

CHAPTER 6

SECURITIES ANALYSIS

The analysis of equity, debt, and derivative securities is a primary function of securities analysts and portfolio managers and is also part of the core curriculum for the CFA program. Understanding the features of these securities and the methods used to analyze and value them is essential to success as a CFA candidate. In this we present the foundation for the securities analysis material you will learn in the Level 1 curriculum. Section 1 presents the basic components of analyzing and valuing equity securities. Section 2 of this chapter focuses on fundamental concepts for analyzing and valuing debt securities. In Section 3, we present the basic features of derivatives that are necessary to understand and analyze such securities. However, the valuation of derivative instruments is complex and beyond the scope of this text.

SECTION 1: EQUITY SECURITIES

Companies finance their operations primarily by issuing debt or by selling off ownership (equity) to the public. This section focuses on the analysis and valuation of the ownership equity issued by public corporations. The most common form of equity issued by corporations is **common stock**, which is a security that represents part ownership in a company.

We begin this section with an overview of the equity valuation framework. We then discuss key financial ratios that characterize the performance of the company. We conclude this section with accepted methods for calculating the **intrinsic value** of a share of common stock. The intrinsic value is also known as the **fair value** of the stock. Mathematically the intrinsic value equals the present value of the cash flows that are expected to materialize in the future.

Chapter Objective: Discuss the framework of and basic concepts related to the valuation of equity securities.

THE EQUITY VALUATION FRAMEWORK

The **market value** of a company equals its stock price times shares outstanding. The market value is also called the company's **market capitalization**.

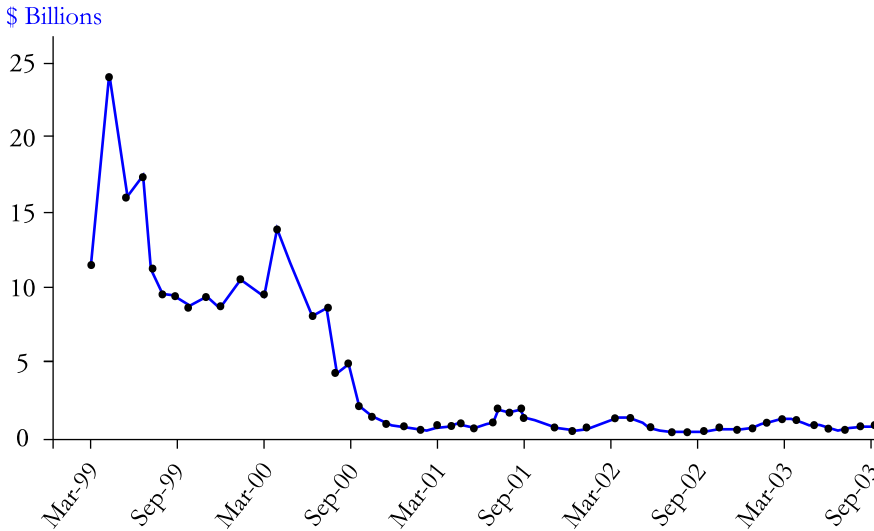
Generally speaking, companies with market capitalizations less than \$1 billion in today's market are called "small cap" companies, and companies with market capitalization greater than \$25 billion are called "large cap" companies.

Before proceeding, it might be interesting to note that stock prices sometimes deviate significantly from their intrinsic value. Consider the case of Priceline.com Inc., the "name your own price" internet services company. The company first issued shares of stock in 1999 at a price of \$69 per share, for a **market value** of approximately \$9.8 billion, much larger than most successful companies that had been in business for decades. By the end of the first month of trading, the stock price soared to \$162, and Priceline's market value jumped to \$23 billion. Interestingly, the very largest companies in the market are identified as having market values of \$25 billion and up in today's market. So within a month of issuing stock, Priceline.com became ranked among the giant companies in the world.

Did Priceline.com deserve a lofty ranking among the largest companies in the world? Consider that the company's earnings (net income) for 1998 through 2002 were *negative* \$65 million, *negative* \$79 million, *negative* \$329 million, *negative* \$18 million, and *negative* 20 million, respectively. The company did not turn a profit until 2003. Eventually, Priceline.com's stock price sank to \$1.13 on December 26, 2000, and its market value plunged to \$190 million.¹ A chart of Priceline.com's market value through 2003 is provided in Figure 1.

¹ The stock recently has regained some of its strength, exceeding \$100 per share, as Priceline's market value has risen to approximately \$4 billion as of January 2008, still far below its peak of \$23 billion in 1999.

Figure 1: Priceline.com Market Value



Investors in Priceline.com and similar dot-com companies got caught up in a classic **speculative bubble**, in which stock prices are driven more by emotion and fads than by discipline and facts. As we know, bubbles can grow to a nice large size and they're great fun to watch, but eventually the bubble bursts. The bigger the bubble, the bigger the messy aftermath. Stock prices reached untenable levels in the late 1990s and then came crashing down with a resounding thud. For instance, the NASDAQ index of primarily smaller technology companies hit its peak in March 2000. By the end of the year 2000, the tech bubble burst and the index had plunged 40% from its high. Today, nearly eight years later, the NASDAQ index is at roughly *half* of its March 2000 high.

Interestingly, or shall we say, ironically, sound methods for valuing companies and for avoiding speculative bubbles such as the dot-com craze were provided nearly 70 years earlier by Benjamin Graham and David Dodd in their seminal work *Security Analysis*.² The authors provided sanity in the midst of the chaos of the depression market when asset prices deviated significantly from reasonable values. Graham and Dodd provided a systematic and disciplined approach to equity analysis. The two key components are **financial statement analysis** and **equity valuation**.

² Graham, Benjamin and David Dodd, *Security Analysis*, McGraw-Hill: New York, 1934.

The **capitalization of income method** is useful not only for valuing equity securities but for other types of securities as well. Many investments can be valued by estimating the expected cash flows the instrument will produce and finding the present risk-adjusted value of those cash flows.

Financial statement analysis refers to extensive, unbiased examination of the company's financial statements and key financial ratios. Analysts also must exercise care and due diligence with the numbers they examine. In particular, analysts should always perform checks on the **earnings quality** of the firm, identifying aggressive use of accounting policies that may underlie the earnings reported by the company. Two good examples of the use of aggressive accounting are recording revenues too quickly and recording expenses too slowly.

Second, after performing a clear and extensive examination of the financial statements, the analyst proceeds to the valuation component. The centerpiece of the valuation component is the **capitalization of income method**, which is used to calculate the intrinsic value of the company's stock.

Chapter Objective: List the steps in the capitalization of income method for determining the intrinsic value of a stock.

Steps in the *capitalization of income method* are:

1. Estimate the amount and timing of all future cash flows.
2. Estimate the risk (uncertainty) associated with cash flows.
3. Assign a required return based upon risk.
4. Find the total present value (today) of all the expected future cash flows.

Chapter Objective: Classify ratios into as internal liquidity, operating performance, risk, growth, and external liquidity, and demonstrate how ratios can be used to analyze financial statements.

FINANCIAL STATEMENT ANALYSIS USING RATIOS

Ratio Analysis

Ratios can be used to evaluate various different facets of a company's performance and condition, such as: (1) working capital management, (2) operating performance, (3) risk profile, and (4) growth potential.

Working Capital Management

Most working capital management ratios are concerned with liquidity, meaning how quickly or even if the firm can meet its short-term obligations, such as accounts payable. Generally, more liquidity is preferred to less.

- The **current ratio**, calculated as the ratio of current assets (CA) to current liabilities (CL), is the best-known measure of liquidity:

$$\text{current ratio, CR} = \frac{\text{CA}}{\text{CL}}$$

The higher the current ratio (i.e., the more current assets as compared to current liabilities), the more likely it is that the company will be able to pay its short-term bills. A current ratio less than one means the company has negative net working capital (defined as current assets minus current liabilities), and could be facing a liquidity crisis. Generally, since current assets are used to pay current liabilities, the greater the current ratio the better the liquidity position of the firm.

Some firms have very specialized inventory that is not readily utilized by many other firms. Also, the firm might have inventory that is undesirable, such as soon-to-be outdated semiconductors. In these cases, liquidating inventory to meet current obligations is not a viable alternative.

- The **quick ratio** is a more stringent measure of liquidity than the current ratio because it does not include inventories, which might not be very liquid. That is, the more specialized the firm's inventory (Inv), the less likely it can be liquidated quickly to meet current obligations.

$$\text{quick ratio} = \frac{\text{CA} - \text{Inv}}{\text{CL}}$$

The higher the quick ratio, sometimes called the acid test ratio, the more likely the company will be able to pay its short-term bills.

We refer to all current accounts collectively as **working capital**. When we compare current assets to current liabilities, we refer to the excess of current assets over current liabilities as **net working capital**, or sometimes just working capital.

- The **receivables turnover ratio** measures how quickly the company collects aggregate accounts receivable (A/R). In other words, it measures the rate of sales compared to the collection of sales revenues.

$$\text{receivables turnover} = \frac{\text{sales}}{\text{A/R}}$$

It is typically considered desirable to have a receivables turnover figure close to the average receivables turnover of the other companies in the same industry.

- The **average collection period** is the inverse of the receivables turnover multiplied by 365. It measures the average number of days it takes for the company's credit customers (accounts receivable) to pay their bills:

$$\text{average collection period, ACP} = \frac{365}{\text{receivables turnover}}$$

Notice that if the company's average collection period is 60 days, its receivables turnover will be $365/60$, or approximately 6. Using the same logic, if its receivables turnover is approximately 6, the average collection period will be 60 days. It is considered desirable to have a collection period (and receivables turnover) close to that of the average company in the same industry.

- The **inventory turnover ratio** measures the firm's efficiency in processing and managing its inventory:

$$\text{inventory turnover} = \frac{\text{COGS}}{\text{Inv}}$$

The inventory turnover equals the number of times the company's inventory is sold (turned over) during the year. Generally, the higher the ratio, the better. If the ratio is low, it may indicate that the inventory is illiquid, obsolete, and is not being sold.

- The **payables turnover ratio** measures generally how quickly the firm meets its accounts payables (A/P). In other words, it measures the rate of sales compared to rate of payment of trade credit:

$$\text{payables turnover ratio} = \frac{\text{COGS}}{\text{AP}}$$

The payables turnover equals the number of times the accounts payable turnover during the year. If the ratio is high, the time between purchase

and payment by the company is short (generally considered good). A low ratio may indicate that the company does not have sufficient cash to pay its bills and is postponing payment.

- The **payables payment period** is the inverse of the payables turnover ratio multiplied by 365. It measures the average amount of time it takes the company to pay its bills:

$$\text{payables payment period} = \frac{365}{\text{payables turnover ratio}}$$

Operating Performance

Performance ratios can help to determine how well management operates the business. They can be divided into two categories: efficiency ratios, which deal with management's efficient utilization of the firm's assets, and profitability ratios, which measure how efficiently management manages costs in generating profits.

Efficiency Ratios

- The **total asset turnover ratio** measures how efficiently management is utilizing all the firm's assets considered together [i.e., total assets (TA)]:

$$\text{total asset turnover, TAT} = \frac{\text{sales}}{\text{TA}}$$

Different types of industries might have considerably different turnover ratios. Manufacturing businesses that are capital intensive might have total asset turnover ratios near one, while retail businesses might have total asset turnover ratios near ten. Again, it is typically desirable for the firm to have a total asset turnover ratio close to the average for the industry. A total asset turnover ratio less than the industry average might mean the company has too many assets for its level of production (i.e., it is not fully utilizing its assets). A total asset turnover ratio higher than the industry average could imply the firm has outdated (fully depreciated) and inefficient capital assets. Naturally, if the assets are not outdated, a high asset turnover is good.

- The **fixed asset turnover ratio** measures how efficiently management is utilizing just the fixed assets (FA). Current assets are not included in the denominator:

$$\text{fixed asset turnover, FAT} = \frac{\text{sales}}{\text{FA}}$$

Again, it is desirable to have a ratio close to the industry norm. An FAT lower than the industry average could mean the company is not fully utilizing its fixed assets. An FAT higher than the industry average might imply the firm has obsolete equipment (fully depreciated). Once again, if the fixed assets are not obsolete, a high FAT is good.

Profitability Ratios

Profitability ratios measure how good management is at turning its efforts into profits. Basically, profitability ratios compare the top of the income statement (sales) to profits and measure how efficiently management is managing expenses. The different ratios are designed to isolate specific costs. Before we proceed to the profitability ratios, here are some important terms and their relation to the income statement:

Important terms:

Gross profits = net sales – COGS

Operating profits = earnings before interest and taxes (EBIT)

Net income = earnings after taxes (EAT)

Capital = long-term debt + short-term debt + equity

How they relate in the income statement:

Sales

– COGS

Gross profit

– Operating expenses

Operating profit (EBIT)

– Interest

Earnings before taxes (EBT)

– Taxes

Earnings after taxes (EAT) = net income

Also note that from the balance sheet:

Liabilities + equity = assets, or

Equity = assets – liabilities

- The **gross profit margin** is the ratio of gross profit (sales less cost of goods sold) to sales:

$$\text{gross profit margin} = \frac{\text{gross profit}}{\text{sales}}$$

Obviously management wants this ratio, as well as any other profitability ratio, to be at least as great as the industry average. The gross profit margin indicates how well the company controls their cost of goods sold.

- The **operating profit margin** is the ratio of operating profit (gross profit less expenses) to sales. Operating profit is also referred to as earnings before interest and taxes (EBIT):

$$\text{operating profit margin} = \frac{\text{operating profit}}{\text{sales}} = \frac{\text{EBIT}}{\text{sales}}$$

The operating profit margin indicates how well the company controls its selling and production costs (rents, salaries, utilities expenses, advertising, depreciation, etc.). In other words, the operating margin indicates if the company runs a tight ship.

- The **net profit margin** is the ratio of net income (NI, also called “earnings”) to sales:

$$\text{net profit margin} = \frac{\text{NI}}{\text{sales}}$$

The net profit margin indicates how well the company controls all its expenses (including interest and taxes). A high net profit margin is desirable.

- The **return on assets (ROA)** is the ratio of net income to total assets:

$$\text{return on assets} = \frac{\text{NI}}{\text{TA}}$$

The analyst should be concerned if the ROA is too low relative to the company’s peers.

- The **return on equity (ROE)** is the ratio of net income to common shareholders’ equity:

$$\text{return on equity} = \frac{\text{NI}}{\text{common equity}}$$

Some analysts prefer to calculate the **operating profit margin** by adding back depreciation and/or amortization expense to arrive at earnings before depreciation, interest, taxes, and amortization (EBDITA).

Analysts should be concerned if ROE is too low relative to the company's peers.

Risk Profile

Risk analysis calculations measure the *uncertainty* of the firm's income flows. They can be divided into two groups, those that measure *business risk* and those that measure *financial risk*.

Business risk is the uncertainty regarding the operating income of a company (EBIT) and is a result of the variability of sales and production costs. The three calculations that measure business risk are business risk, sales volatility, and operating leverage.

Financial risk is the additional volatility of equity returns (ROE) caused by the firm's use of debt. Financial risk can be measured using balance sheet ratios, which include the debt/equity ratio, the long-term debt/total capital ratio, and the total debt ratio; or earnings and cash flow ratios, which include the interest coverage ratio, the fixed financial charge ratio, the total fixed charge coverage ratio, the cash flow/interest expense ratio, the cash flow coverage ratio, the cash flow/long-term debt ratio, and the cash flow/total debt ratio.

- The **coefficient of variation** is a general way of measuring risk of any data series. It is calculated as the standard deviation of the data series divided by its mean. *Business risk* is often measured as the coefficient of variation of a company's operating income (EBIT) over several years:

$$\text{business risk} = \frac{\sigma_{\text{EBIT}}}{\text{average EBIT}}$$

where:

σ_{EBIT} = standard deviation of EBIT over the period

Between five and ten years of data should be used to calculate the coefficient of variation, because using less data calls into question the statistical reliability, and data more than ten years old is likely not to be relevant to the company's present situation. Analysts will be concerned if this ratio is too high (relative to the company's peers).

- One of the contributing sources of earnings variability is **sales volatility**. Sales volatility is the coefficient of variation of sales over several years:

$$\text{sales volatility} = \frac{\sigma_{\text{sales}}}{\text{average sales}}$$

As was the case for business risk, between five and ten years of data should be used in this calculation. Analysts should be concerned if this ratio is too high (relative to the company's peers).

- **Operating leverage** is a measure of the variability of operating earnings. A simple definition is:

$$\text{operating leverage} = \frac{\text{FC}}{\text{TC}}$$

where:

FC = fixed costs

TC = total costs (fixed plus variable costs)

The ratio measures how much of the company's production costs are fixed (as opposed to variable). The greater the use of fixed costs, the more operating income (EBIT) will change when sales change. A high operating leverage indicates that the company's EBIT will be ultra sensitive to changing business cycle conditions. EBIT will rise more than other companies during up periods and will fall more than other companies during down periods.

- The **debt-equity ratio** measures management's use of fixed-cost financing as opposed to equity in financing the firm's assets:

$$\text{debt-equity ratio} = \frac{\text{long-term debt}}{\text{total equity}}$$

Higher or lower values for this ratio suggest a greater or lesser reliance on debt as a source of financing.

- The **debt to assets**, or simply the **debt ratio**, equals the ratio of total debt to total assets and is another way of measuring management's use of debt to finance the firm's assets:

$$\text{debt to assets} = \frac{\text{TD}}{\text{TA}}$$

where:

TD = total debt

TA = total assets

Higher or lower values for this ratio suggest a greater or lesser reliance on debt as a source of financing.

- The **interest coverage ratio**, also known as the *times-interest-earned ratio*, measures the firm's ability to meet its interest (debt) obligations from operating income (EBIT):

$$\text{interest coverage} = \frac{\text{EBIT}}{\text{interest expense}}$$

The higher this ratio, the more likely it is that the firm will be able to meet its interest payments.

Growth Potential

Both owners and creditors are interested in the firm's growth potential. Owners pay attention to growth because stock valuation is dependent on the future growth rate of the firm's cash flows. The analysis of growth potential is important to creditors because the firm's future prospects are crucial to its ability to pay existing debt obligations. If the company does not grow, it stands a much greater chance of defaulting on its loans. In theory, the growth rate of a firm is a function of the rate of return earned on its resources and the amount of resources (profits) retained and reinvested.

For many reasons, all firms go through periods of below- or above-average growth. Analysts are therefore interested in the firm's long-run, *sustainable* growth rate. This is the rate of growth (increase in assets) the firm can maintain without having to sell new common stock. To calculate the sustainable growth rate for a firm, we must know its return on equity,

The **sustainable growth rate** is the rate of growth (increase in assets) the firm can maintain without having to sell new common stock.

ROE, and the proportion of earnings reinvested in the firm [i.e., the retention rate (RR)].

- The long-term **sustainable growth rate**, g , is calculated as:

$$g = RR \times ROE$$

where:

RR = retention rate

ROE = return on (common) equity

- The **retention rate** is the percentage of net income that is retained by the firm (retained earnings) and reinvested in the company. The dividend payout ratio is the percentage of net income paid out to the common stockholders as dividends. The sum of the two must equal 100%.

$$\text{dividend payout ratio} = \frac{\text{dividends paid}}{\text{net income}}$$

and

$$\text{retention rate} = (1 - \text{dividend payout ratio})$$

$$= \left(1 - \frac{\text{dividends}}{\text{net income}} \right)$$

Example: Sustainable growth rate

Calculate the *sustainable growth rate* for the following three firms:

<i>Company</i>	<i>A</i>	<i>B</i>	<i>C</i>
Earnings per share	3.00	4.00	5.00
Dividends per share	1.50	1.00	2.00
Return on equity	14%	12%	10%

Answer:

$$RR = 1 - (\text{dividends} / \text{earnings})$$

$$\text{Company A: } RR = 1 - (1.50 / 3.00) = 0.500$$

$$\text{Company B: } RR = 1 - (1.00 / 4.00) = 0.750$$

$$\text{Company C: } RR = 1 - (2.00 / 5.00) = 0.600$$

$$g = RR \times ROE$$

$$\text{Company A: } g = 0.500 \times 14\% = 7.0\%$$

$$\text{Company B: } g = 0.750 \times 12\% = 9.0\%$$

$$\text{Company C: } g = 0.600 \times 10\% = 6.0\%$$

Alternatively, consider a \$100 million equity investment in Company C. The return on the equity investment is 10%, or \$10 million. Of the \$10 million, assume you consume \$4 million (a 40% dividend payout). Therefore, you retain or plowback \$6 million into the original investment, which is now worth \$106 million (the original \$100 million plus the \$6 million retained earnings). This investment grew 6%, which equaled the return on equity times the retention rate: $0.10 \times 0.60 = 0.06 = 6\%$.

Relative Ratio Analysis

The value of a single financial ratio is not meaningful by itself but must be interpreted relative to one of three factors: industry norms, overall economy norms, and the company's own historical (past) performance.

- Comparison to the industry norm (average) is the most common type of comparison. Industry comparisons are particularly valid when the products generated by all the firms in the industry are similar.

- Comparing a company to the overall economy is particularly important when overall business conditions are changing. For example, a stable profit margin might be considered good if the economy is in recession and the economy-wide average profit margin is declining. On the other hand, it might be considered problematic if a stable profit margin occurs during an economic expansion, and overall average profit margins are increasing.
- Comparing a firm with its history is very common. Typically, the analyst will look at the current level of the ratio and then look to see if it has been declining over time, stable over time, or improving over time.

In most ratio comparisons it is considered desirable to be near the industry (or economy) average. For example, in all turnover ratios, a value could be considered too high or too low if it differs widely from the industry average. However, for some ratios, simply being high is considered good, even if it deviates from the industry average. This is true for most ratios involving income or cash flow. For example, most analysts would agree that having a high return on assets or high profit margin is good. An analyst would not suggest that a company with a return on assets of 15% when the industry average was 10% had an ROA that was *too high*.

Sometimes the “goodness” of a ratio depends on the context. A high ROE that results from high profit margins or asset turnover is typically looked upon favorably. However, high ROEs that result from the overuse of debt (leverage) are typically met with a great deal of skepticism.

Chapter Objective: Perform a comprehensive ratio analysis of a firm.

COMPREHENSIVE EXAMPLE OF A RATIO ANALYSIS OF A FIRM

The following table provides a company’s balance sheets for 2006 and 2007 and income statement for 2007.

Debt is considered **leverage** because it levers (magnifies) both profits and losses. Whenever the firm has positive net income, it has positive ROE. If the firm is profitable and has used too much debt, its ROE might be very high compared to the rest of the industry, but its debt ratio will be out of line (too high). This is only one example of why you must look at more than just one ratio when you analyze a firm’s financial statements.

Balance Sheets		
December 31, 2006 and 2007		
<i>Year</i>	<i>2007</i>	<i>2006</i>
Cash	\$105	\$95
Receivables	205	195
Inventory	310	290
Total current assets	620	580
Gross property, plant, and equipment	\$1,800	\$1,700
Accumulated depreciation	360	340
Net property, plant, and equipment	1,440	1,360
Total assets	\$2,060	\$1,940
Payables	\$110	\$90
Short-term debt	160	140
Current portion of long-term debt	55	45
Total current liabilities	\$325	\$275
Deferred taxes	105	95
Long-term debt	\$610	\$690
Total Debt	\$1040	\$1060
Common stock	300	300
Additional paid in capital	400	400
Retained earnings	320	180
Common shareholders equity	\$1,020	\$880
Total liabilities and equity	\$2,060	\$1,940

Income Statement Year Ending December 31, 2007	
Sales	\$4,000
Cost of goods sold	3,000
Gross profit	1,000
Operating expenses	650
EBIT	350
Interest expense	50
Earnings before taxes	300
Taxes	100
Net income	200
Common dividends	60

Ratios for the industry and the 2006 ratios for the company are reported in the following table:

	2006	Industry
Current ratio	2.1	1.5
Quick ratio	1.00	0.90
Average collection period	18.9	18.0
Inventory turnover	10.7	12.0
Total asset turnover	2.30	2.40
Gross profit margin	27.4%	29.3%
Net profit margin	5.8%	6.5%
Return on assets	13.3%	15.6%
Return on equity	24.1%	19.8%
Debt-to-equity	78.4%	35.7%
Interest coverage	5.9	9.2
Retention rate	50.0%	43.6%
Sustainable growth rate	12.0%	8.6%

Using the company information, **calculate** the 2007 ratios, and **discuss** how these ratios compare with the company's performance last year and with the industry's performance.

Answer:³

- **Current ratio** = current assets / current liabilities

$$\text{Current ratio} = 620 / 325 = 1.9$$

The current ratio indicates lower liquidity levels when compared to last year, but more liquidity than the industry average.

- **Quick ratio** = (cash + receivables) / current liabilities

$$\text{Quick ratio} = (105 + 205) / 325 = 0.95$$

The quick ratio is lower than last year and is above the industry average.

- **Average collection period** = 365 / (sales / receivables)

$$\text{Average collection period} = 365 / (4,000 / 205) = 18.7$$

The average collection period is a bit lower relative to the company's past performance but slightly higher than the industry average.

- **Inventory turnover** = cost of goods sold / inventory

$$\text{Inventory turnover} = 3,000 / 310 = 9.7$$

The inventory turnover is much lower than last year and the industry average. This suggests that the company is not managing inventory efficiently and may even have obsolete inventory.

3 We note that, in practice, many analysts use year-end averages of all balance sheet items in all ratio calculations, especially for ratios that combine income statement and balance sheet items. For example, the return on assets equals net income divided by assets. Net income is a cumulative figure computed over the entire year, while assets is a snapshot at the end of the year. So when the balance sheet item has changed dramatically through the year, it is best to use an average of the end of year t and year $t - 1$ values for assets (e.g., $\text{ROA} = \text{net income divided by the average assets for the year}$). For simplicity here we use only the ending 2007 Balance Sheet values.

- **Total asset turnover** = sales / assets

$$\text{Total asset turnover} = 4,000 / 2,060 = 1.94$$

The total asset turnover is lower than last year and the industry average. This might indicate the management is less efficient in the use of its assets, or perhaps there has been a broad market downturn negatively affecting sales.

- **Gross profit margin** = gross profit / sales

$$\text{Gross profit margin} = 1,000 / 4,000 = 25.0\%$$

The gross profit margin is lower than last year and much lower than the industry average. This might indicate that the cost of sales is not being controlled well.

- **Net profit margin** = net income / sales

$$\text{Net profit margin} = 200 / 4,000 = 5.0\%$$

The net profit margin is lower than last year and much lower than the industry average. This might indicate that the cost of sales and production is not being controlled well.

- **Debt/equity ratio**⁴ = long-term debt / total equity

$$\text{Debt/equity ratio} = 610 / 1020 = 59.8\%$$

The debt/equity ratio is lower than last year but still much higher than the industry average. This suggests the company is trying to get its debt level more in line with the industry.

- **Interest coverage** = EBIT / interest expense

$$\text{Interest coverage} = 350 / 50 = 7.0$$

The interest coverage is better than last year but still worse than the industry average. This, along with the slip in profit margin and return on assets, might cause some concern.

⁴ Note that deferred taxes were not included in the long-term debt calculation. Deferred taxes represent a long-term liability, but in this particular ratio we are more interested in the actual debt financing obtained by the company through the issuance of long-term debt securities.

- **Retention rate** = $1 - (\text{dividends} / \text{earnings})$

$$\text{Retention rate} = 1 - (60 / 200) = 70\%$$

The retention rate is much higher than last year and much higher than the industry. This might suggest that the company is aware of its cash flow and earnings issues and is reinvesting cash into the company to improve the ratios. This is a wise decision as long as their profitability and performance ratios remain high.

- **ROA** = net income / assets

$$\text{ROA} = 200 / 2,060 = 0.097 = 9.7\%$$

The return on assets is lower than last year and far below the industry average. While an ROA close to 10% generally is quite good, the company's ROA is lagging its industry competitors. Also, notice that the ROA dropped considerably from 2006 (when the ROA was 15.5%). The ROA also equals the product of the net profit margin and asset turnover ($0.05 \times 1.94 = 0.097$)

- **ROE** = net income / equity

$$\text{ROE} = 200 / 1,020 = 0.196, \text{ or } 19.6\%$$

The return on equity is lower than last year and slightly below the industry average.

- **Sustainable growth rate**, $g = \text{retention rate} \times \text{ROE}$

$$\text{Sustainable growth rate} = 0.70 \times 0.196 = 0.137, \text{ or } 13.7\%$$

With the high retention rate and good ROE, the company is positioned to grow at a faster rate than last year and faster than the rest of the industry. But note that actual growth (in earnings) can end up above or below the sustainable growth. Actual growth cannot exceed sustainable growth for long, however, because the company will run out of funds to finance its rapid growth. If actual growth consistently lags the sustainable growth, management is doing something wrong, and the company might get taken over, especially if the stock price is low.

Summary: The company's liquidity, as measured by its current and quick ratios, is a little better than the industry as a whole. However, performance figures suggest that earnings continue to trail the industry, and turnover has worsened. The latter probably indicates the firm is employing too many assets to generate the level of sales. The interest coverage ratio has improved but still trails the industry. Although improving, it still might cause some concern for lenders.

The company's debt-equity ratio is very high, indicating management is utilizing too much debt. Coupled with the very high retention rate (low dividend payout), this would indicate too much cash is being burned. That is, with the high retention of earnings, the company should have adequate cash for operations and investments, but it is borrowing heavily.

Chapter Objective: Perform a Du Pont system analysis of the company.

DU PONT SYSTEM

The **Du Pont system** breaks down the components or drivers of the return on equity. Specifically, the ROE equals:

$$\text{ROE} = \left(\frac{\text{net income}}{\text{sales}} \right) \left(\frac{\text{sales}}{\text{assets}} \right) \left(\frac{\text{assets}}{\text{equity}} \right)$$

$$\text{ROE} = (\text{net profit margin})(\text{total asset turnover})(\text{equity multiplier})$$

The genius of breaking ROE down into its component parts is that it indicates the firm's weakness or strength in three separate areas:

1. **Operating efficiency.** The net profit margin catches all the efficiencies and inefficiencies of operating the firm. Poor efficiency produces low profit margins.
2. **Asset utilization.** The total asset turnover measures management's efficient utilization of assets (i.e., higher or lower than industry average utilization). Under-utilization produces lower net income and return on assets due to excessive fixed costs relative to the level of sales.

The **equity multiplier** is the Du Pont system's measure of leverage. The equity multiplier is also called **financial leverage**. The more leverage (debt) employed by management, the higher the equity multiplier and the more ROE is "leveraged" up. The higher (lower) the equity multiplier, the higher (lower) the debt ratio.

3. **Leverage.** The equity multiplier captures management's utilization of debt financing. Too much debt can mean too much risk, and too little signifies "debt capacity," the ability to issue more debt without increasing risk or cost of capital. In other words, the company can improve profitability by borrowing when its performance more than offsets the interest costs of borrowing.

For our company:

$$\text{ROE} = \left(\frac{\text{net income}}{\text{sales}} \right) \left(\frac{\text{sales}}{\text{assets}} \right) \left(\frac{\text{assets}}{\text{equity}} \right)$$

$$\text{ROE} = \left(\frac{200}{4,000} \right) \left(\frac{4,000}{2,060} \right) \left(\frac{2,060}{1,020} \right)$$

$$\text{ROE} = (0.05)(1.9417)(2.0196) = 0.196$$

We again see that the company's ROE is about the same as the industry, so management's first reaction may be to accept the number and carry on. Indeed, it should check the individual ratios in the Du Pont system to be sure that an average ROE isn't masking some very poor and/or very good ratios.

By using the Du Pont system, we can observe that both the net profit margin (net income/sales) and total asset turnover (sales/assets) are substandard. The result is that ROA, which is equal to the product of these ratios, is far below the industry average. This suggests that operating efficiency and asset utilization should be evaluated for potential improvement. Since its ROE appears to be acceptable while its ROA is low, the equity multiplier (assets/equity) must be high.⁵ Without even calculating the industry equity multiplier, we know that management is employing more debt than the industry average. This is confirmed by looking at the firm's debt-to-equity ratio of 59.8% compared to 35.7% for the industry. The bottom line is that although the firm's ROE appears OK on the surface, the excessive use of debt is masking a low profit margin and an under-utilization of the firm's assets.

Chapter Objective: List and discuss the limitations of ratios as a tool for financial statement analysis.

⁵ Note that the ROE equals the ROA times the equity multiplier: $0.097 \times 2.0196 = 19.6\%$.