(.3875)] / [1 - .3200(.3875)] \\ \text{Internal growth rate} &= .1416 \text{ or } 14.16\%\end{aligned}$$

Using the formula $\text{ROA} \times b$, and end of period assets:

$$\begin{aligned}\text{Internal growth rate} &= .3200 \times .3875 \\ \text{Internal growth rate} &= 12.40\%\end{aligned}$$

Using the formula $\text{ROA} \times b$, and beginning of period assets:

$$\begin{aligned}\text{Internal growth rate} &= .3653 \times .3875 \\ \text{Internal growth rate} &= 14.16\%\end{aligned}$$

25. Assuming costs vary with sales and a 20 percent increase in sales, the pro forma income statement will look like this:

MOOSE TOURS INC.	
Pro Forma Income Statement	
Sales	\$ 1,086,000
Costs	852,000
Other expenses	<u>14,400</u>
EBIT	\$ 219,600
Interest	<u>19,700</u>
Taxable income	\$ 199,900
Taxes(35%)	<u>69,965</u>
Net income	<u><u>\$ 129,935</u></u>

The payout ratio is constant, so the dividends paid this year is the payout ratio from last year times net income, or:

$$\begin{aligned}\text{Dividends} &= (\$42,458/\$106,145)(\$129,935) \\ \text{Dividends} &= \$51,974\end{aligned}$$

And the addition to retained earnings will be:

$$\begin{aligned}\text{Addition to retained earnings} &= \$129,935 - 51,974 \\ \text{Addition to retained earnings} &= \$77,961\end{aligned}$$

The new addition to retained earnings on the pro forma balance sheet will be:

$$\begin{aligned}\text{New addition to retained earnings} &= \$257,000 + 77,961 \\ \text{New addition to retained earnings} &= \$334,961\end{aligned}$$

B-42 SOLUTIONS

The pro forma balance sheet will look like this:

MOOSE TOURS INC.
Pro Forma Balance Sheet

Assets		Liabilities and Owners' Equity	
Current assets		Current liabilities	
Cash	\$ 30,000	Accounts payable	\$ 78,000
Accounts receivable	51,600	Notes payable	<u>9,000</u>
Inventory	<u>91,200</u>	Total	\$ 87,000
Total	\$ 172,800	Long-term debt	<u>156,000</u>
Fixed assets		Owners' equity	
Net plant and equipment	<u>436,800</u>	Common stock and paid-in surplus	\$ 21,000
		Retained earnings	<u>334,961</u>
		Total	\$ 355,961
Total assets	<u>\$ 609,600</u>	Total liabilities and owners' equity	<u>\$ 598,961</u>

So the EFN is:

$$\text{EFN} = \text{Total assets} - \text{Total liabilities and equity}$$

$$\text{EFN} = \$609,600 - 598,961$$

$$\text{EFN} = \$10,639$$

26. First, we need to calculate full capacity sales, which is:

$$\text{Full capacity sales} = \$905,000 / .80$$

$$\text{Full capacity sales} = \$1,131,250$$

The capital intensity ratio at full capacity sales is:

$$\text{Capital intensity ratio} = \text{Fixed assets} / \text{Full capacity sales}$$

$$\text{Capital intensity ratio} = \$364,000 / \$1,131,250$$

$$\text{Capital intensity ratio} = .32177$$

The fixed assets required at full capacity sales is the capital intensity ratio times the projected sales level:

$$\text{Total fixed assets} = .32177(\$1,086,000) = \$349,440$$

So, EFN is:

$$\text{EFN} = (\$172,800 + 349,440) - \$598,961 = -\$76,721$$

Note that this solution assumes that fixed assets are decreased (sold) so the company has a 100 percent fixed asset utilization. If we assume fixed assets are not sold, the answer becomes:

$$\text{EFN} = (\$172,800 + 364,000) - \$598,961 = -\$62,161$$

27. The D/E ratio of the company is:

$$D/E = (\$156,000 + 74,000) / \$278,000$$

$$D/E = .82734$$

So the new total debt amount will be:

$$\text{New total debt} = .82734(\$355,961)$$

$$\text{New total debt} = \$294,500.11$$

So the EFN is:

$$\text{EFN} = \$609,600 - (\$294,500.11 + 355,961) = -\$40,861.11$$

An interpretation of the answer is not that the company has a negative EFN. Looking back at Problem 25, we see that for the same sales growth, the EFN is \$10,639. The negative number in this case means the company has too much capital. There are two possible solutions. First, the company can put the excess funds in cash, which has the effect of changing the current asset growth rate. Second, the company can use the excess funds to repurchase debt and equity. To maintain the current capital structure, the repurchase must be in the same proportion as the current capital structure.

Challenge

28. The pro forma income statements for all three growth rates will be:

MOOSE TOURS INC.			
Pro Forma Income Statement			
	<i>15 % Sales Growth</i>	<i>20% Sales Growth</i>	<i>25% Sales Growth</i>
Sales	\$1,040,750	\$1,086,000	\$1,131,250
Costs	816,500	852,000	887,500
Other expenses	<u>13,800</u>	<u>14,400</u>	<u>15,000</u>
EBIT	\$ 210,450	\$ 219,600	\$ 228,750
Interest	<u>19,700</u>	<u>19,700</u>	<u>19,700</u>
Taxable income	\$ 190,750	\$ 199,900	\$ 209,050
Taxes (35%)	<u>66,763</u>	<u>69,965</u>	<u>73,168</u>
Net income	<u>\$ 123,988</u>	<u>\$ 129,935</u>	<u>\$ 135,883</u>
Dividends	\$ 49,595	\$ 51,974	\$ 54,353
Add to RE	74,393	77,961	81,530

B-44 SOLUTIONS

We will calculate the EFN for the 15 percent growth rate first. Assuming the payout ratio is constant, the dividends paid will be:

$$\text{Dividends} = (\$42,458 / \$106,145)(\$123,988)$$

$$\text{Dividends} = \$49,595$$

And the addition to retained earnings will be:

$$\text{Addition to retained earnings} = \$123,988 - 49,595$$

$$\text{Addition to retained earnings} = \$74,393$$

The new addition to retained earnings on the pro forma balance sheet will be:

$$\text{New addition to retained earnings} = \$257,000 + 74,393$$

$$\text{New addition to retained earnings} = \$331,393$$

The pro forma balance sheet will look like this:

15% Sales Growth:

MOOSE TOURS INC.
Pro Forma Balance Sheet

Assets		Liabilities and Owners' Equity	
Current assets		Current liabilities	
Cash	\$ 28,750	Accounts payable	\$ 74,750
Accounts receivable	49,450	Notes payable	<u>9,000</u>
Inventory	<u>87,400</u>	Total	\$ 83,750
Total	\$ 165,600	Long-term debt	<u>156,000</u>
Fixed assets		Owners' equity	
Net plant and equipment	<u>418,600</u>	Common stock and paid-in surplus	\$ 21,000
		Retained earnings	<u>331,393</u>
		Total	\$ 352,393
Total assets	<u>\$ 584,200</u>	Total liabilities and owners' equity	<u>\$ 592,143</u>

So the EFN is:

$$\text{EFN} = \text{Total assets} - \text{Total liabilities and equity}$$

$$\text{EFN} = \$584,200 - 592,143$$

$$\text{EFN} = -\$7,943$$

At a 20 percent growth rate, and assuming the payout ratio is constant, the dividends paid will be:

$$\begin{aligned}\text{Dividends} &= (\$42,458/\$106,145)(\$129,935) \\ \text{Dividends} &= \$51,974\end{aligned}$$

And the addition to retained earnings will be:

$$\begin{aligned}\text{Addition to retained earnings} &= \$129,935 - 51,974 \\ \text{Addition to retained earnings} &= \$77,961\end{aligned}$$

The new addition to retained earnings on the pro forma balance sheet will be:

$$\begin{aligned}\text{New addition to retained earnings} &= \$257,000 + 77,961 \\ \text{New addition to retained earnings} &= \$334,961\end{aligned}$$

The pro forma balance sheet will look like this:

20% Sales Growth:

MOOSE TOURS INC.
Pro Forma Balance Sheet

Assets	Liabilities and Owners' Equity																												
<p>Current assets</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding-left: 20px;">Cash</td> <td style="text-align: right;">\$ 30,000</td> </tr> <tr> <td style="padding-left: 20px;">Accounts receivable</td> <td style="text-align: right;">51,600</td> </tr> <tr> <td style="padding-left: 20px;">Inventory</td> <td style="text-align: right;"><u>91,200</u></td> </tr> <tr> <td style="padding-left: 40px;">Total</td> <td style="text-align: right;">\$ 172,800</td> </tr> </table> <p>Fixed assets</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding-left: 20px;">Net plant and equipment</td> <td style="text-align: right;"><u>436,800</u></td> </tr> </table> <p>Total assets</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: right;"><u>\$ 609,600</u></td> </tr> </table>	Cash	\$ 30,000	Accounts receivable	51,600	Inventory	<u>91,200</u>	Total	\$ 172,800	Net plant and equipment	<u>436,800</u>		<u>\$ 609,600</u>	<p>Current liabilities</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding-left: 20px;">Accounts payable</td> <td style="text-align: right;">\$ 78,000</td> </tr> <tr> <td style="padding-left: 20px;">Notes payable</td> <td style="text-align: right;"><u>9,000</u></td> </tr> <tr> <td style="padding-left: 40px;">Total</td> <td style="text-align: right;">\$ 87,000</td> </tr> <tr> <td style="padding-left: 20px;">Long-term debt</td> <td style="text-align: right;"><u>156,000</u></td> </tr> </table> <p>Owners' equity</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding-left: 20px;">Common stock and paid-in surplus</td> <td style="text-align: right;">\$ 21,000</td> </tr> <tr> <td style="padding-left: 20px;">Retained earnings</td> <td style="text-align: right;"><u>334,961</u></td> </tr> <tr> <td style="padding-left: 40px;">Total</td> <td style="text-align: right;">\$ 355,961</td> </tr> </table> <p>Total liabilities and owners' equity</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: right;"><u>\$ 598,961</u></td> </tr> </table>	Accounts payable	\$ 78,000	Notes payable	<u>9,000</u>	Total	\$ 87,000	Long-term debt	<u>156,000</u>	Common stock and paid-in surplus	\$ 21,000	Retained earnings	<u>334,961</u>	Total	\$ 355,961		<u>\$ 598,961</u>
Cash	\$ 30,000																												
Accounts receivable	51,600																												
Inventory	<u>91,200</u>																												
Total	\$ 172,800																												
Net plant and equipment	<u>436,800</u>																												
	<u>\$ 609,600</u>																												
Accounts payable	\$ 78,000																												
Notes payable	<u>9,000</u>																												
Total	\$ 87,000																												
Long-term debt	<u>156,000</u>																												
Common stock and paid-in surplus	\$ 21,000																												
Retained earnings	<u>334,961</u>																												
Total	\$ 355,961																												
	<u>\$ 598,961</u>																												

So the EFN is:

$$\begin{aligned}\text{EFN} &= \text{Total assets} - \text{Total liabilities and equity} \\ \text{EFN} &= \$609,600 - 598,961 \\ \text{EFN} &= \$10,639\end{aligned}$$

B-46 SOLUTIONS

At a 25 percent growth rate, and assuming the payout ratio is constant, the dividends paid will be:

$$\text{Dividends} = (\$42,458 / \$106,145)(\$135,883)$$

$$\text{Dividends} = \$54,353$$

And the addition to retained earnings will be:

$$\text{Addition to retained earnings} = \$135,883 - 54,353$$

$$\text{Addition to retained earnings} = \$81,530$$

The new addition to retained earnings on the pro forma balance sheet will be:

$$\text{New addition to retained earnings} = \$257,000 + 81,530$$

$$\text{New addition to retained earnings} = \$338,530$$

The pro forma balance sheet will look like this:

25% Sales Growth:

MOOSE TOURS INC.
Pro Forma Balance Sheet

Assets		Liabilities and Owners' Equity	
Current assets		Current liabilities	
Cash	\$ 31,250	Accounts payable	\$ 81,250
Accounts receivable	53,750	Notes payable	<u>9,000</u>
Inventory	<u>95,000</u>	Total	\$ 90,250
Total	\$ 180,000	Long-term debt	<u>156,000</u>
Fixed assets		Owners' equity	
Net plant and equipment	<u>455,000</u>	Common stock and paid-in surplus	\$ 21,000
		Retained earnings	<u>338,530</u>
		Total	\$ 359,530
Total assets	<u>\$ 635,000</u>	Total liabilities and owners' equity	<u>\$ 605,780</u>

So the EFN is:

$$\text{EFN} = \text{Total assets} - \text{Total liabilities and equity}$$

$$\text{EFN} = \$635,000 - 605,780$$

$$\text{EFN} = \$29,221$$

29. The pro forma income statements for all three growth rates will be:

MOOSE TOURS INC.			
Pro Forma Income Statement			
	<i>20% Sales Growth</i>	<i>30% Sales Growth</i>	<i>35% Sales Growth</i>
Sales	\$1,086,000	\$1,176,500	\$1,221,750
Costs	852,000	923,000	958,500
Other expenses	<u>14,400</u>	<u>15,600</u>	<u>16,200</u>
EBIT	\$ 219,600	\$ 237,900	\$ 247,050
Interest	<u>19,700</u>	<u>19,700</u>	<u>19,700</u>
Taxable income	\$ 199,900	\$ 218,200	\$ 227,350
Taxes (35%)	<u>69,965</u>	<u>76,370</u>	<u>79,573</u>
Net income	<u>\$ 129,935</u>	<u>\$ 141,830</u>	<u>\$ 147,778</u>
Dividends	\$ 51,974	\$ 56,732	\$ 59,111
Add to RE	77,961	85,098	88,667

Under the sustainable growth rate assumption, the company maintains a constant debt-equity ratio. The D/E ratio of the company is:

$$D/E = (\$156,000 + 74,000) / \$278,000$$

$$D/E = .82734$$

At a 20 percent growth rate, and assuming the payout ratio is constant, the dividends paid will be:

$$\text{Dividends} = (\$42,458 / \$106,145)(\$129,935)$$

$$\text{Dividends} = \$51,974$$

And the addition to retained earnings will be:

$$\text{Addition to retained earnings} = \$129,935 - 51,974$$

$$\text{Addition to retained earnings} = \$77,961$$

The new addition to retained earnings on the pro forma balance sheet will be:

$$\text{New addition to retained earnings} = \$257,000 + 77,961$$

$$\text{New addition to retained earnings} = \$334,961$$

The new total debt will be:

$$\text{New total debt} = .82734(\$334,961)$$

$$\text{New total debt} = \$294,500$$

So, the new long-term debt will be the new total debt minus the new short-term debt, or:

$$\text{New long-term debt} = \$294,500 - 87,000$$

$$\text{New long-term debt} = \$207,500$$

B-48 SOLUTIONS

The pro forma balance sheet will look like this:

Sales growth rate = 20% and Debt/Equity ratio = .82734:

MOOSE TOURS INC.
Pro Forma Balance Sheet

Assets		Liabilities and Owners' Equity	
Current assets		Current liabilities	
Cash	\$ 30,000	Accounts payable	\$ 78,000
Accounts receivable	51,600	Notes payable	<u>9,000</u>
Inventory	<u>91,200</u>	Total	\$ 87,000
Total	\$ 172,800	Long-term debt	<u>207,500</u>
Fixed assets		Owners' equity	
Net plant and equipment	<u>436,800</u>	Common stock and paid-in surplus	\$ 21,000
		Retained earnings	<u>334,961</u>
		Total	\$ <u>355,961</u>
Total assets	<u>\$ 609,600</u>	Total liabilities and owners' equity	<u>\$ 650,461</u>

So the EFN is:

$$\begin{aligned} \text{EFN} &= \text{Total assets} - \text{Total liabilities and equity} \\ \text{EFN} &= \$609,600 - 650,461 \\ \text{EFN} &= -\$40,861 \end{aligned}$$

At a 30 percent growth rate, and assuming the payout ratio is constant, the dividends paid will be:

$$\begin{aligned} \text{Dividends} &= (\$42,458/\$106,145)(\$141,830) \\ \text{Dividends} &= \$56,732 \end{aligned}$$

And the addition to retained earnings will be:

$$\begin{aligned} \text{Addition to retained earnings} &= \$141,830 - 56,732 \\ \text{Addition to retained earnings} &= \$85,098 \end{aligned}$$

The new addition to retained earnings on the pro forma balance sheet will be:

$$\begin{aligned} \text{New addition to retained earnings} &= \$257,000 + 85,098 \\ \text{New addition to retained earnings} &= \$342,098 \end{aligned}$$

The new total debt will be:

$$\begin{aligned} \text{New total debt} &= .82734(\$342,098) \\ \text{New total debt} &= \$300,405 \end{aligned}$$

So, the new long-term debt will be the new total debt minus the new short-term debt, or:

$$\begin{aligned} \text{New long-term debt} &= \$300,405 - 93,500 \\ \text{New long-term debt} &= \$206,905 \end{aligned}$$

Sales growth rate = 30% and debt/equity ratio = .82734:

MOOSE TOURS INC.
Pro Forma Balance Sheet

Assets	Liabilities and Owners' Equity
Current assets	Current liabilities
Cash	Accounts payable
Accounts receivable	Notes payable
Inventory	Total
Total	Long-term debt
Fixed assets	Owners' equity
Net plant and equipment	Common stock and paid-in surplus
	Retained earnings
	Total
Total assets	Total liabilities and owners' equity

So the EFN is:

$$\begin{aligned} \text{EFN} &= \text{Total assets} - \text{Total liabilities and equity} \\ \text{EFN} &= \$660,400 - 663,503 \\ \text{EFN} &= -\$3,103 \end{aligned}$$

B-50 SOLUTIONS

At a 35 percent growth rate, and assuming the payout ratio is constant, the dividends paid will be:

$$\text{Dividends} = (\$42,458/\$106,145)(\$147,778)$$

$$\text{Dividends} = \$59,111$$

And the addition to retained earnings will be:

$$\text{Addition to retained earnings} = \$147,778 - 59,111$$

$$\text{Addition to retained earnings} = \$88,667$$

The new addition to retained earnings on the pro forma balance sheet will be:

$$\text{New addition to retained earnings} = \$257,000 + 88,667$$

$$\text{New addition to retained earnings} = \$345,667$$

The new total debt will be:

$$\text{New total debt} = .82734(\$366,667)$$

$$\text{New total debt} = \$303,357$$

So, the new long-term debt will be the new total debt minus the new short-term debt, or:

$$\text{New long-term debt} = \$303,357 - 96,750$$

$$\text{New long-term debt} = \$206,607$$

Sales growth rate = 35% and debt/equity ratio = .82734:

MOOSE TOURS INC.
Pro Forma Balance Sheet

Assets	Liabilities and Owners' Equity
Current assets	Current liabilities
Cash	Accounts payable
Accounts receivable	Notes payable
Inventory	Total
Total	Long-term debt
Fixed assets	Owners' equity
Net plant and equipment	Common stock and paid-in surplus
	Retained earnings
	Total
Total assets	Total liabilities and owners' equity

So the EFN is:

$$\text{EFN} = \text{Total assets} - \text{Total liabilities and equity}$$

$$\text{EFN} = \$685,800 - 670,024$$

$$\text{EFN} = \$15,776$$

30. We must need the ROE to calculate the sustainable growth rate. The ROE is:

$$\begin{aligned} \text{ROE} &= (\text{PM})(\text{TAT})(\text{EM}) \\ \text{ROE} &= (.062)(1 / 1.55)(1 + 0.3) \\ \text{ROE} &= .0520 \text{ or } 5.20\% \end{aligned}$$

Now we can use the sustainable growth rate equation to find the retention ratio as:

$$\begin{aligned} \text{Sustainable growth rate} &= (\text{ROE} \times b) / [1 - (\text{ROE} \times b)] \\ \text{Sustainable growth rate} &= .14 = [.0520(b)] / [1 - .0520(b)] \\ b &= 2.36 \end{aligned}$$

This implies the payout ratio is:

$$\begin{aligned} \text{Payout ratio} &= 1 - b \\ \text{Payout ratio} &= 1 - 2.36 \\ \text{Payout ratio} &= -1.36 \end{aligned}$$

This is a negative dividend payout ratio of 136 percent, which is impossible. The growth rate is not consistent with the other constraints. The lowest possible payout rate is 0, which corresponds to retention ratio of 1, or total earnings retention.

The maximum sustainable growth rate for this company is:

$$\begin{aligned} \text{Maximum sustainable growth rate} &= (\text{ROE} \times b) / [1 - (\text{ROE} \times b)] \\ \text{Maximum sustainable growth rate} &= [.0520(1)] / [1 - .0520(1)] \\ \text{Maximum sustainable growth rate} &= .0549 \text{ or } 5.49\% \end{aligned}$$

31. We know that EFN is:

$$\text{EFN} = \text{Increase in assets} - \text{Addition to retained earnings}$$

The increase in assets is the beginning assets times the growth rate, so:

$$\text{Increase in assets} = A \times g$$

The addition to retained earnings next year is the current net income times the retention ratio, times one plus the growth rate, so:

$$\text{Addition to retained earnings} = (\text{NI} \times b)(1 + g)$$

And rearranging the profit margin to solve for net income, we get:

$$\text{NI} = \text{PM}(S)$$

Substituting the last three equations into the EFN equation we started with and rearranging, we get:

$$\begin{aligned} \text{EFN} &= A(g) - \text{PM}(S)b(1 + g) \\ \text{EFN} &= A(g) - \text{PM}(S)b - [\text{PM}(S)b]g \\ \text{EFN} &= -\text{PM}(S)b + [A - \text{PM}(S)b]g \end{aligned}$$

B-52 SOLUTIONS

32. We start with the EFN equation we derived in Problem 32 and set it equal to zero:

$$EFN = 0 = -PM(S)b + [A - PM(S)b]g$$

Substituting the rearranged profit margin equation into the internal growth rate equation, we have:

$$\text{Internal growth rate} = [PM(S)b] / [A - PM(S)b]$$

Since:

$$ROA = NI / A$$

$$ROA = PM(S) / A$$

We can substitute this into the internal growth rate equation and divide both the numerator and denominator by A. This gives:

$$\text{Internal growth rate} = \{ [PM(S)b] / A \} / \{ [A - PM(S)b] / A \}$$

$$\text{Internal growth rate} = b(ROA) / [1 - b(ROA)]$$

To derive the sustainable growth rate, we must realize that to maintain a constant D/E ratio with no external equity financing, EFN must equal the addition to retained earnings times the D/E ratio:

$$EFN = (D/E)[PM(S)b(1 + g)]$$

$$EFN = A(g) - PM(S)b(1 + g)$$

Solving for g and then dividing numerator and denominator by A:

$$\text{Sustainable growth rate} = PM(S)b(1 + D/E) / [A - PM(S)b(1 + D/E)]$$

$$\text{Sustainable growth rate} = [ROA(1 + D/E)b] / [1 - ROA(1 + D/E)b]$$

$$\text{Sustainable growth rate} = b(ROE) / [1 - b(ROE)]$$

33. In the following derivations, the subscript “E” refers to end of period numbers, and the subscript “B” refers to beginning of period numbers. TE is total equity and TA is total assets.

For the sustainable growth rate:

$$\text{Sustainable growth rate} = (ROE_E \times b) / (1 - ROE_E \times b)$$

$$\text{Sustainable growth rate} = (NI/TE_E \times b) / (1 - NI/TE_E \times b)$$

We multiply this equation by:

$$(TE_E / TE_E)$$

$$\text{Sustainable growth rate} = (NI / TE_E \times b) / (1 - NI / TE_E \times b) \times (TE_E / TE_E)$$

$$\text{Sustainable growth rate} = (NI \times b) / (TE_E - NI \times b)$$

Recognize that the numerator is equal to beginning of period equity, that is:

$$(TE_E - NI \times b) = TE_B$$