

STUDY UNIT TWO

FINANCIAL PERFORMANCE METRICS – FINANCIAL RATIOS

2.1	<i>Liquidity Ratios</i>	2
2.2	<i>Leverage and Solvency Ratios</i>	4
2.3	<i>Activity Ratios</i>	10
2.4	<i>Core Concepts</i>	14

This study unit is the **second of three** on **financial statement analysis**. The relative weight assigned to this major topic in Part 2 of the exam is **25%**. The three study units are

- Study Unit 1: Basic Financial Statement Analysis
- Study Unit 2: Financial Performance Metrics – Financial Ratios
- Study Unit 3: Profitability Analysis and Analytical Issues

After studying the outline and answering the questions in this study unit, you will have the skills necessary to address the following topics listed in the ICMA's Learning Outcome Statements:

Part 2 – Section A.2. Financial performance metrics – Financial ratios

The candidate should be able to:

Liquidity

- a. define and calculate current assets, current liabilities, and net working capital
- b. analyze working capital by calculating the current ratio, the quick (acid test) ratio, the cash ratio, the cash flow ratio, and the net working capital ratio
- c. explain how changes in one or more of the elements of current assets, current liabilities, or unit sales can change the liquidity ratios and calculate that impact
- d. demonstrate an understanding of the liquidity of current liabilities

Leverage

- e. define solvency
- f. define operating leverage and financial leverage
- g. calculate degree of operating leverage and degree of financial leverage
- h. demonstrate an understanding of the effect on the capital structure and solvency of a company with a change in the composition of debt vs. equity by calculating leverage ratios
- i. calculate and interpret the financial leverage ratio, and determine the effect of a change in capital structure on this ratio
- j. calculate and interpret the following ratios: total debt to total capital, debt to equity, long-term debt to equity, and debt to total assets
- k. 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
- l. discuss how capital structure decisions affect the risk profile of a firm

Activity

- m. calculate and interpret accounts receivable turnover, inventory turnover, and accounts payables turnover
- n. calculate and interpret days sales outstanding in receivables, days sales in inventory, and days purchases in accounts payable
- o. define and calculate the operating cycle and cash cycle of a firm
- p. calculate and interpret total assets turnover and fixed asset turnover

- d. **Current liabilities**, by the same token, are ones that must be settled the soonest. Specifically, they are expected to be settled or converted to other liabilities within 1 year or the operating cycle, whichever is longer.
- 1) Current liabilities include accounts payable, notes payable, current maturities of long-term debt, unearned revenues, taxes payable, wages payable, and other accruals.
- e. **Net working capital** reports the resources the company would have to continue operating in the short run if it had to liquidate all of its current liabilities at once.
- 1) $\text{Current assets} - \text{Current liabilities}$
 - a) EXAMPLE: Current Year: $\$760,000 - \$390,000 = \$370,000$
Prior Year: $\$635,000 - \$275,000 = \$360,000$
 - b) Although the company's current liabilities increased, its current assets increased by \$10,000 more.
- f. The **current ratio** (working capital ratio) is the most common measure of near-term solvency.
- 1)
$$\frac{\text{Current assets}}{\text{Current liabilities}}$$
 - a) EXAMPLE: Current Year: $\$760,000 \div \$390,000 = 1.949$
Prior Year: $\$635,000 \div \$275,000 = 2.309$
 - b) Although working capital increased in absolute terms (\$10,000), current assets now provide less proportional coverage of current liabilities than in the prior year.
 - 2) A low ratio indicates a possible solvency problem. An overly high ratio indicates that management may not be investing idle assets productively.
 - 3) The general principle is that the current ratio should be proportional to the operating cycle. Thus, a shorter cycle may justify a lower ratio.
 - a) For example, a grocery store has a short operating cycle and can survive with a lower current ratio than could a gold mining company, which has a much longer operating cycle.
 - 4) The quality of accounts receivable and merchandise inventory should be considered before evaluating the current ratio. A low receivables turnover (net credit sales \div average accounts receivable) and a low inventory turnover (cost of sales \div average inventory) indicate a need for a higher current ratio.
 - 5) Use of LIFO lowers the current ratio.
- g. The **quick (acid test) ratio** excludes inventories and prepaids from the numerator, recognizing that those assets are difficult to liquidate at their stated values. The quick ratio is thus a more conservative measure than the basic current ratio.
- 1)
$$\frac{\text{Cash and equivalents} + \text{Marketable securities} + \text{Net receivables}}{\text{Current liabilities}}$$
 - a) EXAMPLE:
Current Year: $(\$325,000 + \$165,000 + \$120,000 + \$55,000) \div \$390,000 = 1.705$
Prior Year: $(\$275,000 + \$145,000 + \$115,000 + \$40,000) \div \$275,000 = 2.455$
 - b) In spite of its increase in total working capital, the company's position in its most liquid assets deteriorated significantly.
 - 2) This ratio measures the firm's ability to easily pay its short-term debts and avoids the problem of inventory valuation.
 - 3) A less conservative variation divides the difference between current assets and inventory by current liabilities.

h. The **cash ratio** is an even more conservative variation.

$$1) \frac{\text{Cash and equivalents} + \text{Marketable securities}}{\text{Current liabilities}}$$

a) EXAMPLE:

$$\text{Current Year: } (\$325,000 + \$165,000) \div \$390,000 = 1.256$$

$$\text{Prior Year: } (\$275,000 + \$145,000) \div \$275,000 = 1.527$$

b) In this working capital measure, the company's position declined, but coverage is still positive, i.e., the ratio is greater than 1.

i. The **cash flow ratio** reflects the significance of cash flow for settling obligations as they become due.

$$1) \frac{\text{Cash flow from operations}}{\text{Current liabilities}}$$

a) EXAMPLE: The company's cash flows from operations for the two most recent years were \$382,000 and \$291,000 respectively.

$$\text{Current Year: } \$382,000 \div \$390,000 = 0.979$$

$$\text{Prior Year: } \$291,000 \div \$275,000 = 1.058$$

b) Unlike the prior year, the cash flows generated by the company in the most recent year were not sufficient to cover current liabilities.

j. The **net working capital ratio** is the most conservative of the working capital ratios.

$$1) \frac{\text{Current assets} - \text{Current liabilities}}{\text{Total assets}}$$

a) EXAMPLE:

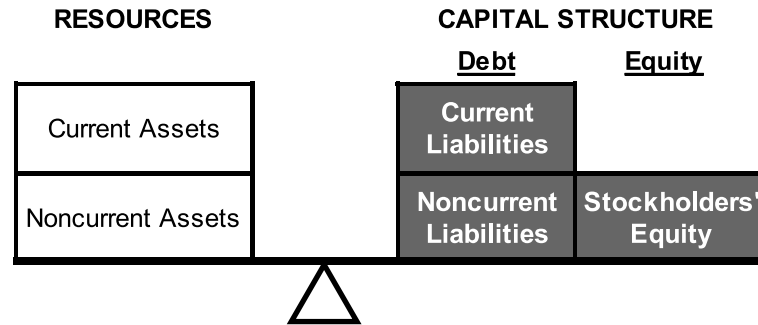
$$\text{Current Year: } (\$760,000 - \$390,000) \div \$1,800,000 = 0.206$$

$$\text{Prior Year: } (\$635,000 - \$275,000) \div \$1,600,000 = 0.225$$

b) Current liabilities are taking a bigger "bite" out of working capital than in the prior year.

2.2 LEVERAGE AND SOLVENCY RATIOS

1. **Solvency** is a firm's ability to pay its noncurrent obligations as they come due and thus remain in business in the long run (contrast with liquidity). The key ingredients of solvency are the firm's capital structure and degree of leverage.
2. A firm's **capital structure** includes its sources of financing, both long- and short-term. These sources can be in the form of debt (external sources) or equity (internal sources). Capital structure decisions affect the risk profile of a firm. For example, a company with a higher percent of debt capital will be riskier than a firm with a high percentage of equity capital. Thus, when there is a lot of debt, equity investors will demand a higher rate of return on their investments to compensate for the risk brought about by the high use of financial leverage. Alternatively, a company with a high level of equity capital will be able to borrow at lower rates because debt holders will accept lower interest in exchange for the lower risk indicated by the equity cushion.



- a. **Debt** is the creditor interest in the firm.
 - 1) The firm is contractually obligated to repay debtholders. The terms of repayment (i.e., timing of interest and principal) are specified in the debt agreement.
 - 2) As long as the return on debt capital exceeds the amount of interest paid, the use of debt financing is advantageous to a firm. This is due to the fact that interest payments on debt are tax-deductible.
 - 3) The tradeoff is that an increased debt load makes a firm riskier (since debt must be paid regardless of whether or not the company is profitable). At some point, either a firm will have to pay a higher interest rate than its return on debt or creditors will simply refuse to lend any more money.
 - b. **Equity** is the ownership interest in the firm.
 - 1) Equity is the permanent capital of an enterprise, contributed by the firm's owners in the hopes of earning a return.
 - 2) However, a return on equity is uncertain because equity embodies only a residual interest in the firm's assets (residual because it is the claim left over after all debt has been satisfied).
 - 3) Periodic returns to owners of excess earnings are referred to as dividends. The firm may be contractually obligated to pay dividends to preferred stockholders but not to common stockholders.
3. **Leverage** is the relative amount of **fixed cost** in a firm's capital structure.
- a. Leverage creates **risk** because fixed costs must be covered, regardless of the level of sales.
 - 1) **Operating leverage** derives from the use of a high level of plant and machinery in the production process, revealed through charges for depreciation, property taxes, etc.
 - 2) **Financial leverage** derives from the use of a high level of debt in the firm's financing structure, revealed through amounts paid out for interest.
 - b. Thus, although leverage arises from items on the balance sheet, it is measured by examining its **effects on the income statement**. A general statement of leverage is

$$\text{Degree of leverage} = \frac{\text{Pre-fixed-cost income amount}}{\text{Post-fixed-cost income amount}}$$

4. The **degree of operating leverage, or DOL** (also called the operating leverage effect, or OLE), is most accurately calculated on a variable-costing basis, since variable costing isolates the use of fixed costs in the firm's ongoing operations. However, variable-costing financial statements are not publicly available, so absorption-basis numbers are used in practice:

$$\text{Degree of operating leverage (DOL)} = \frac{\text{Sales}}{\text{Earnings before interest and taxes (EBIT)}}$$

- a. Sales is a pre-fixed-cost income amount. EBIT is a post-fixed-cost amount. Comparing these two amounts provides a rough measure of the effects of the use of fixed costs in the firm's ongoing and central operations.

1) EXAMPLE:

Operating leverage (absorption-costing basis)		
	Current Year	Prior Year
Net sales	\$1,800,000	\$1,400,000
Variable production costs	(760,000)	(660,000)
Fixed production costs	(690,000)	(510,000)
Gross margin	\$ 350,000	\$ 230,000
Variable SG&A expenses	(100,000)	(60,000)
Fixed SG&A expenses	(60,000)	(20,000)
Operating income	\$ 190,000	\$ 150,000
Other income and loss	(65,000)	(25,000)
Earnings before interest and taxes	\$ 125,000	\$ 125,000
Interest expense	(15,000)	(10,000)
Earnings before taxes	\$ 110,000	\$ 115,000
Income taxes (40%)	(44,000)	(46,000)
Net income	<u>\$ 66,000</u>	<u>\$ 69,000</u>

Degree of operating leverage

Current year: $\$1,800,000 \div \$125,000 = 14.4$

Prior year: $\$1,400,000 \div \$125,000 = 11.2$

The company needs \$14.40 of net sales to generate \$1.00 of EBIT. Last year, it took only \$11.20 of sales to generate \$1.00 of EBIT.

- b. A firm with high operating leverage necessarily carries a greater degree of **risk** because fixed costs must be covered regardless of the level of sales. However, such a firm is also able to expand production rapidly in times of higher product demand. Thus, the **more leveraged** a firm is in its operations, the **more sensitive** operating income is to **changes in sales volume**.
- c. The formula given above is the easiest way to **calculate** DOL. The ratio can be usefully **applied** another way:

$$\text{DOL (using percentages)} = \frac{\% \Delta \text{ in EBIT}}{\% \Delta \text{ in Sales}}$$

- 1) Note that, in the percentage version, the numerator and denominator are switched. This version of the formula allows the firm to quantify the percentage change in EBIT that will result from every 1% change in sales.
- 2) EXAMPLE: A DOL of 14.40 allows the company to predict that, within its relevant range, a 1% increase in net sales will improve operating income by 14.4%. If sales increase to \$1,818,000 ($\$1,800,000 \times 1.01$), then EBIT increases to \$143,000 ($\$125,000 \times 1.144$).

5. The **degree of financial leverage, or DFL** (also called the financial leverage effect, or FLE), also performs a pre-fixed-cost income to post-fixed-cost income comparison, this time on the firm's financing structure.

$$\text{Degree of financial leverage (DFL)} = \frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Net income (NI)}}$$

- a. This formula isolates the effects of interest and taxes as fixed costs.

- 1) EXAMPLE:

Financial leverage (absorption-costing basis)		
	Current Year	Prior Year
Net sales	\$1,800,000	\$1,400,000
Variable production costs	(760,000)	(660,000)
Fixed production costs	(690,000)	(510,000)
Gross margin	<u>\$ 350,000</u>	<u>\$ 230,000</u>
Variable SG&A expenses	(100,000)	(60,000)
Fixed SG&A expenses	(60,000)	(20,000)
Operating income	<u>\$ 190,000</u>	<u>\$ 150,000</u>
Other income and loss	(65,000)	(25,000)
Earnings before interest and taxes	<u>\$ 125,000</u>	<u>\$ 125,000</u>
Interest expense	(15,000)	(10,000)
Earnings before taxes	<u>\$ 110,000</u>	<u>\$ 115,000</u>
Income taxes (40%)	(44,000)	(46,000)
Net income	<u><u>\$ 66,000</u></u>	<u><u>\$ 69,000</u></u>

Degree of financial leverage

Current year: $\$125,000 \div \$66,000 = 1.89$

Prior year: $\$125,000 \div \$69,000 = 1.81$

The company needs \$1.89 of EBIT to generate \$1.00 of net income. Last year, only \$1.81 of EBIT was needed to generate \$1.00 of net income.

- b. A firm with high financial leverage necessarily carries a greater degree of **risk** because debt must be serviced regardless of profits. However, if such a firm is profitable, there is more residual profit for the shareholders after debt service (interest on debt is tax-deductible), reflected in **higher earnings per share**. Furthermore, debt financing permits the current equity holders to retain control.
- c. The formula given above is the easiest way to **calculate** DFL. The ratio can be usefully **applied** another way:

$$\text{DFL (using percentages)} = \frac{\% \Delta \text{ in Net income}}{\% \Delta \text{ in EBIT}}$$

- 1) Note that, in the percentage version, the numerator and denominator are switched. This version of the formula allows the firm to quantify the percentage change in net income that will result from every 1% change in EBIT.
- 2) EXAMPLE: A DFL of 1.89 allows the company to predict that, within its relevant range, a 1% increase in EBIT will improve net income by 1.89%. If EBIT increases to \$126,250 ($\$125,000 \times 1.01$), then net income increases to \$67,250 rounded ($\$66,000 \times 1.0189$).

6. **Capital structure ratios** report the relative proportions of debt and equity in a firm's capital structure.

a. The **total-debt-to-total-capital ratio** measures the percentage of the firm's capital structure provided by creditors.

$$1) \frac{\textit{Total debt}}{\textit{Total capital}}$$

a) EXAMPLE: Current Year: $\$1,000,000 \div \$1,800,000 = 0.556$
 Prior Year: $\$950,000 \div \$1,600,000 = 0.594$

b) The company became slightly less reliant on debt in its capital structure during the current year. Although total debt rose, equity rose by a greater percentage. The company is thus less leveraged than before.

2) When total debt to total capital is low, it means more of the firm's capital is supplied by the stockholders. Thus, creditors prefer this ratio to be low as a cushion against losses.

b. The **debt-to-equity ratio** is a direct comparison of the firm's debt load versus its equity stake.

$$1) \frac{\textit{Total debt}}{\textit{Stockholders' equity}}$$

a) EXAMPLE: Current Year: $\$1,000,000 \div \$800,000 = 1.25$
 Prior Year: $\$950,000 \div \$650,000 = 1.46$

b) The amount by which the company's debts exceed its equity stake declined in the current year.

2) Like the previous ratio, the debt-to-equity ratio reflects long-term debt-payment ability. Again, a low ratio means a lower relative debt burden and thus better chances of repayment of creditors.

c. The **long-term-debt-to-equity ratio** reports the long-term debt burden carried by a company per dollar of equity.

$$1) \frac{\textit{Long-term debt}}{\textit{Stockholder's equity}}$$

a) EXAMPLE: Current Year: $\$610,000 \div \$800,000 = 0.763$
 Prior Year: $\$675,000 \div \$650,000 = 1.038$

b) The company has greatly improved its long-term debt burden. It now carries less than one dollar of long-term debt for every dollar of equity.

c) A low ratio means a firm will have an easier time raising new debt (since its low current debt load makes it a good credit risk).

d. The **debt-to-total-assets ratio** (also called the debt ratio) reports the long-term debt burden carried by a company per dollar of assets.

$$1) \frac{\textit{Total liabilities}}{\textit{Total assets}}$$

a) EXAMPLE: Current Year: $\$1,000,000 \div \$1,800,000 = 0.556$
 Prior Year: $\$950,000 \div \$1,600,000 = 0.594$

b) Although total liabilities increased in absolute terms, this ratio improved because total assets increased even more.

2) Numerically, this ratio is identical to the debt-to-total-capital ratio.

7. **Earnings coverage** is a creditor's best measure of a firm's ongoing ability to generate the earnings that will allow it to satisfy its long-term debts and remain solvent.

a. The **times-interest-earned ratio** is an income statement approach to evaluating a firm's ongoing ability to meet the interest payments on its debt obligations.

$$1) \frac{EBIT}{Interest\ expense}$$

a) EXAMPLE: Current Year: $\$85,000 \div \$15,000 = 5.67$
 Prior Year: $\$45,000 \div \$10,000 = 4.50$

b) The company has improved its ability to comfortably pay interest expense. In the prior year EBIT was only four and a half times interest expense, but in the current year, it is more than five and a half times.

2) For the ratio to be meaningful, net income cannot be used in the numerator. Since what is being measured is the ability to pay interest, earnings **before** interest and taxes is appropriate.

3) The most accurate calculation of the numerator includes only earnings expected to recur. Consequently, unusual or infrequent items, extraordinary items, discontinued operations, and the effects of accounting changes should be excluded.

4) The denominator should include capitalized interest.

b. The **earnings-to-fixed-charges ratio** (also called the fixed charge coverage ratio) extends the times-interest-earned ratio to include the interest portion associated with long-term lease obligations.

$$1) \frac{EBIT + Interest\ portion\ of\ operating\ leases}{Interest\ expense + Interest\ portion\ of\ operating\ leases + Dividends\ on\ preferred\ stock}$$

a) This is a more conservative ratio since it measures the coverage of earnings over all fixed charges, not just interest expense.

c. The **cash-flow-to-fixed-charges ratio** removes the difficulties of comparing amounts prepared on an accrual basis.

$$1) \frac{Pre-tax\ operating\ cash\ flow}{Interest\ expense + Interest\ portion\ of\ operating\ leases + Dividends\ on\ preferred\ stock}$$

2.3 ACTIVITY RATIOS

1. **Activity ratios** measure how quickly the two major noncash assets are converted to cash. Whereas the ratios calculated in Subunit 2.1 report condition at a balance sheet date, the activity ratios measure results over a period of time, and thus draw information from the firm's income statement.

- a. EXAMPLE of an income statement:

	Current Year	Prior Year
Net sales	\$1,800,000	\$1,400,000
Cost of goods sold	(1,650,000)	(1,330,000)
Gross profit	150,000	70,000
Selling expenses	(50,000)	(15,000)
General and admin. expenses	(15,000)	(10,000)
Operating income	85,000	45,000
Other revenues and gains	20,000	0
Other expenses and losses	(35,000)	(10,000)
Income before taxes	70,000	35,000
Income taxes (40%)	(28,000)	(14,000)
Net income	\$ 42,000	\$ 21,000

- b. **Accounts receivable turnover** measures the efficiency of accounts receivable collection.

$$1) \frac{\text{Net credit sales}}{\text{Average trade receivables (net)}}$$

- a) EXAMPLE: All of the company's sales are on credit. Net trade receivables at the balance sheet date of the 2nd prior year were \$105,000.

Current Year: $\$1,800,000 \div [(\$120,000 + \$115,000) \div 2] = 15.3$ times

Prior Year: $\$1,400,000 \div [(\$115,000 + \$105,000) \div 2] = 12.7$ times

- b) The company turned over its trade receivables balance 2.6 more times during the current year, even as receivables were growing in absolute terms. Thus, the company's effectiveness at collecting accounts receivable has improved noticeably.

- 2) If a business is highly seasonal, a simple average of beginning and ending balances is inadequate. The monthly balances should be averaged instead.
- 3) A high turnover means that customers are paying their accounts promptly.
- 4) Since sales is in the numerator, higher sales without an increase in receivables will result in better turnover. Since receivables are in the denominator, encouraging customers to pay quickly (thereby lowering the balance in receivables) also results in a higher turnover ratio.

- c. **Inventory turnover** measures the efficiency of inventory management.

$$1) \frac{\text{Cost of goods sold}}{\text{Average inventory}}$$

- a) EXAMPLE: The balance in inventories at the balance sheet date of the 2nd prior year was \$45,000.

Current Year: $\$1,650,000 \div [(\$85,000 + \$55,000) \div 2] = 23.6$ times

Prior Year: $\$1,330,000 \div [(\$55,000 + \$45,000) \div 2] = 26.6$ times

- b) The company did not turn over its inventories as many times during the current year. This is to be expected during a period of growing sales (and building inventory level) and so is not necessarily a sign of poor inventory management.
- 2) As with receivables turnover, if a business is highly seasonal, a simple average of beginning and ending balances is inadequate. The monthly balances should be averaged instead.
- 3) A high turnover implies that the firm is not carrying excess levels of inventory or inventory that is obsolete.
- 4) The ratio of a firm that uses LIFO may not be comparable with that of a firm with a higher inventory valuation.
- 5) Since cost of goods sold is in the numerator, higher sales without an increase in inventory balances will result in better turnover.
- 6) Since inventory is in the denominator, keeping inventory levels as low as possible also results in a higher turnover ratio.
- d. **Accounts payable turnover** measures the efficiency with which a firm manages the payment of vendors' invoices.

$$1) \frac{\text{Purchases}}{\text{Average accounts payable}}$$

- a) **EXAMPLE:** The company had current and prior year purchases of \$1,760,000 and \$1,440,000 respectively. Net accounts payable at the balance sheet date of the 2nd prior year were \$65,000.

Current Year: $\$1,760,000 \div [(\$150,000 + \$75,000) \div 2] = 15.6$ times

Prior Year: $\$1,440,000 \div [(\$75,000 + \$65,000) \div 2] = 20.6$ times

- b) The company is now carrying a much higher balance in payables so it is not surprising that the balance is turning over less often. It also may be the case that the company was paying invoices too soon in the prior year.
- 2) If a business is highly seasonal, a simple average of beginning and ending balances is inadequate. The monthly balances should be averaged instead.
- e. **Days sales outstanding in receivables** (also called the average collection period) measures the average number of days it takes to collect a receivable.

$$1) \frac{\text{Days in year}}{\text{Accounts receivable turnover}}$$

- a) **EXAMPLE:**

Current Year: $365 \text{ days} \div 15.3 \text{ times} = 23.9 \text{ days}$

Prior Year: $365 \text{ days} \div 12.7 \text{ times} = 28.7 \text{ days}$

- b) Since the denominator (calculated in item 1.b.) increased and the numerator is a constant, days sales will necessarily decrease. In addition to improving its collection practices, the company also may have become better at assessing the creditworthiness of its customers.
- 2) Besides 365, other possible numerators are 360 (for simplicity) and 300 (the number of business days in a year).
- 3) Days sales outstanding in receivables can be compared with the firm's credit terms to determine whether the average customer is paying within the credit period.

- f. **Days sales in inventory** measures the efficiency of the company's inventory management practices.

$$1) \frac{\text{Days in year}}{\text{Inventory turnover}}$$

- a) EXAMPLE:

Current Year: 365 days ÷ 23.6 times = 15.5 days

Prior Year: 365 days ÷ 26.6 times = 13.7 days

- b) Since the numerator is a constant, the decreased inventory turnover calculated meant that days sales tied up in inventory would increase. This is a common phenomenon during a period of increasing sales.

- g. **Days purchases in accounts payable** measures the average number of days it takes to settle a payable.

$$1) \frac{\text{Days in year}}{\text{Accounts payable turnover}}$$

- a) EXAMPLE:

Current Year: 365 days ÷ 15.6 times = 23.4 days

Prior Year: 365 days ÷ 20.6 times = 17.7 days

- b) The slower turnover raises the denominator, thereby increasing the days payables. This substantially extended period reflects mostly the fact that the balance in payables has doubled. It also may imply that the company was paying its suppliers too quickly in the prior year.

- 2) The days purchases in accounts payable can be compared with the average credit terms offered by a company's suppliers to determine whether the firm is paying its invoices on a timely basis (or too soon).

- h. The **fixed assets turnover ratio** measures how efficiently the company is deploying its investment in plant to generate revenues.

$$1) \frac{\text{Net sales}}{\text{Average net fixed assets}}$$

- a) EXAMPLE:

Current Year: $\$1,800,000 \div [(\$915,000 + \$845,000) \div 2] = 2.05$ times

Prior Year: $\$1,400,000 \div [(\$845,000 + \$860,000) \div 2] = 1.64$ times

- 2) This ratio is largely affected by the capital intensiveness of the company and its industry, by the age of the assets, and by the depreciation method used.

- 3) A high turnover is preferable to a low turnover.

- i. The **total assets turnover ratio** measures how efficiently the company is deploying the totality of its resources to generate revenues.

$$1) \frac{\text{Net sales}}{\text{Average total assets}}$$

- a) EXAMPLE:

Current Year: $\$1,800,000 \div [(\$1,800,000 + \$1,600,000) \div 2] = 1.06$ times

Prior Year: $\$1,400,000 \div [(\$1,600,000 + \$1,520,000) \div 2] = .897$ times

- 2) For all turnover ratios, high turnover is preferable because it implies effective use of assets to generate sales.

- 3) Certain assets, for example, investments, do not relate to net sales. Their inclusion decreases the ratio.

2. Overall Liquidity Concepts

- a. A firm's **operating cycle** is the amount of time that passes between the acquisition of inventory and the collection of cash on the sale of that inventory.
 - 1) The (overlapping) steps in the operating cycle are
 - a) Acquisition of inventory and incurrence of a payable
 - b) Settlement of the payable
 - c) Holding of inventory
 - d) Selling of inventory and incurrence of a receivable
 - e) Collection on the receivable and acquisition of further inventory
 - 2) *Days sales in receivables + Days sales in inventory*
 - a) EXAMPLE:
 - Current Year: 23.9 days + 15.5 days = 39.4 days
 - Prior Year: 28.7 days + 13.7 days = 42.4 days
 - b) The company has managed to slightly reduce its operating cycle, even while increasing sales and building inventories.
 - 3) The **cash cycle** is that portion of the operating cycle that is not days purchases in accounts payable. This is somewhat counterintuitive because the cash cycle is the portion of the operating cycle when the company does **not** have cash, i.e., when cash is tied up in the form of inventory or accounts receivable.
 - a) *Operating cycle - Days purchases in payables*
 - i) EXAMPLE:
 - Current Year: 39.4 days – 23.4 days = 16.0 days
 - Prior Year: 42.4 days – 17.7 days = 24.7 days
 - ii) Of the company's total operating cycle of 39.4 days, cash is held for the 23.4 days that payables are outstanding. The 16.0 days of the cash cycle represent the period when cash is tied up as other forms of current assets.
 - 4) The following diagram depicts the interactions between the phases of the operating and cash cycles:



Shaded area = Cash cycle

Days sales in inventory = Operating cycle – Days sales in AR

- b. The **liquidity of current liabilities** is the ease with which a firm can issue new debt or raise new structured (convertible, puttable, callable, etc.) funds.
- 1) The liquidity of current liabilities indicates the ease of funding or availability of sources of funding. A firm's ability to borrow in the financial markets is generally a function of its size, reputation, creditworthiness, and capital levels.
 - 2) Raising liquidity during an adverse situation often requires a combination of both asset liquidity and liability liquidity.
- c. The **liquidity index** is a measure of the proportion that the two major noncash current assets (weighted) make up of all liquid assets.
- 1)
$$\frac{(\text{Accounts receivable} \times \text{Days sales in receivables}) + (\text{Inventory} \times \text{Days sales in inventory})}{\text{Cash} + \text{Accounts receivable} + \text{Inventory}}$$
 - 2) EXAMPLE:

$$\begin{aligned} \text{Current year: Liquidity Index} &= \frac{(\$120,000 \times 23.9 \text{ days}) + (\$85,000 \times 15.5 \text{ days})}{\$325,000 + \$120,000 + \$85,000} \\ &= 7.90 \\ \text{Prior Year: Liquidity Index} &= \frac{(\$115,000 \times 28.7 \text{ days}) + (\$55,000 \times 13.7 \text{ days})}{\$275,000 + \$115,000 + \$55,000} \\ &= 9.11 \end{aligned}$$
 - 3) The lower index indicates that, overall, current assets are tied up as noncash in either (a) smaller proportions or (b) for shorter periods, or both. In the process of increasing sales and building inventories, the company has managed to become more liquid.
- d. The value of the index is a function of the reliability of the weighting methods used.
- e. The significance of the index lies in its identification of period-to-period changes in an entity's liquidity. It is also useful for comparing entity-to-entity liquidity.

2.4 CORE CONCEPTS

Liquidity Ratios

- **Liquidity** is a firm's ability to pay its current obligations as they come due and thus remain in business in the short run. Liquidity measures the ease with which assets can be converted to cash.
- **Liquidity ratios** measure this ability by relating a firm's liquid assets to its current liabilities.
 - The **current ratio**

$$\text{Current assets} \div \text{Current liabilities}$$
 - The **quick (acid test) ratio**

$$(\text{Cash and equivalents} + \text{Marketable securities} + \text{Net receivables}) \div \text{Current liabilities}$$
 - The **cash ratio**

$$(\text{Cash and equivalents} + \text{Marketable securities}) \div \text{Current liabilities}$$
 - The **cash flow ratio**

$$\text{Cash flow from operations} \div \text{Current liabilities}$$
 - The **net working capital ratio**

$$(\text{Current assets} - \text{Current liabilities}) \div \text{Total assets}$$

Leverage and Solvency Ratios

- **Solvency** is a firm's ability to pay its noncurrent obligations as they come due and thus remain in business in the long run (contrast with liquidity). The key ingredients of solvency are the firm's capital structure and degree of leverage.
- A firm's **capital structure** includes its sources of financing, both long- and short-term. These sources can be in the form of debt (external sources) or equity (internal sources). Debt is the creditor interest in the firm. Equity is the ownership interest in the firm.
- A firm's **leverage** is the relative amount of the fixed cost of capital, principally debt, in a firm's capital structure. Leverage, by definition, creates financial risk, which relates directly to the question of the cost of capital. The more leverage, the higher the financial risk, and the higher the cost of debt capital.
 - **Operating leverage**
Sales ÷ EBIT Or %Δ in EBIT ÷ %Δ in Sales
 - **Financial leverage**
EBIT ÷ Net income Or %Δ in Net income ÷ %Δ in EBIT
- **Capital structure ratios** report the relative proportions of debt and equity in a firm's capital structure.
 - The **total-debt-to-total-capital ratio**
Total debt ÷ Total capital
 - The **debt-to-equity ratio**
Total debt ÷ Stockholders' equity
 - The **long-term debt-to-equity-capital ratio** (also called the debt to equity ratio)
Long-term debt ÷ Stockholders' equity
 - The **debt-to-total-assets ratio** (also called the debt ratio)
Total liabilities ÷ Total assets
- **Earnings coverage** is a creditor's best measure of a firm's ongoing ability to generate the earnings that will allow it to satisfy its long-term debts and remain solvent.
 - The **times-interest-earned ratio** is an income statement approach to evaluating a firm's ongoing ability to meet the interest payments on its debt obligations.
EBIT ÷ Interest expense
 - The **earnings-to-fixed-charges ratio** (also called the fixed charge coverage ratio) extends the times-interest-earned ratio to include the interest portion associated with long-term lease obligations.
 - The **cash flow-to-fixed-charges ratio** removes the difficulties of comparing amounts prepared on an accrual basis.
- **Activity ratios** measure how quickly the two major noncash assets are converted to cash. They measure results over a period of time and thus draw information from the firm's income statement.
 - **Accounts receivable turnover**
Net credit sales ÷ Average trade receivables (net)
 - **Inventory turnover**
Cost of goods sold ÷ Average inventory
 - **Accounts payable turnover**
Purchases ÷ Average accounts payable

- **Days sales outstanding in receivables**

Days in year ÷ Accounts receivable turnover

- **Days sales in inventory**

Days in year ÷ Inventory turnover

- **Days purchases in accounts payable**

Days in year ÷ Accounts payable turnover

- **Fixed assets turnover**

Net sales ÷ Average net fixed assets

- **Total assets turnover**

Net sales ÷ Average total assets

- **Overall Liquidity Concepts**

- A firm's **operating cycle** is the amount of time that passes between the acquisition of inventory and the collection of cash on the sale of that inventory.

Days sales in receivables + Days sales in inventory

- The **cash cycle** is that portion of the operating cycle that is not days purchases in accounts payable. This is somewhat counterintuitive because the cash cycle is the portion of the operating cycle when the company does not have cash, i.e., when cash is tied up in the form of inventory or accounts receivable.

Operating cycle - Days purchases in payables

- The **liquidity of current liabilities** is the ease with which a firm can issue new debt or raise new structured (convertible, puttable, callable, etc.) funds. The **liquidity index** is a measure of the proportion that the two major noncash current assets (weighted) make up of all liquid assets.