***CHAPTER 3***

**FINANCIAL STATEMENTS ANALYSIS AND FINANCIAL MODELS**

**Answers to Concepts Review and Critical Thinking Questions**

**1.** Time trend analysis gives a picture of changes in the company’s financial situation over time. Comparing a firm to itself over time allows the financial manager to evaluate whether some aspects of the firm’s operations, finances, or investment activities have changed. 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. Both allow an investigation into what is different about a company from a financial perspective, but neither method gives an indication of whether the difference is positive or negative. For example, suppose a company’s current ratio is increasing over time. It could mean that the company had been facing liquidity problems in the past and is rectifying those problems, or it could mean the company has become less efficient in managing its current accounts. Similar arguments could be made for a peer group comparison. A company with a current ratio lower than its peers could be more efficient at managing its current accounts, or it could be facing liquidity problems. Neither analysis method tells us whether a ratio is good or bad; both show that something is different, and tell us where to look.

**2.** 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.

**3.** 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.

**4.** 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 at a faster rate if its profit margin increases, if it changes its dividend policy by increasing the retention ratio, or its total asset turnover increases.

**5.** The sustainable growth rate is greater than 20 percent, because at a 20 percent growth rate the negative EFN indicates that there is excess financing still available. If the firm is 100 percent equity financed, then the sustainable and internal growth rates are equal and the internal growth rate would be greater than 20 percent. 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 percent. 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.

**6.** Common-size financial statements provide the financial manager with a ratio analysis of the company. The common-size income statement can show, for example, that cost of goods sold as a percentage of sales is increasing. The common-size balance sheet can show a firm’s increasing reliance on debt as a form of financing. Common-size statements of cash flows are not calculated for a simple reason: There is no possible denominator.

**7.** It would reduce the external funds needed. If the company is not operating at full capacity, it would be able to increase sales without a commensurate increase in fixed assets.

**8.** ROE is a better measure of the company’s performance. ROE shows the percentage return earned on shareholder investment. Since the goal of a company is to maximize shareholder wealth, this ratio shows the company’s performance in achieving this goal over the period.

**9.** The EBITD/Assets ratio shows the company’s operating performance before interest, taxes, and depreciation. This ratio would show how a company has controlled costs. While taxes are a cost, and depreciation and amortization can be considered costs, they are not as easily controlled by company management. Conversely, depreciation and amortization can be altered by accounting choices. This ratio only uses costs directly related to operations in the numerator. As such, it gives a better metric to measure management performance over a period than does ROA.

**10.** Long-term liabilities and equity are investments made by investors in the company, either in the form of a loan or ownership. Return on investment is intended to measure the return the company earned from these investments. Return on investment will be higher than the return on assets for a company with current liabilities. To see this, realize that total assets must equal total debt and equity, and total debt and equity is equal to current liabilities plus long-term liabilities plus equity. So, return on investment could be calculated as net income divided by total assets minus current liabilities.

**11.** 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.

**12.** 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.

**13.** 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.

**14.** 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.

**15.** 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.** Using the DuPont identity, the ROE is:

ROE = (Profit margin)(Total asset turnover)(Equity multiplier)

 ROE = (.0605)(1.87)(1.43)

 ROE = .1618, or 16.18%

**2.** The equity multiplier is:

EM = 1 + D/E

 EM = 1 + .63

 EM = 1.63

 One formula to calculate return on equity is:

 ROE = ROA(EM)

 ROE = .084(1.63)

 ROE = .1369, or 13.69%

 ROE can also be calculated as:

 ROE = NI/TE

 So, net income is:

 Net income = ROE(TE)

 Net income = .1369($645,000)

 Net income = $88,313.40

**3.** This is a multistep 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:

 ROE = .11 = (PM)(TAT)(EM) = (PM)(S/TA)(1 + D/E)

 Solving the DuPont identity for profit margin, we get:

 PM = [(ROE)(TA)]/[(1 + D/E)(S)]

 PM = [(.11)($2,532)]/[(1 + .57)($5,987)]

 PM = .0296

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

 PM = .0296 = NI/S

 NI = .0296($5,987)

 Net income = $177.40

**4.** An increase of sales to $23,345 is an increase of:

 Sales increase = ($23,345 – 20,300)/$20,300

 Sales increase = .15, or 15%

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

 Pro forma income statement Pro forma balance sheet

 Sales $ 23,345.00 Assets $ 54,050 Debt $ 26,900.00

 Costs 19,665.00 Equity 21,397.20

 EBIT 3,680.00 Total $ 54,050 Total $48,297.20

 Taxes (21%) 772.80

 Net income $ 2,907.20

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

 Dividends = ($1,400/$2,528)($2,907.20)

 Dividends = $1,610

 The addition to retained earnings is:

 Addition to retained earnings = $2,907.20 – 1,610

 Addition to retained earnings = $1,297.20

 And the new equity balance is:

 Equity = $20,100 + 1,297.20

 Equity = $21,397.20

So the EFN is:

 EFN = Total assets – Total liabilities and equity

EFN = $54,050 – 48,297.20

 EFN = $5,752.80

**5.** The maximum percentage sales increase without issuing new equity is the sustainable growth rate. To calculate the sustainable growth rate, we first need to calculate the ROE, which is:

 ROE = NI/TE

 ROE = $2,325/$10,300

 ROE = .2257, or 22.57%

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

 *b* = 1 – .40

 *b* = .60

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

 Sustainable growth rate = (ROE × b)/[1 – (ROE × b)]

 Sustainable growth rate = [.2257(.60)]/[1 – .2257(.60)]

 Sustainable growth rate = .1567, or 15.67%

 So, the maximum dollar increase in sales is:

 Maximum increase in sales = $8,700(.1567)

 Maximum increase in sales = $1,362.89

**6.** 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:

 Sustainable growth rate = (ROE × *b*)/[1 – (ROE × *b*)]

 Sustainable growth rate = [.141(.75)]/[1 – .141(.75)]

 Sustainable growth rate = .1183, or 11.83%

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

 ROE = (PM)(TAT)(EM)

 ROE = (.052)(3.2)(.95)

 ROE = .1581, or 15.81%

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

 *b* = 1 – .35

 *b* = .65

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

 Sustainable growth rate = (ROE × *b*)/[1 – (ROE × *b*)]

 Sustainable growth rate = [.1581(.65)]/[1 – .1581(.65)]

 Sustainable growth rate = .1145, or 11.45%

**8.** An increase of sales to $11,092 is an increase of:

 Sales increase = ($11,092 – 9,400)/$9,400

 Sales increase = .18, or 18%

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

 Pro forma income statement Pro forma balance sheet

 Sales $ 11,092 Assets $ 23,954 Debt $ 8,400

 Costs 7,941 Equity 15,051

 Net income $ 3,151 Total $ 23,954 Total $ 23,451

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

 Equity = $11,900 + 3,151

 Equity = $15,051

 So the EFN is:

 EFN = Total assets – Total liabilities and equity

 EFN = $23,954 – 23,451

 EFN = $503

**9.** *a.* First, we need to calculate the current sales and change in sales. The current sales are next year’s sales divided by one plus the growth rate, so:

 Current sales = Next year’s sales/(1 + *g*)

 Current sales = $320,000,000/(1 + .16)

 Current sales = $275,862,069

 And the change in sales is:

 Change in sales = $320,000,000 – 275,862,069

 Change in sales = $44,137,931

 We can now complete the current balance sheet. The current assets, fixed assets, and short-term debt are calculated as a percentage of current sales. The long-term debt and par value of stock are given. The plug variable is the addition to retained earnings. So:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   | Assets |   |   | Liabilities and equity |   |
|   | Current assets | $55,172,414 |   | Accounts payable | $41,379,310 |
|   |   |  |   | Long-term debt | $105,000,000 |
|   |   |  |   |   |  |
|   | Fixed assets | 193,103,448 |   | Common stock | $45,000,000 |
|   |   |  |   | Accumulated retained earnings | 56,896,552 |
|   |   |  |   |  Total equity | $101,896,552 |
|   |   |  |   |   |  |
|   | Total assets | $248,275,862 |   | Total liabilities and equity | $248,275,862 |

 *b.* We can use the equation from the text to answer this question. The assets/sales and debt/sales are the percentages given in the problem, so:

 EFN =  × ΔSales –  × ΔSales – (PM × Projected sales) × (1 – *d*)

 EFN = (.20 + .70) × $44,137,931 – (.15 × $44,137,931) – [(.09 × $320,000,000) × (1 – .30)]

 EFN = $12,943,448

 *c.* The current assets, fixed assets, and short-term debt will all increase at the same percentage as sales. The long-term debt and common stock will remain constant. The accumulated retained earnings will increase by the addition to retained earnings for the year. We can calculate the addition to retained earnings for the year as:

 Net income = Profit margin × Sales

 Net income = .09($320,000,000)

 Net income = $28,800,000

 The addition to retained earnings for the year will be the net income times one minus the dividend payout ratio, which is:

 Addition to retained earnings = Net income(1 – *d*)

 Addition to retained earnings = $28,800,000(1 – .30)

 Addition to retained earnings = $20,160,000

 So, the new accumulated retained earnings will be:

 Accumulated retained earnings = $56,896,552 + 20,160,000

 Accumulated retained earnings = $77,056,552

 The pro forma balance sheet will be:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   | Assets |   |   | Liabilities and equity |   |
|   | Current assets | $64,000,000 |   | Accounts payable | $48,000,000 |
|   |   |  |   | Long-term debt | $105,000,000 |
|   |   |  |   |   |  |
|   | Fixed assets | $224,000,000 |   | Common stock | $45,000,000 |
|   |   |  |   | Accumulated retained earnings | 77,056,552 |
|   |   |  |   | Total equity | $122,056,552 |
|   |   |  |   |   |  |
|   | Total assets | $288,000,000 |   | Total liabilities and equity | $275,056,552 |

 The EFN is:

 EFN = Total assets – Total liabilities and equity

 EFN = $288,000,000 – 275,056,552

 EFN = $12,943,448

**10.** *a.* The plowback ratio is one minus the dividend payout ratio, so:

 *b* = 1 – .25

 *b* = .75

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

 Sustainable growth rate = (ROE × *b*)/[1 – (ROE × *b*)]

 Sustainable growth rate = [.1105(.75)]/[1 – .1105(.75)]

 Sustainable growth rate = .0904, or 9.04%

 *b.* It is possible for the sustainable growth rate and the actual growth rate to differ. If any of the actual parameters in the sustainable growth rate equation differ from those used to compute the sustainable growth rate, the actual growth rate will differ from the sustainable growth rate. Since the sustainable growth rate includes ROE in the calculation, this also implies that changes in the profit margin, total asset turnover, or equity multiplier will affect the sustainable growth rate.

 *c*. The company can increase its growth rate by doing any of the following:

* Increase the debt-to-equity ratio by selling more debt or repurchasing stock.
* Increase the profit margin, most likely by better controlling costs.
* Decrease its total assets/sales ratio; in other words, utilize its assets more efficiently.
* Reduce the dividend payout ratio.

 *Intermediate*

**11.** The solution requires substituting two ratios into a third ratio. Rearranging Debt/Total assets:

 Firm A Firm B

 D/TA = .60 D/TA = .35

 (TA – E)/TA = .60 (TA – E)/TA = .35

 (TA/TA) – (E/TA) = .60 (TA/TA) – (E/TA) = .35

 1 – (E/TA) = .60 1 – (E/TA) = .35

 E/TA = .40 E/TA = .65

 E = .40(TA) E = .65(TA)

 Rearranging ROA = Net income/Total assets, we find:

 NI/TA = .045 NI/TA = .08

 NI = .045(TA) NI = .08(TA)

 Since ROE = Net income/Equity, we can substitute the above equations into the ROE formula, which yields:

 ROE = .045(TA)/.40(TA) ROE = .08(TA)/.65(TA)

 ROE = .045/.40 ROE = .08/.65

 ROE = .1125, or 11.25% ROE = .1231, or 12.31%

**12.** Profit margin = Net income/Sales

 Profit margin = –£26,382/£315,650

 Profit margin = –.0836, or –8.36%

 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:

 Net income = Profit margin × Sales

 Net income = –.0836($385,815)

 Net income = –$32,246.38

**13.** *a.* The equation for external funds needed is:

 EFN =  × ΔSales –  × ΔSales – (PM × Projected sales) × (1 – *d*)

 where:

 Assets/Sales = $26,625,000/$24,046,000 = 1.11

 ΔSales = Current sales × Sales growth rate = $24,046,000(.15) = $3,606,900

 Short-term debt/Sales = $5,200,000/$24,046,000 = .2163

 Profit margin = Net income/Sales = $1,988,250/$24,046,000 = .0827

 Projected sales = Current sales × (1 + Sales growth rate) = $24,046,000(1 + .15) = $27,652,900

 *d* = Dividends/Net income = $397,600/$1,988,250 = .20

 so:

 EFN = (1.11 × $3,606,900) – (.2163 × $3,606,900) – (.0827 × $27,652,900) × (1 – .20)

 EFN = $1,384,503

 *b.* The current assets, fixed assets, and short-term debt will all increase at the same percentage as sales. The long-term debt and common stock will remain constant. The accumulated retained earnings will increase by the addition to retained earnings for the year. We can calculate the addition to retained earnings for the year as:

 Net income = Profit margin × Sales

 Net income = .0827($27,652,900)

 Net income = $2,286,488

 The addition to retained earnings for the year will be the net income times one minus the dividend payout ratio, which is:

 Addition to retained earnings = Net income(1 – *d*)

 Addition to retained earnings = $2,286,488(1 – .20)

 Addition to retained earnings = $1,829,248

 So, the new accumulated retained earnings will be:

 Accumulated retained earnings = $12,425,000 + 1,829,248

 Accumulated retained earnings = $14,254,248

 The pro forma balance sheet will be:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   | Assets |   |   | Liabilities and equity |   |
|   | Current assets | $8,331,750 |   | Accounts payable | $5,980,000 |
|   |   |  |   | Long-term debt | $5,900,000 |
|   |   |  |   |   |  |
|   | Fixed assets | 22,287,000 |   | Common stock | $3,100,000 |
|   |   |  |   | Accumulated retained earnings | 14,254,248 |
|   |   |  |   | Total equity | $17,354,248 |
|   |   |  |   |   |  |
|   | Total assets | $30,618,750 |   | Total liabilities and equity | $29,234,248 |

 The EFN is:

 EFN = Total assets – Total liabilities and equity

 EFN = $30,618,750 – 29,234,248

 EFN = $1,384,503

 *c*. The ROE is:

 ROE = Net income/Total equity

 ROE = $1,988,250/$15,525,000

 ROE = .1281, or 12.81%

 And the retention ratio is:

 *b* = Retention ratio = Retained earnings/Net income

 *b* = $1,590,650/$1,988,250

 *b* = .80

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

 Sustainable growth rate = (ROE × *b*)/[1 – (ROE × *b*)]

 Sustainable growth rate = [.1281(.80)]/[1 – .1281(.80)]

 Sustainable growth rate = .1142, or 11.42%

 *d*. The company cannot just cut its dividends to achieve the forecast growth rate. As shown below, even with a zero dividend policy, the EFN will still be $927,263.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   | Assets |   |   | Liabilities and equity |   |
|   | Current assets | $8,331,750 |   | Accounts payable | $5,980,000 |
|   |   |  |   | Long-term debt | $5,900,000 |
|   |   |  |   |   |  |
|   | Fixed assets | 22,287,000 |   | Common stock | $3,100,000 |
|   |   |  |   | Accumulated retained earnings | 14,711,488 |
|   |   |  |   | Total equity | $17,811,488 |
|   |   |  |   |   |  |
|   | Total assets | $30,618,750 |   | Total liabilities and equity | $29,691,488 |

 The EFN is:

 EFN = Total assets – Total liabilities and equity

 EFN = $30,618,750 – 29,691,488

 EFN = $927,263

 The company does have several alternatives. It can increase its asset utilization and/or its profit margin. The company could also increase the debt in its capital structure. This will decrease the equity account, thereby increasing ROE.

**14.** This is a multistep 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:

 PM = .071 = NI/Sales

 PM = .071 = $213,700/Sales

 Sales = $3,009,859

Credit sales are 65 percent of total sales, so:

 Credit sales = .65($3,009,859)

 Credit sales = $1,956,408

 Now we can find receivables turnover by:

 Receivables turnover = Credit sales/Accounts receivable

 Receivables turnover = $1,956,408/$126,385

 Receivables turnover = 15.48 times

 Days’ sales in receivables = 365 days/Receivables turnover

 Days’ sales in receivables = 365/15.48

 Days’ sales in receivables = 23.58 days

**15.** The solution to this problem requires a number of steps. First, remember that Current assets + Net fixed assets = Total assets. So, if we find the current assets and the total assets, we can solve for net fixed assets. Using the numbers given for the current ratio and the current liabilities, we solve for current assets:

 Current ratio = Current assets/Current liabilities

 Current assets = Current ratio(Current liabilities)

 Current assets = 1.45($1,140)

 Current assets = $1,653

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

 Profit margin = Net income/Sales

 Net income = Profit margin(Sales)

 Net income = .083($8,370)

 Net income = $694.71

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

 ROE = Net income/Total equity

 Total equity = Net income/ROE

 Total equity = $694.71/.165

 Total equity = $4,210.36

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

 Long-term debt ratio = .35 = LTD/(LTD + Total equity)

 Inverting both sides gives:

 1/.35 = (LTD + Total equity)/LTD = 1 + (Total equity/LTD)

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

 1.857 = 1 + ($4,210.36/LTD)

 LTD = $4,210.36/1.857

 LTD = $2,267.12

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

 Total debt = Current liabilities + LTD

 Total debt = $1,140 + 2,267.12

 Total debt = $3,407.12

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

 Total assets = Total debt + Total equity

 Total assets = $3,407.12 + 4,210.36

 Total assets = $7,617.48

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

 Net fixed assets = Total assets – Current assets

 Net fixed assets = $7,617.48 – 1,653

 Net fixed assets = $5,964.48

**16.** This problem requires us to work backward through the income statement. First, recognize that Net income = (1 – *TC*)EBT. Plugging in the numbers given and solving for EBT, we get:

 EBT = $19,382/(1 – .21)

 EBT = $24,534.18

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

 EBIT = EBT + Interest

 EBIT = $24,534.18 + 3,681

 EBIT = $28,215.18

 To get EBITD (earnings before interest, taxes, and depreciation), the numerator in the cash coverage

 ratio, add depreciation to EBIT:

 EBITD = EBIT + Depreciation

 EBITD = $28,215.18 + 4,738

 EBITD = $32,953.18

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

 Cash coverage ratio = EBITD/Interest

 Cash coverage ratio = $32,953.18/$3,681

 Cash coverage ratio = 8.95 times

**17.** We can start by multiplying ROE by Total assets/Total assets

 ROE = $\frac{Net income}{Equity}=\frac{Net income}{Equity}×\frac{Total assets}{Total assets}$

 Rearranging, we get:

 ROE = $\frac{Net income}{Total assets}×\frac{Total assets}{Equity}$

Next, we can multiply by Sales/Sales, which yields:

ROE = $\frac{Net income}{Total assets}×\frac{Equity}{Total assets}×\frac{Sales}{Sales}$

Rearranging, we get:

ROE = $\frac{Net income}{Sales}×\frac{Sales}{Total assets}×\frac{Total assets}{Equity}$

Next, we can multiply the preceding three factor DuPont equation by EBT/EBT, which yields:

ROE = $\frac{Net income}{Sales}×\frac{Sales}{Total assets}×\frac{Total assets}{Equity}×\frac{EBT}{EBT}$

We can rearrange as:

ROE = $\frac{Net income}{EBT}×\frac{EBT}{Sales}×\frac{Sales}{Total assets}×\frac{Total assets}{Equity}$

Finally, multiplying this equation EBIT/EBIT and rearranging yields:

ROE = $\frac{Net income}{EBT}×\frac{EBT}{Sales}×\frac{Sales}{Total assets}×\frac{Total assets}{Equity}×\frac{EBIT}{EBIT}$

ROE = $\frac{Net income}{EBT}×\frac{EBT}{EBIT}×\frac{EBIT}{Sales}×\frac{Sales}{Total assets}×\frac{Total assets}{Equity}$

 (1) (2) (3) (4) (5)

 The interpretation of each term is as follows:

(1) This is the company's tax burden. This is the proportion of the company's profits retained after paying income taxes.

 (2) This is the company’s interest burden. It will be 1.00 for a company with no debt or financial leverage.

 (3) This is the company’s operating profit margin. It is the operating profit before interest and taxes per dollar of sales.

 (4) This is the company’s operating efficiency as measured by dollar of sales per dollar of total assets.

 (5) This is the company’s financial leverage as measured by the equity multiplier.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **18.**  | **2020** | **Common****size** |  | **2021** | **Common****size** | **Common base year** |
| Assets |   |   |   |   |   |   |
| Current assets |   |   |   |   |   |   |
|  Cash | $12,032 | 2.61% |  | $15,176 | 2.82% | 1.2613 |
|  Accounts receivable | 30,709 | 6.67% |  | 34,969 | 6.50% | 1.1387 |
|  Inventory | 55,288 | 12.01% |  | 63,723 | 11.85% | 1.1526 |
|  Total | $98,029 | 21.29% |  | $113,868 | 21.17% | 1.1616 |
| Fixed assets |  |  |  |  |  |  |
|  Net plant and equipment | 362,374 | 78.71% |  | 423,995 | 78.83% | 1.1700 |
| Total assets | $460,403 | 100% |  | $537,863 | 100% | 1.1682 |
|   |  |  |  |  |  |  |
| Liabilities and Owners’ Equity |  |  |  |  |  |  |
| Current liabilities |  |  |  |  |  |  |
|  Accounts payable | $61,407 | 13.34% |  | $64,385 | 11.97% | 1.0485 |
|  Notes payable | 26,228 | 5.70% |  | 24,735 | 4.60% | 0.9431 |
|  Total | $87,635 | 19.03% |  | $89,120 | 16.57% | 1.0169 |
| Long-term debt | 37,500 | 8.15% |  | 43,500 | 8.09% | 1.1600 |
| Owners' equity |  |  |  |  |  |  |
|  Common stock and paid-in surplus | $59,000 | 12.81% |  | $64,500 | 11.99% | 1.0932 |
|  Accumulated retained earnings | 276,268 | 60.01% |  | 340,743 | 63.35% | 1.2334 |
|  Total | $335,268 | 72.82% |  | $405,243 | 75.34% | 1.2087 |
| Total liabilities and owners' equity | $460,403 | 100% |  | $537,863 | 100% | 1.1682 |

The common-size balance sheet answers are found by dividing each category by total assets. For example, the cash percentage for 2020 is:

 $12,032/$460,403 = .0261, or 2.61%

 This means that cash is 2.61 percent of total assets.

The common-base year answers are found by dividing each category value for 2021 by the same category value for 2021. For example, the cash common-base year number is found by:

$15,176/$12,032 = 1.2613

 This means the cash balance in 2021 is 1.2613 times as large as the cash balance in 2020.

**19.** To determine full capacity sales, we divide the current sales by the capacity the company is currently

 using, so:

 Full capacity sales = $575,000/.90

 Full capacity sales = $638,889

 So, the dollar growth rate in sales is:

 Sales growth = $638,889 – 575,000

 Sales growth = $63,889

**20.** 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:

 Fixed assets/Full capacity sales = $720,000/$638,889

 Fixed assets/Full capacity sales = 1.1270

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

 Total fixed assets = 1.1270($665,000)

 Total fixed assets = $749,426

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

 New fixed assets = $749,426 – 720,000

 New fixed assets = $29,426

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

 Pro Forma Income Statement

 Sales $ 823,836

 Costs 665,304

 Other expenses 16,824

 EBIT $ 141,708

 Interest 12,090

 Taxable income $ 129,618

 Taxes (21%) 27,220

 Net income $ 102,398

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

 Dividends = ($27,475/$83,740)($102,398)

 Dividends = $33,597

 And the addition to retained earnings will be:

 Addition to retained earnings = $102,398 – 33,597

 Addition to retained earnings = $68,801

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

 New retained earnings = $166,705 + 68,801

 New retained earnings = $235,506

The pro forma balance sheet will look like this:

Pro Forma Balance Sheet

 Assets Liabilities and Owners’ Equity

 Current assets Current liabilities

 Cash $ 25,128 Accounts payable $ 64,548

 Accounts receivable 38,364 Notes payable 13,215

 Inventory 85,584 Total $ 77,763

 Total $ 149,076 Long-term debt $ 127,500

 Fixed assets

 Net plant and Owners’ equity

 equipment $ 410,376 Common stock and

 paid-in surplus $ 105,000

 Retained earnings 235,506

 Total $ 340,506

 Total liabilities and owners’

 Total assets $ 559,452 equity $ 545,769

 So the EFN is:

 EFN = Total assets – Total liabilities and equity

 EFN = $559,452– 545,769

 EFN = $13,683

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

 Full capacity sales = $686,530/.80

 Full capacity sales = $858,163

 The full capacity ratio at full capacity sales is:

 Full capacity ratio = Fixed assets/Full capacity sales

 Full capacity ratio = $341,980/$858,163

 Full capacity ratio = .39850

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

 Total fixed assets = .39850($823,836) = $328,301

 So, EFN is:

 EFN = ($149,076 + 328,301) – $545,769 = –$68,393

 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:

 EFN = ($149,076 + 341,980) – $545,769 = –$54,713

**23.** The D/E ratio of the company is:

 D/E = ($67,005 + 127,500)/$271,705

 D/E = .7159

 So the new total debt amount will be:

 New total debt = .7159($340,506)

 New total debt = $243,758

 This is the new total debt for the company. Given that our calculation for EFN is the amount that must be raised externally and does not increase spontaneously with sales, we need to subtract the spontaneous increase in accounts payable. The new level of accounts payable, which is the current accounts payable times the sales growth, will be:

 Spontaneous increase in accounts payable = $53,790(.20)

 Spontaneous increase in accounts payable = $10,758

 This means that $10,758 of the new total debt is not raised externally. So, the debt raised externally, which will be the EFN, is:

 EFN = New total debt – (Beginning LTD + Beginning CL + Spontaneous increase in AP)

 EFN = $243,758 – ($127,500 + 67,005 + 10,758) = $38,495

 The pro forma balance sheet with the new long-term debt will be:

Pro Forma Balance Sheet

 Assets Liabilities and Owners’ Equity

 Current assets Current liabilities

 Cash $ 25,128 Accounts payable $ 64,548

 Accounts receivable 38,364 Notes payable 13,215

 Inventory 85,584 Total $ 77,763

 Total $ 149,076 Long-term debt $ 165,995

 Fixed assets

 Net plant and Owners’ equity

 equipment $ 410,376 Common stock and

 paid-in surplus $ 105,000

 Retained earnings 235,506

 Total $ 340,506

 Total liabilities and owners’

 Total assets $ 559,452 equity $ 584,264

 The funds raised by the debt issue can be put into an excess cash account to make the balance sheet balance. The excess cash will be:

 Excess cash = $584,264 – 559,452 = $24,812

 To make the balance sheet balance, the company will have to increase its assets. We will put this amount in an account called excess cash, which will give us the following balance sheet:

Pro Forma Balance Sheet

 Assets Liabilities and Owners’ Equity

 Current assets Current liabilities

 Cash $ 25,128 Accounts payable $ 64,548

 Excess cash 24,812

 Accounts receivable 38,364 Notes payable 13,215

 Inventory 85,584 Total $ 77,763

 Total $ 173,888 Long-term debt $ 165,995

 Fixed assets

 Net plant and Owners’ equity

 equipment $ 410,376 Common stock and

 paid-in surplus $ 105,000

 Retained earnings 235,506

 Total $ 340,506

 Total liabilities and owners’

 Total assets $ 584,264 equity $ 584,264

 The excess cash has an opportunity cost that we discussed earlier. Increasing fixed assets would also not be a good idea since the company already has enough fixed assets. A likely scenario would be the repurchase of debt and equity in its current capital structure weights. The company’s debt-assets and equity-assets are:

 Debt-assets = .7159/(1 + .7159) = .42

 Equity-assets = 1/(1 + .7159) = .58

 So, the amount of debt and equity needed will be:

 Total debt needed = .42($559,452) = $233,406

 Equity needed = .58($559,452) = $326,046

 So, the repurchases of debt and equity will be:

 Debt repurchase = ($77,763 + 165,995) – 233,406 = $10,352

 Equity repurchase = $340,506 – 326,046 = $14,460

Assuming all of the debt repurchase is from long-term debt, and the equity repurchase is entirely from the retained earnings, the final pro forma balance sheet will be:

Pro Forma Balance Sheet

 Assets Liabilities and Owners’ Equity

 Current assets Current liabilities

 Cash $ 25,128 Accounts payable $ 64,548

 Accounts receivable 38,364 Notes payable 13,215

 Inventory 85,584 Total $ 77,763

 Total $ 149,076 Long-term debt $ 155,643

 Fixed assets

 Net plant and Owners’ equity

 equipment $ 410,376 Common stock and

 paid-in surplus $ 105,000

 Retained earnings 221,046

 Total $ 326,046

 Total liabilities and owners’

 Total assets $ 559,452 equity $ 559,452

 *Challenge*

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

 Pro Forma Income Statement

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | *15 % Sales**Growth* | *20% Sales**Growth* | *25% Sales**Growth* |
|  | Sales | $789,510 | $823,836 | $858,163 |
|  | Costs | 637,583 | 665,304 | 693,025 |
|  | Other expenses | 16,123 | 16,824 | 17,525 |
|  | EBIT | $135,804 | $141,708 | $147,613 |
|  | Interest | 12,090 | 12,090 | 12,090 |
|  | Taxable income | $123,714 | $129,618 | $135,523 |
|  | Taxes (21%) | 25,980 | 27,220 | 28,460 |
|  | Net income | $97,734 | $102,398 | $107,063 |
|  |   |  |  |  |
|  |  Dividends | $32,066 | $33,597 | $35,127 |
|  |  Add to RE | 65,667 | 68,801 | 71,936 |

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

 Dividends = ($27,475/$83,740)($97,734)

 Dividends = $32,066

 And the addition to retained earnings will be:

 Addition to retained earnings = $97,734 – 32,066

 Addition to retained earnings = $65,667

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

 New retained earnings = $166,705 + 65,667

 New retained earnings = $232,372

The pro forma balance sheet will look like this:

 *15% Sales Growth*:

Pro Forma Balance Sheet

 Assets Liabilities and Owners’ Equity

 Current assets Current liabilities

 Cash $ 24,081 Accounts payable $ 61,859

 Accounts receivable 36,766 Notes payable 13,215

 Inventory 82,018 Total $ 75,074

 Total $ 142,865 Long-term debt $ 127,500

 Fixed assets

 Net plant and Owners’ equity

 equipment $ 393,277 Common stock and

 paid-in surplus $ 105,000

 Retained earnings 232,372

 Total $ 337,372

 Total liabilities and owners’

 Total assets $ 536,142 equity $ 539,946

 So the EFN is:

 EFN = Total assets – Total liabilities and equity

 EFN = $536,142 – 539,946

 EFN = –$3,804

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

 Dividends = ($27,475/$83,740)($102,398)

 Dividends = $33,597

 And the addition to retained earnings will be:

 Addition to retained earnings = $102,398 – 33,597

 Addition to retained earnings = $68,801

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

 New retained earnings = $166,705 + 68,801

 New retained earnings = $235,506

The pro forma balance sheet will look like this:

 *20% Sales Growth:*

Pro Forma Balance Sheet

 Assets Liabilities and Owners’ Equity

 Current assets Current liabilities

 Cash $ 25,128 Accounts payable $ 64,548

 Accounts receivable 38,364 Notes payable 13,215

 Inventory 85,584 Total $ 77,763

 Total $ 149,076 Long-term debt $ 127,500

 Fixed assets

 Net plant and Owners’ equity

 equipment $ 410,376 Common stock and

 paid-in surplus $ 105,000

 Retained earnings 235,506

 Total $ 340,506

 Total liabilities and owners’

 Total assets $ 559,452 equity $ 545,769

 So the EFN is:

 EFN = Total assets – Total liabilities and equity

 EFN = $559,452 – 545,769

 EFN = $13,683

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

 Dividends = ($27,475/$83,740)($107,063)

 Dividends = $35,127

 And the addition to retained earnings will be:

 Addition to retained earnings = $107,063 – 35,127

 Addition to retained earnings = $71,936

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

 New retained earnings = $166,705 + 71,936

 New retained earnings = $238,641

The pro forma balance sheet will look like this:

 *25% Sales Growth*:

Pro Forma Balance Sheet

 Assets Liabilities and Owners’ Equity

 Current assets Current liabilities

 Cash $ 26,175 Accounts payable $ 67,238

 Accounts receivable 39,963 Notes payable 13,215

 Inventory 89,150 Total $ 80,453

 Total $ 155,288 Long-term debt $ 127,500

 Fixed assets

 Net plant and Owners’ equity

 equipment $ 427,475 Common stock and

 paid-in surplus $ 105,000

 Retained earnings 238,641

 Total $ 343,641

 Total liabilities and owners’

 Total assets $ 582,763 equity $ 551,593

 So the EFN is:

 EFN = Total assets – Total liabilities and equity

 EFN = $582,763 – 551,593

 EFN = $31,169

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

Pro Forma Income Statement

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | *20% Sales**Growth* | *30% Sales**Growth* | *35% Sales**Growth* |
|  | Sales | $823,836 | $892,489 | $926,816 |
|  | Costs | 665,304 | 720,746 | 748,467 |
|  | Other expenses | 16,824 | 18,226 | 18,927 |
|  | EBIT | $141,708 | $153,517 | $159,422 |
|  | Interest | 12,090 | 12,090 | 12,090 |
|  | Taxable income | $129,618 | $141,427 | $147,332 |
|  | Taxes (21%) | 27,220 | 29,700 | 30,940 |
|  | Net income | $102,398 | $111,727 | $116,392 |
|  |   |  |  |  |
|  |  Dividends | $33,597 | $36,658 | $38,188 |
|  |  Add to RE | 68,801 | 75,070 | 78,204 |

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

 Dividends = ($27,475/$83,740)($111,727)

 Dividends = $36,658

 And the addition to retained earnings will be:

 Addition to retained earnings = $111,727 – 36,658

 Addition to retained earnings = $75,070

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

 New retained earnings = $166,705 + 75,070

 New retained earnings = $241,775

 The new total debt will be:

 New total debt = .7159($346,775)

 New total debt = $248,245

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

 New long-term debt = $248,245 – 83,142

 New long-term debt = $165,103

The pro forma balance sheet will look like this:

 *Sales growth rate = 30% and debt/equity ratio = .7159*

Pro Forma Balance Sheet

 Assets Liabilities and Owners’ Equity

 Current assets Current liabilities

 Cash $ 27,222 Accounts payable $ 69,927

 Accounts receivable 41,561 Notes payable 13,215

 Inventory 92,716 Total $ 83,142

 Total $ 161,499 Long-term debt $ 165,103

 Fixed assets

 Net plant and Owners’ equity

 equipment $ 444,574 Common stock and

 paid-in surplus $ 105,000

 Retained earnings 241,775

 Total $ 346,775

 Total liabilities and owners’

 Total assets $ 606,073 equity $ 595,020

 So the excess debt raised is:

 Excess debt = $595,020 – 606,073

 Excess debt = –$11,053

 And the EFN is:

 EFN = $37,603 + 11,053

 EFN = $48,656

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

 Dividends = ($27,475/$83,740)($116,392)

 Dividends = $38,188

 And the addition to retained earnings will be:

 Addition to retained earnings = $116,392 – 38,188

 Addition to retained earnings = $78,204

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

 New retained earnings = $166,705 + 78,204

 New retained earnings = $244,909

 The new total debt will be:

 New total debt = .7159($349,909)

 New total debt = $250,489

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

 New long-term debt = $250,489 – 85,832

 New long-term debt = $164,657

 *Sales growth rate = 35% and debt/equity ratio = .7159:*

Pro Forma Balance Sheet

 Assets Liabilities and Owners’ Equity

 Current assets Current liabilities

 Cash $ 28,269 Accounts payable $ 72,617

 Accounts receivable 43,160 Notes payable 13,215

 Inventory 96,282 Total $ 85,832

 Total $ 167,711 Long-term debt $ 164,657

 Fixed assets

 Net plant and Owners’ equity

 equipment $ 461,673 Common stock and

 paid-in surplus $ 105,000

 Retained earnings 244,909

 Total $ 349,909

 Total liabilities and owners’

 Total assets $ 629,384 equity $ 600,397

 So the excess debt raised is:

 Excess debt = $600,397 – 629,384

 Excess debt = –$28,986

At a 35 percent growth rate, the firm will need funds in the amount of $28,986 in addition to the external debt already raised. So, the EFN will be:

 EFN = $37,157 + 28,986

 EFN = $66,143

**26.** We need the ROE to calculate the sustainable growth rate. The ROE is:

 ROE = (PM)(TAT)(EM)

 ROE = (.062)(1/1.05)(1 + .55)

 ROE = .0915, or 9.15%

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

 Sustainable growth rate = (ROE × *b*)/[1 – (ROE × *b*)]

 Sustainable growth rate = .12 = (.0915*b*)/(1 – .0915*b*)

 *b* = 1.17

 This implies the payout ratio is:

 Payout ratio = 1 – *b*

 Payout ratio = 1 – 1.17

 Payout ratio = –.17

 This answer indicates a dividend payout ratio of negative 17 percent, which is impossible. So, the growth rate is not consistent with the other constraints. The lowest possible payout rate is 0 (without issuing stock), which corresponds to a retention ratio of 1, or total earnings retention. This problem illustrates a key point we made in the chapter: Sustainable growth analysis forces the user to make internally consistent assumptions.

        As an aside, we should note that it is possible to have a retention ration greater than 1 if the company issues new stock. However, since the growth rate we are evaluating is perpetual, the company would have to issue stock every year, forever. But, doing so violates our underlying assumption that the sustainable growth rate requires no new equity.

 The maximum sustainable growth rate for this company is:

 Maximum sustainable growth rate = (ROE × *b*)/[1 – (ROE × *b*)]

 Maximum sustainable growth rate = [.0915(1)]/[1 – .0915(1)]

 Maximum sustainable growth rate = .1007, or 10.07%

**27.** We know that EFN is:

 EFN = Increase in assets – Addition to retained earnings

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

 Increase in assets = A × *g*

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

 Addition to retained earnings = (NI × *b*)(1 + *g*)

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

 NI = PM(S)

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

 EFN = A(*g*) – PM(S)*b*(1 + *g*)

 EFN = A(*g*) – PM(S)*b* – [PM(S)*b*]*g*

 EFN = –PM(S)*b* + [A – PM(S)*b*]*g*

**28.** We start with the EFN equation we derived in Problem 27 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:

 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:

 Internal growth rate = {[PM(S)*b*]/A}/{[A – PM(S)*b*]/A}

 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 both the numerator and denominator by A:

 Sustainable growth rate = PM(S)*b*(1 + D/E)/[A – PM(S)*b*(1 + D/E )]

 Sustainable growth rate = [ROA(1 + D/E)*b*]/[1 – ROA(1 + D/E)*b*]

 Sustainable growth rate = *b*(ROE)/[1 – *b*(ROE)]

**29.** 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*:*

 Sustainable growth rate = (ROEE × *b*)/(1 – ROEE × *b*)

 Sustainable growth rate = (NI/TEE × *b*)/(1 – NI/TEE × *b*)

 We multiply this equation by:

 (TEE/TEE)

 Sustainable growth rate = (NI/TEE × *b*)/(1 – NI/TEE × *b*) × (TEE/TEE)

 Sustainable growth rate = (NI × *b*)/(TEE – NI × *b*)

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

 (TEE – NI × *b*) = TEB

 Substituting this into the previous equation, we get:

 Sustainable rate = (NI × *b*)/TEB

 Which is equivalent to:

 Sustainable rate = (NI/TEB) × *b*

 Since ROEB = NI/TEB

 The sustainable growth rate equation is:

 Sustainable growth rate = ROEB × *b*

 For the internal growth rate:

 Internal growth rate = (ROAE × *b*)/(1 – ROAE × *b*)

 Internal growth rate = (NI/TAE × *b*)/(1 – NI/TAE × *b*)

 We multiply this equation by:

 (TAE/TAE)

 Internal growth rate = (NI/TAE × *b*)/[(1 – NI/TAE × *b*) × (TAE/TAE)]

 Internal growth rate = (NI × *b*)/(TAE – NI × *b*)

 Recognize that the denominator is equal to beginning of period assets, that is:

 (TAE – NI × *b*) = TAB

 Substituting this into the previous equation, we get:

 Internal growth rate = (NI × *b*)/TAB

 Which is equivalent to:

 Internal growth rate = (NI/TAB) × *b*

 Since ROAB = NI/TAB

 The internal growth rate equation is:

 Internal growth rate = ROAB × *b*

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

 Retained earnings = NI – Dividends

 Retained earnings = $80,000 – 44,000

 Retained earnings = $36,000

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

 Ending equity = $260,000 + 36,000

 Ending equity = $296,000

 The ROE based on the end-of-period equity is:

 ROE = $80,000/$296,000

 ROE = .2703, or 27.03%

 The plowback ratio is:

 Plowback ratio = Addition to retained earnings/NI

 Plowback ratio = $36,000/$80,000

 Plowback ratio = .45, or 45%

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

 Sustainable growth rate = (ROE × *b*)/[1 – (ROE × *b*)]

 Sustainable growth rate = [.2703(.45)]/[1 – .2703(.45)]

 Sustainable growth rate = .1385, or 13.85%

 The ROE based on the beginning-of-period equity is

 ROE = $80,000/$260,000

 ROE = .3077, or 30.77%

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

 Sustainable growth rate = ROE × *b*

 Sustainable growth rate = .3077 × .45

 Sustainable growth rate = .1385, or 13.85%

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

 Sustainable growth rate = ROE × *b*

 Sustainable growth rate = .2703 × .45

 Sustainable growth rate = .1216, or 12.16%

 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.