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Part 2 | Strategic Financial Management

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Contents

Section A. Financial Statement Analysis

Section B. Corporate Finance

Section C. Business Decision Analysis

Section D. Enterprise Risk Management

Section E. Capital Investment Decisions

Section F. Professional Ethics

Appendices

Section A.
Financial Statement Analysis

Topic 1. Comparative Financial Statement Analysis

Common-Size Financial Statement Analysis (Vertical Analysis)

After studying this lesson, you should be able to:

- For the balance sheet and income statement, prepare and analyze common-size financial statements (ie, calculate percentage of assets and sales, respectively; also called vertical analysis) (2.A.1.a).
- Calculate and interpret gross profit margin percentage; operating profit margin percentage; net profit margin percentage; and earnings before interest, taxes, depreciation, and amortization (EBITDA) margin percentage (2.A.2.p).
- Analyze cost of sales by calculating and interpreting the gross profit margin (2.A.3.g).
- Distinguish between gross profit margin, operating profit margin, and net profit margin and analyze the effects of changes in the components of each (2.A.3.h).
- Define and perform a variation analysis (percentage change over time) (2.A.3.i).

Financial statements serve both external and internal users for decision-making and performance evaluation, respectively. However, to gain a comprehensive understanding of a company's operating results and financial position, vertical analysis of the income statement and balance sheet is essential. Vertical analysis highlights the significance of gross profit, operating profit, and net income, and emphasizes that effective cost management, particularly concerning cost of sales, is crucial for improving profit margins beyond simply generating sales.

I. Financial Statements in General

A. Financial statements are used by a variety of users with an economic interest in the organization. Their purpose is to provide financial information that has decision-making usefulness for each of the users described.

1. Direct interest users include the following groups:

a. Investors and owners
b. Management
c. Suppliers
d. Creditors
e. Employees
f. Customers

2. Indirect interest users include the following groups:
    a. Regulatory agencies
    b. Stock exchanges
    c. Financial analysts
3. Internal users who make decisions impacting the operations and long-term viability of an organization include the following:
    a. Owners
    b. Board of directors
    c. Company management
    d. Employees
4. External users who determine whether they will invest in or do business with the organization include the following:
    a. Investors
    b. Suppliers
    c. Customers
    d. Stock exchanges
    e. Regulatory agencies

B. Every organization, especially publicly traded corporations, prepares four basic financial statements to report its financial position. The following four statements are required by GAAP in the United States:

1. The income statement reports revenues, expenses, gains and losses, and other factors that have impacted the organization's profitability for a period of time, such as a month, quarter, or year. In addition, there will be a statement of comprehensive income that can be combined with the income statement or prepared as a separate statement immediately following it. The statement of comprehensive income starts with net income and then reports other items, net of taxes, such as the unrealized gain or loss on available-for-sale securities or the gain or loss on foreign currency translations.
2. The balance sheet, or statement of financial position, reports the assets, liabilities, and equity at a given point in time. It is based on the accounting equation:

$$\text{Assets} = \text{Liabilities} + \text{Stockholders' equity}$$

3. The statement of changes in equity reports the changes from one time period to another. This statement shows changes to stockholders' equity by major accounting category such as common stock, additional paid-in-capital, retained earnings, and treasury stock.
4. The statement of cash flows provides information about the sources and uses of cash over a period of time. The operating activity section of the statement reconciles net income, which is based on accrual accounting according to U.S. GAAP, to the cash provided by or cash used by operating activities. This is important because a company can have net income and be profitable but still go bankrupt if it doesn't have sufficient operating cash inflows to cover operating costs, invest in the business, and repay creditors. It also reconciles the organization's beginning cash balance plus (or minus) the net increase (or decrease) to cash during the period to arrive at the ending cash balance.

II. Common-Size Financial Statement Analysis

A. Financial statements show performance results over multiple months, quarters, or years.

1. A single set of financial statements does not show relationships or trends from period to period.
2. Users examine the financials in order to make optimal decisions concerning investing in or doing business with the organization.

B. Common-size financial statement analysis allows the user to compare financial statements from different time periods to analyze trends and review the organization's future growth prospects. Common-size analyses are also known as vertical analyses.

1. Vertical analysis calculates financial statement amounts in each statement as a percentage of a base amount for that statement.
2. The base amount is set at 100%. All of the other line items on the financial statement are calculated as a percentage of the base amount. The formula is:

Amount of the line item ÷ Amount of the base

C. A look at the Pharma Company's condensed income statements below shows data for Year 5 and Year 4. When analyzing the income statement, the base amount is net sales, which is set at 100%. Note that Year 5 net sales are $360,000.

Pharma Company
Condensed Income Statements
For the Years Ended December 31

	Year 5		Year 4	
	Amount	**Percent***	**Amount**	**Percent***
Net Sales	$360,000	100.0	$369,300	100.0
Cost of Goods Sold	85,500	23.7	81,100	22.0
Gross Profit	274,500	76.3	288,200	78.0
Operating Expenses	93,600	26.0	121,200	32.8
Depreciation and Amortization	78,100	21.7	82,200	22.3
Operating Income	102,800	28.6	84,800	23.0
Interest Expense	17,200	4.8	17,200	4.7
Income before Income Taxes	85,600	23.8	67,600	18.3
Income Tax Expense (25% rate)	21,400	5.9	16,900	4.6
Net Income	$ 64,200	17.8	$ 50,700	13.7

**Numbers may not add due to rounding.*

1. The first calculation is cost of goods sold and is calculated as $85,500 ÷ $360,000 = 23.7%.
2. The next calculation is gross profit and is calculated as $274,500 ÷ $360,000 = 76.3%.
3. Each of the remaining line items on the statement are divided by $360,000 to get their percentage.
4. It is important to note that the percentages will be added and subtracted on the statement the same way the dollar amounts are. For example, a 23.7% cost of goods sold subtracted from 100% will yield a 76.3% gross profit.

D. Our profitability analysis of Pharma begins with a vertical analysis of the income statement. Pharma is a manufacturing company. Vertical analysis is also applicable for a merchandising company. The manufacturer will purchase the materials used to make the products they sell. The merchandiser will purchase the products they sell. Refer back to Pharma Company's income statement to reference the amounts and percentages that follow. There are four vertical analysis ratios used to evaluate different levels of profit, also called return on sales.

1. Gross margin = Gross profit ÷ Net sales = $274,500 ÷ $360,000 = 76.3%

    a. Gross margin is an important ratio because of its strong influence on profit margin. It is an indicator of the adequacy of the selling price to cover cost of goods sold. It measures the amount of each sales dollar available to cover operating expenses, including selling and administrative expenses, other expenses, and income tax expense. Pharma's gross margin is 76.3%, or $0.763 of every sales dollar available.

    b. A company operating in a competitive market cannot significantly influence the selling price. However, the company can improve the gross margin by controlling its manufacturing costs, including purchasing costs. Hence, there is a lot of motivation to reduce the cost of inventory.

    c. If Pharma has flexibility in setting the selling price, it is better able to cover cost increases in direct materials, direct labor, and manufacturing overhead included in cost of sales. As a result, Pharma may not be as motivated to lower these costs.

2. Operating margin = Income from operations ÷ Net sales = $102,800 ÷ $360,000 = 28.6%

    a. Operating margin indicates the percent of profit from the day-to-day operations of the business. It measures the amount of each sales dollar available to cover interest expense, nonoperating expenses, and income tax expense. Pharma has $0.286 of operating margin available for every sales dollar.

3. Net profit margin = Net income ÷ Net sales = $64,200 ÷ $360,000 = 17.8%

    a. Net profit margin is also an important ratio, indicating the "bottom line" results of the company's performance for the time period.

    b. Net profit margin measures the amount of each sales dollar earned for stockholders of the company. In Year 5, Pharma earned $0.178 of every sales dollar for its stockholders.

4. EBITDA margin = EBITDA ÷ Net sales = $180,900 ÷ $360,000 = 50.3%.

    a. Earnings before interest, taxes, depreciation, and amortization (EBITDA) provides an estimate of cash supplied by operations. For Year 5, it is calculated as $102,800 + $78,100 = $180,900.

    b. Use EBITDA to analyze companies with high property, plant, and equipment to estimate profitability, regardless of the depreciation assumptions or financing choices made.

5. Each ratio is determined by the expense component used to calculate it. The following chart identifies each cost category and whether it impacts each ratio.

Ratio	Cost of Sales	Operating Expenses, including Selling & Admin	Interest Expense, Non-Operating Gains/(Losses), Income Taxes
Gross margin	Yes	No	No
Operating margin	Yes	Yes	No
Net profit margin	Yes	Yes	Yes

a. Understanding the income statement and how the different margins are determined is extremely important for both the managers of the company and the external users of the statement. Managers use this information to focus on costs that may need to be reduced. The external users of this information want to determine how profitable the company is at each level.

E. All of these margins indicate that Pharma Company is quite profitable. However, each margin takes on more meaning when compared to the prior period, a competitor's margins, or the industry average.

1. Vertical analysis allows the analysis of multiple time periods—in Pharma Company's case the comparison of Year 5 to Year 4. This is called an intracompany analysis.
2. By eliminating the impact of size differences, vertical analysis also enables an intercompany comparison of companies of different sizes or to industry averages.
3. The income statements shown below compare Pharma Company to Medicine Inc. using an intercompany vertical analysis. Comparing the dollar amounts of these two companies would be meaningless because Pharma's results are in thousands while Medicine's results are is in millions.
4. We see that Pharma is more profitable than Medicine at the gross margin level due to a relatively lower cost of goods sold. Pharma is also more profitable than Medicine at both the operating margin and net profit margin levels. This is primarily due to much lower operating expenses.

Condensed Income Statements

For Year 5 Ended December 31

	Pharma Company (in thousands)		Medicine Inc. (in millions)	
	Amount	**Percent***	**Amount**	**Percent***
Net sales	$360,000	100.0	$681,300	100.0
Costs of goods sold	85,500	23.7	212,400	31.2
Gross profit	274,500	76.3	468,900	68.8
Operating expenses	93,600	26.0	292,800	43.0
Depreciation and amortization	78,100	21.7	59,900	8.8
Operating income	102,800	28.6	116,200	17.0
Interest expense	17,200	4.8	6,200	0.9
Income before income taxes	85,600	23.8	110,000	16.1
Income tax expense (25% rate)	21,400	5.9	27,500	4.0
Net Income	$ 64,200	17.8	$ 82,500	12.1

**Numbers may not add due to rounding.*

F. Next is the vertical analysis of the balance sheet. We continue with Pharma for Year 5 and Year 4 on the balance sheets that are shown below. When analyzing the balance sheet, the base amount is total assets (set at 100%).

Pharma Company
Condensed Balanced Sheets
As of December 31

	Year 5		Year 4	
	Amount	**Percent***	**Amount**	**Percent***
Current Assets	$254,200	31.8	$218,100	28.9
Property, Plant, and Equipment (net)	53,200	6.6	50,100	6.6
Other Assets	492,200	61.6	486,800	64.5
Total Assets	$799,600	100.0	$755,000	100.0
Current Liabilities	$153,100	19.2	$141,000	18.7
Long-term Liabilities	344,000	43.0	344,000	45.5
Total Liabilities	$497,100	62.2	$485,000	64.2
Preferred and Common Stock	172,000	21.5	156,600	20.8
Retained Earnings	230,200	28.8	204,000	27.0
Treasury Stock	(99,700)	(12.5)	(90,600)	(12.0)
Total Stockholders' Equity	$302,500	37.8	$270,000	35.8
Total Liabilities and Stockholders' Equity	$799,600	100.0	$755,000	100.0

**Numbers have been rounded to total 100%.*

1. The first calculation is for the line item current assets and is calculated as $254,200 ÷ $799,600 = 31.8%.
2. The second calculation is property, plant, and equipment (net) and is calculated as $53,200 ÷ $799,600 = 6.6%.
3. The third calculation is other assets and is calculated as $492,200 ÷ $799,600 = 61.6%.
4. These three percentages are combined to equal 100%.
5. This analysis continues in the same way with the calculations for the liability and stockholders' equity sections. The base amount used is still total assets (which is the same amount as total liability and stockholders' equity).
6. Note that treasury stock reduces stockholders' equity, which is why the dollar amount and the percentage is negative.

Summary

The four core financial statements—income statement, retained earnings (or stockholders' equity), balance sheet, and cash flows—serve both external and internal users. Vertical analysis of the income statement and balance sheet is based on computing ratios using net sales and total assets, respectively. Gross profit, operating income, and net income as percentages of net sales are all key measures of profit margin performance for the company.

Horizontal Financial Statement Analysis

After studying this lesson, you should be able to:

- For the balance sheet and income statement, prepare a comparative financial statement horizontal analysis (ie, calculate year-over-year trends for every item on the financial statement compared to a base year) (2.A.1.b).
- Calculate the growth rate of individual line items on the balance sheet and income statement (2.A.1.c).
- Analyze financial statement data to identify patterns and trends that can be used to make business decisions (2.A.1.d).
- Demonstrate an understanding of the impact of inflation on financial ratios and the reliability of financial ratios (2.A.4.b).

Horizontal analysis of financial statements provides insight into a company's performance over time by comparing data across multiple periods, revealing trends in key items like sales and net income. However, inflation can distort these comparisons by impacting sales, expenses, income, and inventory costs, making it crucial to use horizontal analysis to identify and remove inflationary effects for accurate period-to-period assessments of real financial changes.

I. Horizontal Analysis

A. Financial statements are evaluated over a period of time. Horizontal analysis is also called trend analysis. It determines the increase or decrease from one time period to another.

B. A base period is determined in order to perform the analysis. The base period can be the period immediately prior or it can go back further in time.

C. The increase or decrease from the base period can be expressed as either a percentage or an amount. The basic calculations are:

1. Amount of change method: Current period − Prior period = Amount of change
2. Percent change method: (Current period − Prior period) ÷ Prior period = Growth rate

D. The following information about Pharma Company will be used for our calculations. The base year in the calculations is the second time period given. For example, in the amount of change method, the base year for Lines a and b is Year 1 and the base year for Line c is Year 4.

	Year 5	Year 4	Year 3	Year 2	Year 1
Net sales	$360,000	$369,300	$371,000	$340,000	$209,200

1. Amount of change method

	Current Period	−	Prior Period	=	Amount of Change
a. Year 2 from Year 1	$340,000		$209,200		$130,800
b. Year 5 from Year 1	$360,000		$209,200		$150,800
c. Year 5 from Year 4	$360,000		$369,300		$ (9,300)

2. Percent of change method

	(Current Period	−	Prior Period)	÷	Prior Period	=	Growth Rate
a. Year 2 from Year 1	$340,000		$209,200		$209,200		62.5%
b. Year 5 from Year 1	$360,000		$209,200		$209,200		72.1%
c. Year 5 from Year 4	$360,000		$369,300		$369,300		(2.5)%

3. Using the percent of change method, complete horizontal analysis of net sales, operating expenses, and net income using the following information:

Pharma Company
Select Income Statement Items
Base Period: Year 1

	Year 5	Year 4	Year 3	Year 2	Year 1
Net Sales	$360,000	$369,300	$371,100	$340,000	$209,200
Percent of Change	72.1%	76.5%	77.4%	62.5%	n/a
Operating Expenses	$ 93,600	$121,200	$115,300	$ 95,000	$ 88,800
Percent of Change	5.4%	36.5%	29.8%	7.0%	n/a
Net Income	$ 64,200	$ 50,700	$ 55,200	$ 19,500	$ 27,517
Percent of Change	133.3%	84.2%	100.6%	(29.1)%	n/a

E. Now the data will be used to identify patterns and trends to aid in making business decisions.

1. Sales have increased each year from the base Year 1 to Years 2 and 3. Notice that sales decreased slightly from Year 3 (77.4% of the base year) to Year 4 (76.5% of the base year) and again from Year 4 (76.5% of the base year) to Year 5 (72.1% of the base year). Investigating the economic conditions, competition, and individual product sales during each of these years will provide information about the reason(s) for the declines. Based on this information, management can use the analysis to project future sales.
2. Operating expenses increased each year from Year 1 to Years 2, 3, and 4. However, operating expenses decreased in Year 5, almost down to the Year 1 and Year 2 levels. Investigating the

categories reported within operating expenses can provide information about the decreases and give management insight to determine the amount of spending they should plan for future years.

3. Net income actually decreased from Year 1 to Year 2. After that, net income for Years 3, 4, and 5 saw increases. Year 5 is interesting because sales were down from Year 4, but due to the decrease in operating expenses, net income was higher. Once again, recognizing reasons for increases and decreases will give management information for future business decisions.

F. The horizontal analysis can be used to analyze both the income statement and the balance sheet. The horizontal analysis of the comparative income statements for Pharma Company follows:

Pharma Company
Condensed Income Statements
For the Years Ended December 31

			Increase (Decrease) during Year 5	
	Year 5	**Year 4**	**Amount**	**Percent**
Net Sales	$360,000	$369,300	$ (9,300)	(2.5)
Cost of Goods Sold	85,500	81,100	4,400	5.4
Gross Profit	274,500	288,200	(13,700)	(4.8)
Operating Expenses	93,600	121,200	(27,600)	(22.8)
Depreciation and Amortization	78,100	82,200	(4,100)	(5.0)
Operating Income	102,800	84,800	18,000	21.2
Interest Expense	17,200	17,200	0	0.0
Income before Income Taxes	85,600	67,600	18,000	26.6
Income Tax Expense (25% rate)	21,400	16,900	4,500	26.6
Net Income	$ 64,200	$ 50,700	$13,500	26.6

1. The comparative income statements show the changes from Year 4 to Year 5. From these statements, we can see that the Year 5 net sales decreased from Year 4 by $9,300; this is calculated as $360,000 − $369,300.
2. The $9,300 decrease in net sales represents a 2.5% decrease from Year 4, calculated as $9,300 ÷ $369,300.
3. It is important to note that the Increase (Decrease) Amount column is additive, similar to how income statement amounts are additive down the column. However, the Increase (Decrease) Percent column *is not* additive.

G. Next is the horizontal analysis of comparative balance sheets for Pharma Company:

Pharma Company
Condensed Balance Sheets
As of December 31

			Increase (Decrease) to Year 5	
	Year 5	Year 4	Amount	Percent
Current Assets	$254,200	$218,100	$36,100	16.6
Property, Plant, and Equipment, net	53,200	50,100	3,100	6.2
Intangible Assets, net	492,200	486,800	5,400	1.1
Total Assets	$799,600	$755,000	$44,600	5.9
Current Liabilities	$153,100	$141,000	$12,100	8.6
Long-term Liabilities	344,000	344,000	0	0.0
Total Liabilities	$497,100	$485,000	$12,100	2.5
Preferred and Common Stock	172,000	156,600	15,400	9.8
Retained Earnings	230,200	204,000	26,200	12.8
Treasury Stock	(99,700)	(90,600)	(9,100)	(10.0)
Total Stockholders' Equity	$302,500	$270,000	$32,500	12.0
Total Liabilities and Stockholders' Equity	$799,600	$755,000	$44,600	5.9

1. The amount change for current assets from Year 4 to Year 5 is $36,100, which represents a 16.6% increase.
2. The calculations are performed in the same way as those completed on the income statement. The Year 4 current assets amount of $218,100 is subtracted from the Year 5 amount of $254,200 to yield the $36,100 increase. Then the increase of $36,100 is divided by $218,100 to yield the 16.6% increase.

II. Inflation will impact sales, expenses, income, and the cost of inventory. This can cause distortions when comparing year-over-year financial statements.

A. During inflationary times, the costs of items will increase for the firm, as will the prices of products or services sold by the firm. The questions to ask include:

1. Are expenses increasing from year to year because we are using more, or are we paying more?
2. Are sales increasing due to increased volume, or are we charging more?

B. The use of horizontal analysis to measure growth in sales or income from a base year is useful because the results can be adjusted for and restated to remove the impact of inflation.

1. A sales analysis can be done to measure the percent increase from year to year.
2. However, if sales increased by 10% based solely on increasing the selling price with a 12% inflation rate, the firm did not see sales increase in real terms. This would be a bad sign for the firm because it indicates that the increase due to inflation exceeds the increase in selling price.

3. Let's assume that sales went from $1,000 in Year 1 to $1,100 in Year 2. This would be a 10% sales growth in absolute dollars. Now let's assume that inflation is 12%. The Year 2 sales can be adjusted for inflation by dividing the Year 2 sales amount ($1,100) by 1.12. This yields $982, which is a decrease of $18 from Year 1 sales. This means there was an actual economic decline in sales from Year 1 to Year 2.

C. The use of vertical analysis can measure how growth in one financial metric relates to another metric. This can also help highlight the impact of inflation.

D. Inflation can have a significant impact on key ratios because of its effect on price and cost increases. As revenues and expenses increase over time during periods of inflation, ratios such as return on assets can show increases that are not necessarily due to the firm performing better, but rather because income is higher due to inflation.

E. Inflation has been rising in North America and Europe during the past several years. The issues discussed so far have an impact on these countries and the firms doing business there. However, in South America and Africa, where there has been much higher inflation over the last decade, the impact is much more considerable.

Summary

Horizontal analysis, also known as trend analysis, evaluates a company's performance over multiple periods by calculating amount of change or growth rates in specific accounts by comparing to a selected base year of operations. In inflationary environments, the horizontal analysis results should be adjusted for the annual rate of inflation in order to avoid distorting how the results are understood by managers.

Topic 2. Financial Ratios

Liquidity Ratios

After studying this lesson, you should be able to:

- Calculate and interpret the current ratio, the quick (acid-test) ratio, the cash ratio, the cash flow ratio, and the net working capital ratio (2.A.2.a).
- Explain how changes in one or more of the elements of current assets, current liabilities, and/or unit sales can change the liquidity ratios and calculate that impact (2.A.2.b).
- Demonstrate an understanding of the liquidity of current liabilities (2.A.2.c).

Financial ratios offer a powerful yet accessible way to assess a company's financial health. This lesson introduces the concept of financial ratios, with a focus on liquidity analysis—how well a company can meet its short-term obligations.

I. Understanding and Using Financial Ratios

A. Ratios measure a comparative relationship between two components of a financial statement or statements.

B. Financial ratios are an effective method for analyzing company performance.

1. Ratios can measure the relationship between different components on a single financial statement or between components on different financial statements.
2. Management and other users with basic financial knowledge can use ratios to asses organization performance.
3. Ratios can also be charted or graphed over time to measure a company's performance in an easy-to-follow visual format.

C. Ratios are classified into three types of analysis of financial statements. The analyses are (1) liquidity, (2) solvency, and (3) profitability. Liquidity will be reviewed in this lesson. Solvency and profitability will be reviewed in subsequent lessons.

II. Liquidity Ratios

A. Liquidity measures the company's ability to pay its short-term obligations and meet any unexpected needs for cash with its current assets. The current liabilities represent the company's short-term obligations.

1. Liquidity is based on the ability of the company to convert its current assets to cash.
2. A profitable company can have liquidity problems or even go bankrupt if it cannot convert sales to cash, as needed, to pay its short-term obligations.

B. Basic Concepts

1. Current assets include cash and other assets expected to convert to cash within one year or the company's operating cycle, whichever is longer.
2. Current liabilities are the company's short-term obligations that are expected to be paid within one year or the company's operating cycle, whichever is longer.
3. Liquidity analysis involves:
    a. Conversion of inventory to sales
    b. Conversion of credit sales in accounts receivable (A/R) to cash
    c. Payment of purchases in accounts payable (A/P)
    d. Payment of other current liabilities
4. The operating cycle of a company represents the time it takes to go from receiving inventory, then sell that inventory on account, and finally receive cash from the customer.
    a. A service provider incurs expenses for salaries, wages, and supplies in order to provide their service. Once the service is provided, the customer is invoiced and then cash comes in.
    b. A retailer and a manufacturer receive inventory to sell as is, or to produce and sell a finished product. The inventory can be held for varying lengths of time. Once the sale is made, the customer is invoiced and then cash comes in.

C. Key Liquidity Measures

1. Net working capital is the difference between current assets and current liabilities and is measured as a dollar amount:
    a. Net working capital = Current assets − Current liabilities
2. The net working capital ratio is a variation of net working capital. The ratio is an additional way to evaluate net working capital and its relationship to total assets. It is calculated as:
    a. Net working capital ratio = Net working capital ÷ Total assets
    b. It is expressed as a percent (%).
    c. Most organizations will report net working capital as a positive amount. A negative amount indicates that the current liabilities are greater than the company's current assets. In this situation, the percent would be expressed as a negative number.
    d. Firms need to balance the need for cash and liquidity (which encourages higher current ratios) with the need for increasing shareholder wealth and growing the business (which may suggest lower current ratios). This means financial statement users may question low current ratios as well as high current ratios.
3. Current ratio measures the relationship between current assets and current liabilities:
    a. Current ratio = Current assets ÷ Current liabilities
    b. It is expressed as X.XX. This describes dollars and cents in current assets for every dollar of current liabilities.
4. Quick ratio (aka acid-test ratio) measures the firm's ability to meet its current obligations with its cash, marketable securities, and A/R.
    a. Quick ratio = (Cash + Marketable securities + A/R) ÷ Current liabilities
    b. Also expressed as X.XX

5. Cash ratio reduces the amount in the numerator to cash and marketable securities. It is a tougher measure of liquidity than the quick ratio and the current ratio.
   a. Cash ratio = (Cash + Marketable securities) ÷ Current liabilities
   b. Also expressed as X.XX
6. Cash flow ratio measures how efficiently the cash provided from operations covers the current liabilities. The operating cash flow (cash provided by operations) is found on the statement of cash flows.
   a. Cash flow ratio = Operating cash flow ÷ Current liabilities
   b. Typically expressed as a percent (%).

D. We will use the following data to work on liquidity calculations for Pharma Company:

Pharma Company
Select Financial Statement Data
As of December 31

	Year 5	Year 4
Current Assets:		
Cash and Cash Equivalents*	$ 98,200	$ 74,000
Accounts Receivable, net	87,400	79,600
Inventory	21,300	18,700
Prepaid Expenses	47,300	45,800
Total Current Assets	$254,200	$218,100
Non-current Assets	545,400	536,900
Total Assets	$799,600	$755,000
**Includes Marketable Securities*		
Current Liabilities:		
Accounts Payable	$ 26,100	$ 24,300
Accrued and Other Liabilities	127,000	116,700
Total Current Liabilities	$153,100	$141,000
Cash provided by operations	$142,500	$124,700

1. Net working capital = Capital assets − Current liabilities

	Current Assets	−	Current Liabilities	=	Net Working Capital
Year 5	$254,200		$153,100		$101,100
Year 4	$218,100		$141,000		$ 77,100

In both years, Pharma had more current assets than current liabilities. Net working capital increased from Year 4 to Year 5.

2. Net working capital ratio = Net working capital ÷ Total assets

	Net Working Capital	÷	Total Assets	=	Net Working Capital Ratio
Year 5	$101,100		$799,600		12.6%
Year 4	$ 77,100		$755,000		10.2%

These ratios are meaningful because they are both positive and showed an increase from Year 4 to Year 5. This is consistent with the results of the net working capital calculation.

3. Current ratio = Current assets ÷ Current liabilities

	Current Assets	÷	Current Liabilities	=	Current Ratio
Year 5	$254,200		$153,100		1.66
Year 4	$218,100		$141,000		1.55

The intracompany analysis for Pharma Company shows the current ratio improved from 1.55 in Year 4 to 1.66 in Year 5. Generally, the ratio should be a minimum of 1. The results show that Pharma is liquid, meaning it has the ability to pay its current liabilities with current assets.

The results can be stated another way: Pharma had $1.66 of current assets for every $1.00 of current liabilities in Year 5.

4. Quick ratio = (Cash + Marketable securities + A/R) ÷ Current liabilities

	Cash + Marketable Securities + A/R	÷	Current Liabilities	=	Quick Ratio
Year 5	$185,600		$153,100		1.21
Year 4	$153,600		$141,000		1.09

As seen in the current ratio, Pharma Company's quick ratio improved from Year 4 to Year 5 and is above the benchmark of 1. Notice that the quick ratio is lower than the current ratio. This is due to the exclusion of inventory and prepaid expenses in the numerator of the equation. The quick ratio will always be lower than the current ratio.

5. Cash ratio = (Cash + Marketable securities) ÷ Current liabilities

	Cash + Marketable Securities	÷	Current Liabilities	=	Cash Ratio
Year 5	$98,200		$153,100		0.64
Year 4	$74,000		$141,000		0.52

Now notice that the cash ratio for both Years 4 and 5 has dropped below the benchmark of 1. This result is due to the additional exclusion of A/R in the numerator of the equation. Pharma is, therefore, reliant on the conversion of A/R to cash in order to stay above the benchmark of 1 and be able to pay the current liabilities with cash, marketable securities, and A/R. The cash ratio will always be lower than both the current ratio and the quick ratio.

6. Cash flow ratio = Cash provided by operations ÷ Average current liabilities.

	Operating Cash Flow	÷	Current Liabilities	=	Cash Flow Ratio
Year 5	$142,500		$153,100		93.1%
Year 4	$124,700		$141,000		88.4%

This calculation looks at the amount of after-tax cash provided by the operations of the company to determine the relationship to current liabilities. In both Years 4 and 5, the operating cash flows were almost equal to the current liabilities. The ratio improved from Year 4 to Year 5.

7. The above calculations used to analyze the liquidity of Pharma Company reveal that the company is liquid, meaning it is able to pay the current liabilities as they come due. In addition, liquidity improved from Year 4 to Year 5.

E. The Impact of Changes in Current Assets and Current Liabilities on Liquidity

1. In general, an increase in current assets, while keeping current liabilities the same, will improve the liquidity of a company. However, an increase in some current assets can make a bigger difference than an increase in others.
   a. When cash and A/R increase, there will be increases in the current ratio and quick ratio.
   b. However, increases in inventory and prepaid expenses will improve the current ratio but not the quick ratio and cash ratio. Remember that prepaid expenses will never convert to cash, though they will save on future expenditures of cash. This asset will generally be expensed with the passage of time.
2. The opposite is true for an increase in current liabilities. An increase in any current liability will decrease all of the liquidity ratios.
3. Overall, there will be improvements to liquidity when current assets increase, current liabilities decrease, or the cash provided by operating activities increases. There will be a decline in liquidity when current assets decrease, current liabilities increase, or the cash provided by operating activities decreases.

Summary

Liquidity ratios evaluate a company's ability to meet short-term obligations using current assets. Key measures include the current ratio, quick ratio, cash ratio, and cash flow ratio. Each offers a different view of how easily a company can convert assets to cash. Strong liquidity improves financial flexibility, while weak liquidity can lead to solvency issues—even in profitable companies. Monitoring trends helps assess performance and the effectiveness of cash and working capital management.

Solvency Ratios

After studying this lesson, you should be able to:

- Define solvency and distinguish from liquidity (2.A.2.d).
- Calculate and interpret the following ratios: debt-to-equity, long-term debt-to-equity, and debt-to-total assets (2.A.2.i).
- Define, calculate, and interpret the following ratios: fixed charge coverage (earnings to fixed charges), interest coverage (times interest earned), and cash flow to fixed charges (2.A.2.j).

A next step in analyzing a company's financial health is to determine how solvent it is. Solvency ratios assess the ability of the company to survive for the long term. Solvency ratios are concerned with all liabilities, not just current liabilities. This lesson will focus on understanding and interpreting solvency ratios.

I. Solvency Ratios

A. Solvency is the ability of a company to survive over a long period of time—in other words, the ability of the company to pay its long-term liabilities in addition to its current ones. This is in contrast to liquidity, which focuses on the company's ability to pay current liabilities using current assets.

1. An analysis of solvency uses components from the balance sheet, income statement, and statement of cash flows.
2. It is important to understand the terminology that is used when referring to financial statement items. Debt, total debt, liabilities, and total liabilities are interchangeable terms. Long-term debt and long-term liabilities are interchangeable terms and can be calculated as total debt minus current liabilities. Equity, stockholders' equity, and total stockholders' equity are interchangeable terms.

B. Key solvency measures are as follows:

1. Debt-to-equity measures the relationship between total liabilities and stockholders' equity:

   a. Debt-to-equity = Total debt ÷ Equity

2. Long-term debt-to-equity measures the relationship between only the long-term liabilities and stockholders' equity:

   a. Long-term debt-to-equity = (Total debt − Current liabilities) ÷ Equity

3. Debt-to-total assets measures the relationship between total liabilities and total assets. The percentage can be interpreted as how much of the assets creditors have claim to since the assets are financed. The difference between this percentage and 100% is the amount of assets owned by the stockholders.

   a. Debt-to-total assets = Total debt ÷ Total assets

4. Fixed charge coverage (ie, earnings to fixed charges ratio) is a way to measure how well earnings can cover fixed charges. The earnings amount used is earnings before fixed charges and taxes. Fixed charges include interest, required principal repayment of loans, and leases.

   a. Fixed charge coverage = Earnings before fixed charges and taxes ÷ Fixed charges

5. Interest coverage (ie, times interest earned ratio) is a way to measure how well earnings can cover interest expense.
   a. Interest coverage = Earnings before interest and taxes (EBIT) ÷ Interest expense
6. The cash flow-to-fixed charges ratio recognizes that payments for fixed charges must be made from cash and not from earnings. It answers the question of whether the company has enough cash flow from operations to pay for the fixed charges it incurs.
   a. Cash flow-to-fixed charges = (Cash from operations + Fixed charges + Tax payments) ÷ Fixed charges
   b. Note that cash from operations is an after-tax amount that is found on the statement of cash flows.

II. Solvency Calculations for Pharma Company

Pharma Company
Condensed Balance Sheets
As of December 31

	Year 5	Year 4
Current Assets	$254,200	$218,100
Property, Plant, and Equipment, net	53,200	50,100
Intangible Assets, net	492,200	486,800
Total Assets	$799,600	$755,000
Current Liabilities	$153,100	$141,000
Long-Term Liabilities	344,000	344,000
Total Liabilities	497,100	485,000
Preferred and Common Stock	172,000	156,600
Retained Earnings	230,200	204,000
Treasury Stock	(99,700)	(90,600)
Total Stockholders' Equity	302,500	270,000
Total Liabilities and Stockholders' Equity	$799,600	$755,000

Pharma Company
Condensed Income Statements
For the Years Ended December 31

	Year 5	Year 4
Net Sales	$360,000	$369,300
Costs of Goods Sold	85,500	81,100
Gross Profit	274,500	288,200
Operating Expenses	93,600	121,200
Depreciation and Amortization	78,100	82,200
Operating Income	102,800	84,800
Interest Expense	17,200	17,200
Income before Income Taxes	85,600	67,600
Income Tax Expense (25% rate)	21,400	16,900
Net Income	$ 64,200	$ 50,700

Pharma Company
Condensed Statements of Cash Flows
For the Years Ended December 31

	Year 5	Year 4
Cash Flow from Operating Activities:		
Net Income	$ 64,200	$ 50,700
Depreciation and Amortization	78,100	82,200
Net Adjustments to Reconcile Net Income	200	(8,200)
Net Cash Provided by Operating Activities	$142,500	$124,700

A. Debt-to-equity = Total debt ÷ Equity

	Total Debt	÷	Total Equity	=	Debt to Equity
Year 5	$497,100		$302,500		164.3% or 1.643
Year 4	$485,000		$270,000		179.6% or 1.796

B. Long-term debt-to-equity = Long-term debt ÷ Equity

	Long-Term Debt	÷	Total Equity	=	Long-Term Debt to Equity
Year 5	$344,000		$302,500		113.7% or 1.137
Year 4	$344,000		$270,000		127.4% or 1.274

Both debt-to-equity and long-term debt-to-equity are similar calculations that are slightly different ways of measuring the relationship. For Pharma, the relative use of borrowed money to the resources invested by the owners is very high. This is a risky position for the company. However, both percentages decreased from Year 4 to 5, which shows improvement.

C. Debt-to-total assets = Total debt ÷ Total assets

	Total Debt	÷	Total Assets	=	Debt to Total Assets
Year 5	$497,100		$799,600		62.2%
Year 4	$485,000		$755,000		64.2%

In both years, the debt-to-assets ratio indicates that Pharma relies primarily on debt to finance its assets. At this point, the ratio is probably not cause for concern, and the ratio has declined somewhat in Year 5. If this ratio were to increase significantly, Pharma may be at significant risk of not being able to pay its maturing obligations as they come due.

D. Fixed charge coverage = Earnings before fixed charges and taxes ÷ Fixed charges

1. The fixed charges referred to in this calculation are made up of interest expense, the required repayment of principal of loans, and all lease payments.
2. Pharma's fixed charges consist of only the interest expense of $17,200. The charges are the same in both Year 4 and Year 5. This means that the earnings before fixed charges and taxes are equal to the operating income for both years.

	Earnings Before Fixed Charges* and Taxes	÷	Fixed Charges	=	Fixed Charge Coverage
Year 5	$102,800		$17,200		6.0 times
Year 4	$ 84,800		$17,200		4.9 times

**Fixed charges include interest expense, required principal repayment of loans, and lease payments.*

The fixed charge coverage rate increased 1.1 times from Year 4 to Year 5, indicating that Pharma has increased its ability to cover its fixed charges at the current adjusted earnings levels. This shows improvement. The bonds payable and annual interest that goes along with it remained constant from Year 4 to Year 5.

E. Interest coverage = EBIT ÷ Interest expense

	EBIT	÷	Interest Expense	=	Interest Coverage
Year 5	$102,800		$17,200		6.0 times
Year 4	$ 84,800		$17,200		4.9 times

Because Pharma has no fixed charges other than interest expense, the interest coverage ratio is the same as the fixed charge coverage ratio. Hence, the computations and results are the same. Pharma's solvency is improving. Note that the fixed charge coverage and the interest coverage rates would be more meaningful if Pharma's results were compared to the industry average as well as to a competitor's results.

F. Cash flow to fixed charges = (Cash from operations + Fixed charges + Tax payments) ÷ Fixed charges

	(Cash from Operations + Fixed Charges + Taxes)	÷	Fixed Charges	=	Cash Flow to Fixed Charges
Year 5	($142,500 + $17,200 + $21,400)		$17,200		10.5 times
Year 4	($124,700 + $17,200 + $16,900)		$17,200		9.2 times

Compared to the fixed charge coverage ratio, this ratio gives a better indication of Pharma's ability to pay the cash needed for the fixed charges. Similar to the fixed charge coverage results, these calculations show that Pharma's ability to cover its fixed charges has increased from Year 4 to Year 5. This time it increased by 1.3 times. Remember that all fixed charges must be paid with cash.

Overall, Pharma appears to be solvent. All calculations improved from Year 4 to Year 5, which indicates that solvency has improved.

III. It's important at this point to ask yourself, "Who cares about the solvency of a company?" This is best answered by looking at the two main user categories.

A. The treasurer of the company is in the internal user group category. As treasurer, this individual and their team are responsible for the company having enough cash to pay bills and having access to cash at future dates to repay any principal due on long-term debt. If there isn't enough cash, the treasurer is responsible for determining how to get the cash to meet these obligations. The treasurer is also responsible for finding investment opportunities when there is excess cash. These opportunities should be selected based on both the short-term and long-term cash needs to ensure that the investment can be liquidated when the cash is needed.

B. Creditors, banks, and bond investors all have an interest in the solvency of the company because they want to ensure that they will be compensated for the principal and interest they are owed over time, which can span five, ten, or twenty years or more.

Summary

Solvency ratios assess an entity's ability to survive for the long term—specifically, its ability to meet long-term obligations using insights from the balance sheet, income statement, and cash flow statement. Key measures include debt-to-equity, debt-to-assets, fixed charge coverage, interest coverage, and cash flow to fixed charges. High solvency reduces risk for creditors and investors. Improving ratios indicate a stronger financial position and better capacity to repay debt and sustain operations over time.

Activity Ratios

After studying this lesson, you should be able to:

- Calculate and interpret accounts receivable turnover, inventory turnover, and accounts payable turnover (2.A.2.l).
- Calculate and interpret days sales outstanding in receivables, days sales in inventory, and days purchases in accounts payable (2.A.2.m).
- Define and calculate the operating cycle and the cash cycle of a company (2.A.2.n).
- Calculate and interpret total asset turnover and fixed asset turnover (2.A.2.o).

Operating activities offer insights into a company's efficiency and cash management, evaluating how quickly it collects cash from credit sales through an accounts receivable analysis. Tracking how promptly a company pays its suppliers via accounts payable is also crucial. Furthermore, asset turnover ratios reveal the effectiveness of asset utilization in generating sales, providing another lens on operational efficiency.

I. Operating Activity Ratios

A. Three accounts on the balance sheet are analyzed to determine the operating efficiency of a company. They are (1) inventory, (2) accounts receivable (A/R), and (3) accounts payable (A/P). Activity analysis is performed to determine the length of the *operating cycle*, which is the time between when inventory is purchased and when the cash is received from the sale of those goods. In addition, a further analysis can be performed to determine the length of the *cash cycle*, which represents the amount of time that the company carries inventories and A/R less the amount of time the company carries accounts payable.

1. Inventory is analyzed using the inventory turnover ratio and the number of days sales in inventory. A higher inventory turnover means there are fewer days of sales in inventory.

   a. Inventory turnover ratio = Cost of goods sold ÷ Average inventory

   b. Days sales in inventory = 365 days ÷ Inventory turnover

   c. An ***alternative*** calculation for days sales in inventory is: Average inventory ÷ (Cost of goods sold ÷ 365 days)

2. A/R is analyzed using the A/R turnover ratio and the number of days sales in receivables. A higher A/R turnover means there are fewer days of sales in A/R.

   a. A/R turnover ratio = Credit sales ÷ Average A/R

   b. Days sales in receivables = 365 days ÷ A/R turnover

   c. An ***alternative*** calculation for days sales in receivables is: Average A/R ÷ (Credit sales ÷ 365 days)

3. A/P is analyzed using the A/P turnover ratio and the number of days of purchases in A/P. A higher A/P turnover means there are fewer days of credit purchases in A/P.

   a. A/P turnover ratio = Credit purchases ÷ Average A/P

   b. Days purchases in A/P = 365 days ÷ A/P turnover

   c. An ***alternative*** calculation for days purchases in A/P is: Average A/P ÷ (Credit purchases ÷ 365 days)

II. Operating Activity Calculations for Pharma Company

Pharma Company Select Financial Statement Data					
	Year 5	**Year 4**	**Year 3**	**Year 5 Average***	**Year 4 Average***
Income Statement:					
Net Sales	$360,000	$369,300	n/a	n/a	n/a
Cost of Goods Sold	$ 85,500	$ 81,100	n/a	n/a	n/a
Balance Sheet:					
Accounts Receivable, net	$ 87,400	$ 79,600	$ 75,000	$ 83,500	$ 77,300
Inventory	$ 21,300	$ 18,700	$ 16,700	$ 20,000	$ 17,700
PP&E, net	$ 53,200	$ 50,100	$ 48,400	$ 51,650	$ 49,250
Total Assets	$799,600	$755,000	$736,000	$777,300	$745,500
Accounts Payable	$ 26,100	$ 24,300	$ 23,600	$ 25,200	$ 23,950

**Averages are computed using beginning-of-year and end-of-year balances. For example, the Year 5 A/R average is computed as ($79,600 + $87,400) ÷ 2. Note that A/R at the end of Year 4 is the beginning balance for Year 5.*

A. Inventory:

1. Inventory turnover ratio = Cost of goods sold ÷ Average inventory

	Cost of Goods Sold	÷	**Average Inventory**	=	**Inventory Turnover Ratio**
Year 5	$85,500		$20,000		4.28 times
Year 4	$81,100		$17,700		4.58 times

2. Days sales in inventory = 365 days ÷ Inventory turnover

	365 days	÷	**Inventory Turnover***	=	**Days Sales in Inventory**
Year 5	365		4.28		85 days
Year 4	365		4.58		80 days

**Note that the turnover ratios are not rounded before using to compute days sales in inventory*

So what do the 85 days indicate? First, compare the 85 days to management's targeted days sales in inventory to see if the target is being met. Next, compare the 85 days to the industry average. Notice that the days sales in inventory increased from 80 days in Year 4 to 85 days in Year 5. This increase could be due to the fact that Pharma's net sales decreased from Year 4 to Year 5. Managing inventory levels means finding a balance between increased inventory and incurring additional costs versus decreased inventory and the risk of losing sales.

B. Accounts Receivable:

Most often the credit sales are not available, so in this case, use net sales. The formula for the average cash collection of credit sales is:

1. A/R turnover ratio = Credit sales ÷ Average A/R

	Credit Sales	÷	Average A/R	=	A/R Turnover Ratio
Year 5	$360,000		$83,500		4.31 times
Year 4	$369,300		$77,300		4.78 times

2. Days sales in receivables = 365 days ÷ A/R turnover

	365 days	÷	A/R Turnover	=	Days Sales in Receivables
Year 5	365		4.31		85 days
Year 4	365		4.78		76 days

These ratios measure the company's ability to convert A/R into cash. First compare the 85 days to the credit terms of Pharma Company's sales invoice. If the invoice terms are net 45 days, then it seems that customers are delaying payment until 40 days after the due date of 85 days (and that payment delays are longer compared to last year). On the other hand, if the days sales are under the 45 days, then customers are paying before the end of the credit term. The high number may indicate collection issues or poor customer credit management. A comparison to the industry average can also be made.

C. Accounts Payable:

1. A/P turnover ratio = Credit purchases ÷ Average A/P

Not knowing what the credit purchases are, we can calculate an estimate by taking the cost of goods sold plus or minus the change in inventory from one year to another. The estimated credit purchases are calculated as $88,100 ($85,500 + $21,300 − $18,700) for Year 5 and $83,100 ($81,100 + $18,700 − $16,700) for Year 4.

	Credit Purchases*	÷	Average A/P	=	A/P Turnover Ratio
Year 5	$88,100		$25,200		3.50 times
Year 4	$83,100		$23,950		3.47 times

**Estimated as COGS ± the change in inventory.*

2. Days purchases in A/P = 365 days ÷ A/P turnover

	365 days	÷	A/P Turnover*	=	Days Purchases in A/P
Year 5	365		3.50		104 days
Year 4	365		3.47		105 days

**Note that the turnover ratios are not rounded before using to compute days purchases in A/P*

The interpretation is that Pharma pays for its credit purchases, on average, in 104 days. Again, a comparison would be made to the payment terms on the vendor's invoice to determine if it is paying its bills on time.

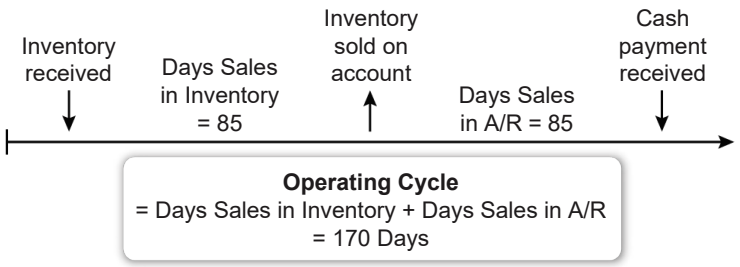
III. Operating Cycles and Cash Cycles

A. The calculation of the operating cycle can now be made.

1. Operating cycle = Days sales in A/R + Days sales in inventory

	Days Sales in Receivables	+	Days Sales in Inventory	=	Operating Cycle
Year 5	85		85		170 days
Year 4	76		80		156 days

This means that in Year 5, Pharma took 170 days to convert its inventory into cash. Note that the operating cycle has increased from 156 days in Year 4, which may not be a positive indicator.



B. Now calculate the cash cycle. Note that there are two ways to calculate the cash cycle. If the operating cycle is known, simply subtract the days purchases in A/P from that number.

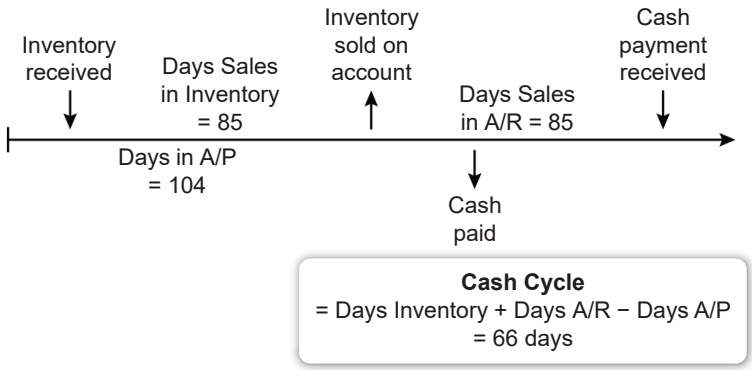
1. Cash cycle = Days sales in A/R + Days sales in inventory − Days purchases in A/P

OR Cash cycle = Operating cycle − Days purchases in AP

	Days Sales in Receivables	+	Days Sales in Inventory	−	Days Purchases in A/P	=	Cash Cycle
Year 5	85		85		104		66 days
Year 4	76		80		105		51 days

OR	Operating Cycle	−	Days Purchases in A/P	=	Cash Cycle
Year 5	170		104		66 days
Year 4	156		105		51 days

This means that in Year 5, Pharma had to finance 66 days' worth of purchases, likely using an external line of credit. This is an increase from Year 4. A shorter cash cycle is better than a longer one.



The analyses performed here are very important to assess a company's net working capital and cash management.

IV. Asset Turnover Ratios

A. Asset turnover ratios evaluate how well the company uses assets to generate sales. There are two common calculations to evaluate these ratios:

1. Asset Turnover:

a. Asset turnover = Net sales ÷ Average total assets

	Net Sales	÷	Average Total Assets	=	Asset Turnover
Year 5	$360,000		$777,300		0.46 times
Year 4	$369,300		$745,500		0.50 times

Interpret the asset turnover of 0.46 times as $0.46 of sales are generated by every $1.00 invested in assets. Pharma has a very low turnover, which indicates that it may not be using its assets in an efficient way to generate sales. In addition, the asset turnover rate is slowing down compared to Year 4.

2. Fixed Asset Turnover:

   a. Fixed asset turnover = Net sales ÷ Average net property, plant, and equipment

	Net Sales	÷	Average Net Property, Plant, and Equipment	=	Fixed Asset Turnover
Year 5	$360,000		$51,650		6.97 times
Year 4	$369,300		$49,250		7.50 times

The Year 5 fixed asset turnover is worse than the fixed asset turnover in Year 4. Fixed assets are considered productive assets because they are used in the company's daily operations. This ratio is also interpreted in terms of sales dollars. Specifically, each dollar of investment in Year 5 fixed assets generated $6.97 in sales.

Summary

This lesson describes the formulas to evaluate (1) accounts receivable to determine the timing of the cash collection of credit sales, (2) inventory for the time it takes to sell what is on hand, and (3) accounts payable to determine when cash is disbursed for payments. Once these are known, the operating and cash cycles can be calculated to assess how long it takes to convert inventory into cash and the extent of external financing needed to support operations. Asset turnover ratios can help measure the effective use of assets in generating sales. This measure evaluates the dollar amount of sales generated by one dollar of assets. Remember there are different definitions of assets that can be used in turnover formulas.

Market Value Ratios

After studying this lesson, you should be able to:

- Calculate and interpret the market/book ratio and the price/earnings ratio (2.A.2.r).
- Calculate and interpret book value per share (2.A.2.s).
- Identify and explain the limitations of book value per share (2.A.2.t).

Investors highly value successful companies. Just how high that value is can be assessed by understanding book value per share and earnings per share and how these amounts compare to the current market price of the company's stock. This lesson will teach ratios used to evaluate a company's market value.

I. Book Value per Share

A. Book value is important to investors because it represents the amount of **net assets** owned by the common stockholders, either in total or on a per share basis. Book value per share can provide insight to determine if a stock is overvalued or undervalued in the marketplace. It could also give some indication of the value of a share of common stock if the company were liquidated.

B. There are limitations to book value per share as an indicator for investors.

1. Historical cost and accrual accounting are used to record transactions. This means that the book value of certain assets can be much lower than their current market value due to inflation, depreciation taken, and changing markets. The accounting treatment for intangible assets requires their purchase cost to be recorded on the books, but not the research and development (R&D) that went into them. As a result, this category of assets can be significantly undervalued on the balance sheet.
2. Book value is most relevant for certain types of companies, including:

    i. Financial companies with high cash and other investment-type assets, since book value approximates market value.

    ii. Manufacturing or other companies with physical, long-term assets, since book value represents the original investment base.

3. Book value is less useful for other organizations, such as:

    i. Technology companies and services companies, since these rely more on intangibles like intellectual property, branding, and human capital. These resources are not reflected well in book value on the balance sheet.

II. Computing Pharma Company's Market Value Ratios

A. Pharma's book value per share of common stock is calculated as follows:

Pharma Company
Select Balance Sheet Data

	Year 5
Stockholders' Equity	
Preferred Stock (800 shares, 5%, $50 par value)	$ 40,000
Common Stock (164,000 shares, $0.50 par value)	82,000
Additional Paid-in Capital	50,000
Retained Earnings	230,200
Treasury Stock	(99,700)
Total Stockholders' Equity	$302,500

	(Total Stockholders' Equity − Preferred Equity)	÷	Number of Common Shares Outstanding	=	Book Value
Year 5	($302,500 − $40,000)		164,000		$1.60

Pharma's book value is $1.60 per share of common stock. This is the book value of the net assets owned by the common stockholders. However, as a pharmaceutical business, Pharma Company will likely have a lot of R&D investment that will not be reflected in the book values on its balance sheet.

B. Market value ratios are an indication of how highly investors value a publicly traded company. These computations combine accounting data with stock market data. Let's look at two important ratios.

1. Market-to-book ratio = Current stock price ÷ Book value per share
2. Price / earnings ratio (P/E) = Market price per share ÷ Earnings per share (EPS)
3. Note that the current stock price and market price per share are typically the same.
4. Some additional information is needed to perform these calculations for Pharma:

    i. The market price of Pharma Company's stock at the end of Year 5 was $7.70.

    ii. Pharma Company's Year 5 EPS was $0.39 per share. (Basic and diluted EPS will be discussed in the next lesson.)

C. Calculations and Interpretations.

1. Calculating the Market-to-Book Ratio

	Current Stock Price	÷	Book Value per Share	=	Market-to-Book Ratio
Year 5	$7.70		$1.60		4.8 times

This ratio shows how much investors value a company compared to its book value. A high market-to-book ratio suggests investors expect strong future returns beyond the book value of its net assets. A market value below 1 occurs when the market price per share is less than the book value per share and indicates a problem.

2. Calculating Price Earnings Ratio (P/E Ratio)

	Market Price per Share	÷	Earnings per Share (EPS)*	=	Price / Earnings Ratio (P/E)
Year 5	$7.70		$0.39		19.7 times

**Basic EPS is used here. The more conservative calculation would use diluted EPS.*

Pharma's P/E ratio is 19.7 times. The P/E ratio is an investor's assessment of the future earnings of the company. A high P/E might indicate that the company has good earnings growth opportunities or that earnings are relatively safe. Both the market-to-book and P/E ratios indicate that the market is putting a high value on Pharma. It is valid to compare these results to the industry average, as well as to another firm in the same industry.

Summary

Remember that the names of these ratios largely tell you how to compute the ratios: book value per share, P/E ratio, and market-to-book ratio. Book value per share shows net assets per share but has limitations due to historical costs and accounting estimates. The P/E ratio and market-to-book ratio reflect investor expectations for growth and profitability. They're especially useful when compared to industry averages.

EPS, Yields, and Shareholder Return

After studying this lesson, you should be able to:

- Calculate and interpret basic and diluted earnings per share (2.A.2.u).
- Calculate and interpret earnings yield, dividend yield, dividend payout ratio, and shareholder return (2.A.2.v).

This lesson introduces key measurements for shareholder profitability, including earnings per share (EPS), yields, and total shareholder return. You'll learn how to calculate and interpret both basic and diluted EPS, along with other metrics like earnings yield, dividend yield, dividend payout ratio, and shareholder return. These tools help you see not just how much a company earns, but how much of that value is passed on to shareholders—through earnings, dividends, and stock price changes.

I. Earnings per Share (EPS) measures how much profit is earned for each share of common stock. EPS focuses only on common shareholders, even if a company also has preferred stock.

A. EPS is based on the net income available to common shareholders (after preferred dividends).

B. The number of shares used in EPS is not a simple count, but a weighted average that reflects potential changes in the number of shares during the period due to stock issuances and repurchases.

C. Basic EPS = Net income available to common shareholders ÷ Weighted average common shares outstanding

1. Net Income available to common shareholders = Net income − Preferred dividends
2. Weighted average common shares outstanding account for:

a. Stock splits and stock dividends, which are treated as if they happened at the beginning of the period

b. All other issuance of shares or repurchases of shares (treasury shares) are weighted based on their actual transaction date during the period

D. Diluted EPS = Adjusted net income available to common shareholders ÷ Diluted weighted average common shares outstanding

1. Diluted EPS starts with basic EPS and adjusts for potentially dilutive securities—those that could turn into common stock and reduce EPS if exercised or converted during the period.
2. Two components are adjusted:

a. Net income: Increased by interest (after tax) or dividends that would be saved, assuming the securities had already been converted

b. Shares: Increased by the number of additional shares that would be issued upon exercise or conversion

3. Common Types of Dilutive Securities

   a. Stock options and warrants

      i. Only included if "in the money" (exercise price < market price)

      ii. Use the treasury stock method, which assumes the company uses cash received from exercising options to buy back shares from the market. Only the net increase in shares outstanding is added

      iii. No change to net income available to common shareholders

   b. Convertible bonds

      i. Use the if-converted method to adjust the numerator and add back after-tax interest saved.

      ii. Adjust the denominator to add shares that would have been issued upon conversion.

   c. Convertible preferred stock

      i. Also uses the if-converted method to adjust the numerator to add back preferred dividends (no tax effect).

      ii. Adjusts the denominator to add shares that would have been issued upon conversion.

E. Both basic EPS and diluted EPS are reported by public companies. Diluted EPS is a type of "worst case scenario" when evaluating earnings performance for common shareholders.[1] A complete ratio analysis should evaluate financial performance using both basic and diluted EPS.

   1. By itself, EPS does not have a lot of meaning, so it is best to compare the amount to a forecasted amount, a prior period EPS, or both.

   2. Note that there will not be an industry average for comparison. This is due to the large variations in the number of shares outstanding for individual companies within the industry.

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1 Note that diluted EPS includes an anti-dilution rule that is beyond the scope of this lesson.

II. Example: Calculate basic EPS and diluted EPS using the following data for Pharma Company, Year 5:

Net income	$64,200
Tax rate	25%
Year 5 average stock price per share	$ 7.40
Common stock (CS):	
Shares issued and outstanding, Jan. 1 Year 5	80,000
2-for-1 stock split, June 30	80,000
New issue of CS, Oct. 1	4,000
Total CS issued and outstanding, Dec. 31 Year 5	164,000
Preferred stock (cumulative, convertible)	
Dividend rate	5%
Par value per share	$ 50.00
Shares outstanding, Jan. 1 to Dec. 31 Year 5	800
Convertible to shares of CS	10
Stock options:	
Number of options outstanding during the year	1,000
Right to purchase shares of CS per option	25
Exercise price per share	$ 5.00
Convertible bonds:	
Interest rate	5%
Number of bonds outstanding during the year	344
Issue price	$ 1,000
Right to convert to shares of CS	125

A. Calculate Basic EPS:

1. Calculate the numerator of the basic EPS equation: Net income available to common shareholders = Net income − Preferred dividends

	Year 5
Net income	$64,200
Preferred dividends*	(2,000)
Net income available to common shareholders	**$62,200**

**When adjusting for the dividends, even when the preferred stock is cumulative, only the current year dividends (paid or not) should be deducted from net income.*