

## 2.7: Problems

### ? Problem 2.7.1

Using the [Financial Statements for Joe's Gadgets](#) in Appendix B, find the following ratios for both 2016 and 2017

- Current ratio
- Quick ratio (Acid Test)
- Inventory Turnover Ratio
- Days Sales Outstanding (Average Collection Period)
- Fixed Assets Turnover
- Total Assets Turnover
- Total Debt to Total Assets (Debt Ratio)
- Total Debt to Equity
- Times Interest Earned
- Gross Profit Margin
- Net Profit Margin
- Return on Assets
- Return on Equity
- Price Earnings Ratio
- Market-to-Book Ratio
- Dividend Yield

#### Answer

##### 2016

$$\begin{aligned} \text{CR} &= \text{CA}/\text{CL} = 7,000,000/4,500,000 = 1.56 \\ \text{QR} &= (\text{CA} - \text{Inv})/\text{CL} = (7,000,000 - 2,000,000)/4,500,000 = 1.11 \\ \text{ITR} &= \text{CGS}/\text{Inv} = 6,000,000/2,000,000 = 3 \text{ times} \\ \text{DSO} &= \text{AR}/(\text{Sales}/365) = 2,000,000/(15,000,000/365) = 48.67 \text{ days} \\ \text{FAT} &= \text{Sales}/\text{Fixed Asst} = 15,000,000/10,000,000 = 1.5 \text{ times} \\ \text{TAT} &= \text{Sales}/\text{Total Asst} = 15,000,000/17,000,000 = 0.88 \text{ times} \\ \text{TD}/\text{TA} &= 10,000,000/17,000,000 = 58.8\% \\ \text{TD}/\text{OE} &= 10,000,000/7,000,000 = 142.86\% \\ \text{TIE} &= \text{EBIT}/\text{Int} = 4,000,000/1,000,000 = 4 \text{ times} \\ \text{GPM} &= (\text{Sales} - \text{CGS})/\text{Sales} = (15,000,000 - 6,000,000)/15,000,000 = 60\% \\ \text{NPM} &= \text{NI}/\text{Sales} = 2,100,000/15,000,000 = 14.0\% \\ \text{ROA} &= \text{NI}/\text{Asst} = 2,100,000/17,000,000 = 12.4\% \\ \text{ROE} &= \text{NI}/\text{OE} = 2,100,000/7,000,000 = 30.0\% \\ \text{PE} &= \text{Price}/\text{EPS} = 25/1.05 = 23.81 \\ \text{M/B} &= \text{Price}/\text{BV} = 25/(7,000,000/2,000,000) = 7.14 \\ \text{DY} &= \text{Div}/\text{Price} = \$0.50/\$25 = 2.00\% \end{aligned}$$

##### 2017

$$\begin{aligned} \text{CR} &= \text{CA}/\text{CL} = 11,050,000/7,000,000 = 1.58 \\ \text{QR} &= (\text{CA} - \text{Inv})/\text{CL} = (11,050,000 - 4,000,000)/7,000,000 = 1.01 \\ \text{ITR} &= \text{CGS}/\text{Inv} = 11,000,000/4,000,000 = 2.75 \text{ times} \\ \text{DSO} &= \text{AR}/(\text{Sales}/365) = 4,000,000/(20,000,000/365) = 73 \text{ days} \\ \text{FAT} &= \text{Sales}/\text{Fixed Asst} = 20,000,000/11,000,000 = 1.82 \text{ times} \\ \text{TAT} &= \text{Sales}/\text{Total Asst} = 20,000,000/22,050,000 = 0.91 \text{ times} \\ \text{TD}/\text{TA} &= 15,000,000/22,050,000 = 68.0\% \\ \text{TD}/\text{OE} &= 15,000,000/7,050,000 = 212.77\% \\ \text{TIE} &= \text{EBIT}/\text{Int} = 3,000,000/1,500,000 = 2 \text{ times} \end{aligned}$$

$GPM = (Sales - CGS)/Sales = (20,000,000 - 11,000,000)/20,000,000 = 45\%$   
 $NPM = NI/Sales = 1,050,000/20,000,000 = 5.25\%$   
 $ROA = NI/Asst = 1,050,000/22,050,000 = 4.76\%$   
 $ROE = NI/OE = 1,050,000/7,050,000 = 14.89\%$   
 $PE = Price/EPS = 17.5/0.525 = 33.33$   
 $M/B = Price/BV = 17.5/(7,050,000/2,000,000) = 4.96$   
 $DY = Div/Price = \$0.50/\$17.50 = 2.86\%$

### ? Problem 2.7.2

Using the [Financial Statements for Joe's Gadgets](#) in Appendix B, prepare common size income statements and balance sheets for 2016 & 2017.

#### Answer

Each item in the income statement is expressed as a percentage of sales (revenues) and each item in the balance sheet is presented as a percentage of total assets.

	2016	16CS	2017	17CS
Sales	15,000,000	100.0%	20,000,000	100.0%
CGS	6,000,000	40.0%	11,000,000	55.0%
S&A Exp.	3,000,000	20.0%	3,500,000	17.5%
Depreciation	2,000,000	13.3%	2,500,000	12.5%
EBIT	4,000,000	26.7%	3,000,000	15.0%
Interest	1,000,000	6.7%	1,500,000	7.5%
EBT	3,000,000	20.0%	1,500,000	7.5%
Taxes (30%)	900,000	6.0%	450,000	2.2%
Net Income	2,100,000	14.0%	1,050,000	5.2%
Num. of Shares	2,000,000		2,000,000	
EPS	\$1.05		\$0.525	
Div. per Share	\$0.50		\$0.50	
Stock Price	\$25		\$17.50	
Cash	3,000,000	17.6%	3,050,000	13.8%
A/R	2,000,000	11.8%	4,000,000	18.1%
Inv.	2,000,000	11.8%	4,000,000	18.1%
Cur. Assets	7,000,000	41.2%	11,050,000	50.1%
Net Prp, Plant & Equip	10,000,000	58.8%	11,000,000	49.9%
Total Assets	17,000,000	100%	22,050,000	100.0%
A/P	2,500,000	14.7%	3,500,000	15.9%
Accruals	1,500,000	8.8%	2,000,000	9.1%
Notes Payable	500,000	2.9%	1,500,000	6.8%

	2016	16CS	2017	17CS
Cur Liabilities	4,500,000	26.5%	7,000,000	31.7%
Long-Term Debt	5,500,000	32.4%	8,000,000	36.3%
Total Liabilities	10,000,000	58.8%	15,000,000	68.0%
Common Stock	1,000,000	5.9%	1,000,000	4.5%
Retained Earnings	6,000,000	35.3%	6,050,000	27.4%
Owners' Equity	7,000,000	41.2%	7,050,000	32.0%
Tot. Liab. & O.E.	17,000,000	100.0%	22,050,00	100.0%

### ? Problem 2.7.3

Use the following industry average ratios for 2017 and your answers to Problem 1 and Problem 2 to highlight any strengths and weaknesses for Joe's Gadgets.

- Current ratio 1.75
- Quick ratio 1.00
- Inventory Turnover Ratio 4.75
- Days Sales Outstanding 50.0
- Fixed Assets Turnover 1.30
- Total Assets Turnover 0.50
- Total Debt to Total Assets 0.55
- Total Debt to Equity 1.22
- Times Interest Earned 3.25
- Gross Profit Margin 46.53%
- Net Profit Margin 4.88%
- Return on Assets 4.17%
- Return on Equity 12.02%
- Price Earnings Ratio 24.15
- Market-to-Book Ratio 3.98
- Dividend Yield 1.99%

### Answer

To start the analysis of finding strengths and weaknesses, I started with the common size statements. The first thing that I noticed was the increase in Cost of Goods Sold from 40% of sales in 2015 to 55% of sales in 2017. This indicates that our production costs jumped significantly and will act to lower our net income. Selling and Administrative expenses dropped slightly from 20% of sales to 17.5% of sales. This is a strength, but is not a very large change so I don't place much emphasis on it. The declines in EBIT and Net Income as a % of sales are due to the increase in CGS, so do not need further analysis. Thus, from the Common Size Income statement, I focus on the increase in CGS as a significant weakness and would classify the decline in S&A Expenses as a small strength.

Next I proceed to the Common Size balance sheet. The first things I notice are the increases in accounts receivable and inventory as a % of total assets. This is a concern that needs more analysis before I declare it a weakness. Consider accounts receivable first. AR could increase due to higher sales levels. If 25% of my sales are done on credit and sales increase, my AR will automatically increase as well. This could result in AR being a bigger portion of my firm's assets and would not be seen as a negative. On the other hand, AR may be increasing because fewer customers are paying their bills on time. This could lead to more bad debt expense or higher collection costs. I can not tell which explanation is causing the increase in AR from the CS balance sheet, so I will make a note of it and look more at the issue as I move through my analysis. Like AR, inventory increases may or may not be a weakness. If sales increase, I will need more inventory on hand to handle the increase in sales which is likely to cause inventory to make up a larger portion of my firm's assets.

Alternatively, if I am getting stuck with more out-of-date inventory it will also make up a larger portion of my firm's assets until I am forced to do a write down and take the loss. From the CS balance sheet I can't tell which scenario is taking place so this is also something to investigate further.

Net PPE shows a large drop in the CS Balance sheet, but that is primarily a result of the increase in current assets caused by the jump in AR and Inv which have already been discussed, so I will not pay much attention to the decline in Net PPE. Notes Payable shows a large jump, however that could just be a function of me financing some of my increase in current assets so again that is not something that would concern me too much. I would probably want to note it and make sure I find out the reason for the increase but it likely is not a strength/weakness. The jump in Total Liabilities as a % of total assets is something that might concern me. Higher levels of liabilities as a % of total assets indicates higher risk levels. The firm has a greater chance of serious financial problems if there is a slowdown. This is not necessarily bad as the higher debt levels also have the chance to increase our profits if things go well, however it is something to note with a degree of caution due to the higher risk. Finally, the drop in OE is merely the flip side to the increase in TL, so needs no further analysis.

Next I move on to the ratio analysis. My liquidity ratios appear to be sound as both are stable from year to year and similar to the industry averages. Next is my Inv. Turnover Ratio. This, combined with the increase in inventory on the CS balance sheet indicates a problem. If my inventory increase was merely a result of increased sales, the inventory turnover ratio would hold steady or increase slightly. Instead it has decreased slightly and is noticeably lower than the industry average. This means that I am tying up more of my capital as inventory and probably ending up with older inventory that will need to be marked down and sold at a loss.

I also notice problems with my Days Sales Outstanding ratio. The significant jump in the DSO ratio tells me its taking me an about 24 days longer on average to collect each dollar in sales. Since this is also much higher than the industry average it means one of two things. Either I have a lot of customers that aren't paying on time and may end up with higher levels of bad debts or that I have to offer more favorable credit terms to my customers to keep sales from dropping. Both of these possibilities are bad, so my accounts receivable situation is a definite cause for concern.

Fixed Asset Turnover and Total Asset Turnover both look good. FAT is up and both are higher than the industry average. This is a sign that I am doing a good job overall of using my assets (especially my LT assets) to generate sales.

The debt management ratios are troublesome. My TD/TA and TD/OE ratios have increased by quite a bit and are higher than the industry averages. Also, my TIE ratio has dropped and is lower than the industry average. This means that our firm is using more debt financing and has less margin for error. If we experience an off year or two our firm is likely to run into severe financial problems and could face bankruptcy. On the other hand, if we have a couple of strong years, we will make higher returns for our shareholders due to the leverage provided by debt. This is not necessarily a strength/weakness but is a sign of high financial risk.

The profitability ratios are all showing an interesting pattern that ties back into my CGS observation from the CS income statement. My profitability (PM, ROA, ROE) is down due to the increase in CGS. However, all three ratios are consistent with the industry average. This might be an indication that the increase in CGS is more of an industry issue rather than firm specific. If a key input had a price increase, this is likely to impact all firms in the industry equally. For example, if grain prices jumped significantly both Kellogg's and General Mills may see a jump in their CGS and a decline in their profit margins. It doesn't indicate a management problem, but an industry issue. If my profitability ratios declined significantly AND were lower than the industry average I would be more concerned about company specific problems.

Finally we have the market value ratios which are difficult to interpret in this instance. The PE ratio has increased significantly as my stock price fell, but earnings fell faster. It is also higher than the industry average which indicates the stock is more expensive in terms of what investors pay for each dollar of earnings (possibly indicating that they believe the earnings drop is not permanent). The MV/BV ratio has decreased significantly which indicates the stock is cheaper. This is because book value is less sensitive to the recent earnings decline which lowered the stock price (making the stock cheaper relative to its book value). However, the stock is still slightly more expensive than the industry average. While our dividend yield increased and is higher than the industry average (which is good), there is a danger sign here. If earnings drop any further, we may have to cut our dividend which would cause the yield to drop.

To summarize, our financial statement analysis indicates

- The firm needs to address the CGS issue, but that it is probably an industry issue instead of a company specific problem. This doesn't mean we can ignore it, just that it will be more difficult to fix.

- The firm needs to get control of its credit policies and improve its collections process.
- The firm needs to get control of its inventory concerns The firm is doing a good job at generating sales from its LT Assets.
- The firm has a high degree of financial risk
- The firm does not appear to have any major liquidity constraints.
- The stock is relatively expensive relative to the industry average and the dividend yield (while attractive) should be viewed with caution as it may not be sustainable.

### ? Problem 2.7.4

Firm A reports a Profit Margin of 5% and a Total Asset Turnover Ratio of 1.5. Their total asset level is \$6,000,000. Assume there are 600,000 shares outstanding and the PE ratio is 13. Also, assume the Return on Equity is 14%. Based on this, calculate the MV/BV ratio. Hint 1: Use (Net Income)/(Shares Outstanding) to get Earnings Per Share. Hint 2: Think of how you can use data provided and ratio formulas to fill in missing values to ultimately get the MV/BV ratio – it will take several steps.

#### Answer

You know that you need the current stock price and the book value per share in order to get the MV/BV ratio. To get current stock price, you can use the PE ratio:

$$PE = \text{Price}/EPS \Rightarrow \text{Price} = (PE) \times (EPS)$$

To get EPS, you need Net Income which you can get from the net profit margin:

$$\text{Net Profit Margin} = \text{Net Income}/\text{Sales} \Rightarrow \text{Net Income} = \text{Net Profit Margin} \times \text{Sales}$$

You have the Profit Margin, so you need Sales. You can get Sales from the Total Asset Turnover Ratio:

$$\text{Total Asset Turnover} = \text{Sales} / \text{Assets} \Rightarrow \text{Sales} = \text{TA Turnover} \times \text{Assets}$$

- Sales =  $(1.5) \times (\$6,000,000) = \$9,000,000$
- Net Income =  $(0.05) \times (\$9,000,000) = \$450,000$
- EPS =  $(\$450,000) / (600,000 \text{ shares}) = \$0.75 \text{ per share}$
- Stock Price =  $(13) \times (0.75) = \$9.75$

Now you need to solve for Book Value which is Owners' Equity per Share. We know the Return on Equity, so we can use that (along with Net Income) to get Owners' Equity:

$$ROE = \text{Net Income}/\text{Owners Equity} \Rightarrow \text{Owners Equity} = \text{NI}/ROE$$

- Owners' Equity =  $(\$450,000) / (0.14) = \$3,214,285.71$
- Book Value =  $(\$3,214,285.71) / (600,000 \text{ shares}) = \$5.36 \text{ per share}$
- MV/BV =  $(\$9.75) / (\$5.36) = 1.82$

Our MV/BV ratio is 1.82. This is a tough problem as it not only tests your knowledge of ratios, but your problem solving skills. Don't worry if you didn't get it at first, but hopefully once you see the solution it makes sense.