1. Introduction

As a manager, you may want to reward employees based on their performance. How do you know how well they have done? How can you determine what departments or divisions have performed well? As a lender, how do decide the borrower will be able to pay back as promised? As a manager of a corporation how do you know when existing capacity will be exceeded and enlarged capacity will be needed? As an investor, how do you predict how well the securities of one company will perform relative to that of another? How can you tell whether one security is riskier than another? We can address all of these questions through financial analysis.

Financial analysis is the selection, evaluation, and interpretation of financial data, along with other pertinent information, to assist in investment and financial decision-making. Financial analysis may be used internally to evaluate issues such as employee performance, the efficiency of operations, and credit policies, and externally to evaluate potential investments and the credit-worthiness of borrowers, among other things.

The analyst draws the financial data needed in financial analysis from many sources. The primary source is the data provided by the company itself in its annual report and required disclosures. The annual report comprises the income statement, the balance sheet, and the statement of cash flows, as well as footnotes to these statements. Certain businesses are required by securities laws to disclose additional information.

Besides information that companies are required to disclose through financial statements, other information is readily available for financial analysis. For example, information such as the market prices of securities of publicly-traded corporations can be found in the financial press and the electronic media daily. Similarly, information on stock price indices for industries and for the market as a whole is available in the financial press.

Another source of information is economic data, such as the Gross Domestic Product and Consumer Price Index, which may be useful in assessing the recent performance or future prospects of a company or industry. Suppose you are evaluating a company that owns a chain of retail outlets. What information do you need to judge the company's performance and financial condition? You need financial data, but it doesn't tell the whole story. You also need information on consumer spending, producer prices, consumer prices, and the competition. This is economic data that is readily available from government and private sources.

Besides financial statement data, market data, and economic data, in financial analysis you also need to examine events that may help explain the company's present condition and may have a bearing on its future prospects. For example, did the company recently incur some extraordinary losses? Is the company developing a new product? Or acquiring another company? Is the company regulated? Current events can provide information that may be incorporated in financial analysis.

The financial analyst must select the pertinent information, analyze it, and interpret the analysis, enabling judgments on the current and future financial condition and operating performance of the company. In this reading, we introduce you to financial ratios -- the tool of financial analysis. In financial ratio analysis we select the relevant information -- primarily the financial statement data -- and evaluate it. We show how to incorporate market data and economic data in the analysis and interpretation of financial ratios. And we show how to interpret financial ratio analysis, warning you of the pitfalls that occur when it's not used properly.

We use Microsoft Corporation's 2004 financial statements for illustration purposes throughout this reading. You can obtain the 2004 and any other year's statements directly from Microsoft. Be sure to save these statements for future reference.
2. Classification of ratios

A ratio is a mathematical relation between one quantity and another. Suppose you have 200 apples and 100 oranges. The ratio of apples to oranges is 200 / 100, which we can more conveniently express as 2:1 or 2. A financial ratio is a comparison between one bit of financial information and another. Consider the ratio of current assets to current liabilities, which we refer to as the current ratio. This ratio is a comparison between assets that can be readily turned into cash -- current assets -- and the obligations that are due in the near future -- current liabilities. A current ratio of 2:1 or 2 means that we have twice as much in current assets as we need to satisfy obligations due in the near future.

Ratios can be classified according to the way they are constructed and their general characteristics. By construction, ratios can be classified as a coverage ratio, a return ratio, a turnover ratio, or a component percentage:

1. A **coverage ratio** is a measure of a company's ability to satisfy particular obligations.
2. A **return ratio** is a measure of the net benefit, relative to the resources expended.
3. A **turnover ratio** is a measure of the gross benefit, relative to the resources expended.
4. A **component percentage** is the ratio of a component of an item to the item.

When we assess a company's operating performance, we want to know if it is applying its assets in an efficient and profitable manner. When we assess a company's financial condition, we want to know if it is able to meet its financial obligations.

There are six aspects of operating performance and financial condition we can evaluate from financial ratios:

1. A **liquidity ratio** provides information on a company's ability to meet its short-term, immediate obligations.
2. A **profitability ratio** provides information on the amount of income from each dollar of sales.
3. An **activity ratio** relates information on a company's ability to manage its resources (that is, its assets) efficiently.
4. A **financial leverage ratio** provides information on the degree of a company's fixed financing obligations and its ability to satisfy these financing obligations.
5. A **shareholder ratio** describes the company's financial condition in terms of amounts per share of stock.
6. A **return on investment ratio** provides information on the amount of profit, relative to the assets employed to produce that profit.

We cover each type of ratio, providing examples of ratios that fall into each of these classifications.

A. Liquidity Ratios

Liquidity reflects the ability of a company to meet its short-term obligations using assets that are most readily converted into cash. Assets that may be converted into cash in a short period of time are referred to as **liquid assets**; they are listed in financial statements as **current assets**. These liquid assets are also often referred to as the company’s **working capital** because these assets represent the resources needed for the day-to-day operations of the company’s long-term, capital investments. Current assets are
used to satisfy short-term obligations, or current liabilities. The amount by which current assets exceed current liabilities is referred to as the **net working capital**.  

The role of the operating cycle

How much liquidity a company needs depends on its operating cycle. The operating cycle is the duration between the time cash is invested in goods and services to the time that investment produces cash. For example, a company that produces and sells goods has an operating cycle comprising four phases:

![Operating Cycle Diagram]

The **operating cycle** is the length of time it takes to convert an investment of cash in inventory back into cash (through collections of sales). The net operating cycle is the length of time it takes to convert an investment of cash in inventory and back into cash considering that some purchases are made on credit.

The number of days a company ties up funds in inventory is determined by:

1. the total amount of money represented in inventory, and
2. the average day's cost of goods sold.

The current investment in inventory -- that is, the money "tied up" in inventory -- is the ending balance of inventory on the balance sheet. The average day's cost of goods sold is the cost of goods sold on an average day in the year, which can be estimated by dividing the cost of goods sold found on the income statement by the number of days in the year.

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1 You will see reference to the net working capital (i.e., current assets – current liabilities) as simply *working capital*, which may be confusing. Always check the definition for the particular usage because both are common uses of the term *working capital*.  

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We compute the **number of days of inventory** by calculating the ratio of the amount of inventory on hand (in dollars) to the average day's Cost of Goods Sold (in dollars per day):

\[ \text{Number of days inventory} = \frac{\text{Inventory}}{\text{Average day's cost of goods sold}} = \frac{\text{Inventory}}{\frac{\text{Cost of goods sold}}{365}} \]

If the ending inventory is representative of the inventory throughout the year, the number of days inventory tells us the time it takes to convert the investment in inventory into sold goods. Why worry about whether the year-end inventory is representative of inventory at any day throughout the year? Well, if inventory at the end of the fiscal year-end is lower than on any other day of the year, we have understated the number of days of inventory.

Indeed, in practice most companies try to choose fiscal year-ends that coincide with the slow period of their business. That means the ending balance of inventory would be lower than the typical daily inventory of the year. We could, for example, look at quarterly financial statements and take averages of quarterly inventory balances to get a better idea of the typical inventory. However, here for simplicity in this and other ratios, we will make a note of this problem and deal with it later in the discussion of financial ratios.

We can extend the same logic for calculating the number of days between a sale -- when an account receivable is created -- to the time it is collected in cash. If the ending balance of receivables at the end of the year is representative of the receivables on any day throughout the year, then it takes, on average, approximately the "number of days credit" to collect the accounts receivable, or the **number of days receivables**:

\[ \text{Number of days receivables} = \frac{\text{Accounts receivable}}{\text{Average day's sales on credit}} = \frac{\text{Accounts receivable}}{\frac{\text{Sales on credit}}{365}} \]

The number of days receivables is also referred to as the **days sales outstanding**, or **DSO**.

What does the operating cycle have to do with liquidity? The longer the operating cycle, the more current assets needed (relative to current liabilities) because it takes longer to convert inventories and receivables into cash. In other words, the longer the operating cycle, the more net working capital required.

We also need to look at the liabilities on the balance sheet to see how long it takes a company to pay its short-term obligations. We can apply the same logic to accounts payable as we did to accounts receivable and inventories. How long does it take a company, on average, to go from creating a payable (buying on credit) to paying for it in cash? The measure of how long it takes is referred to as the **number of days payables** or **days payables outstanding**, **DPO**:^2

\[ \text{Number of days payables} = \frac{\text{Accounts payable}}{\text{Average day's purchases}} = \frac{\text{Accounts payable}}{\frac{\text{Purchases}}{365}} \]

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^2 The purchases can be calculated using the balance sheet and income statement information, remembering the accounting relationship: beginning inventory + purchases = cost of goods sold + ending inventory.
Wal-Mart Stores, Inc., had cost of revenue of $219,793 million for the fiscal year ended January 31, 2005. It had an inventory balance of $29,447 million at the end of this fiscal year. Using the quarterly information, Wal-Mart’s average inventory balance during the fiscal year is $29,769.25:

Based on this information, what is Wal-Mart’s inventory turnover for fiscal year 2004 (ending January 31, 2005)?

**Solution:**

Using the fiscal year end balance of inventory:

\[
\text{Number of days inventory} = \frac{\$29,447}{\$219,793/365} = \frac{29,447}{602.173} = 48.9 \text{ days}
\]

Using the average of the quarterly balances:

\[
\text{Number of days inventory} = \frac{\$29,769.25}{\$219,793/365} = \frac{29,769.25}{602.173} = 49.436 \text{ days}
\]

In other words, it takes Wal-Mart approximately 50 days to sell its merchandise from the time it acquires it.

The operating cycle tells us how long it takes to convert an investment in cash back into cash (by way of inventory and accounts receivable):

\[
\text{Operating cycle} = \frac{\text{Number of days of inventory}}{\text{Number of days of receivables}}
\]

The number of days of purchases tells us how long it takes use to pay on purchases made to create the inventory. If we put these two pieces of information together, we can see how long, on net, we tie up cash. The difference between the operating cycle and the number of days of payables is the net operating cycle:

\[
\text{Net operating cycle} = \text{Operating Cycle} - \text{Number of days of purchases}
\]

or, substituting for the operating cycle,
The net operating cycle is given by the following equation:

\[
\text{Net operating cycle} = \frac{\text{Number of days of inventory}}{\text{Number of days of purchases}} - \frac{\text{Number of days of receivables}}{\text{Number of days of inventory}}
\]

The net operating cycle is often referred to as the **cash conversion cycle**.

### Microsoft’s Number of Days Receivables, 2005

Average day's receivables = $39,788 million ÷ 365 = $109.008 million

Number of days receivables = $7,190 million ÷ $109.008 million = **65.867 days**

Source of data: Income Statement and Balance Sheet, Microsoft Corporation Annual Report 2005

The net operating cycle therefore tells us how long it takes for the company to get cash back from its investment in inventory and accounts receivable, considering that purchases may be made on credit. By not paying for purchases immediately (that is, using trade credit), the company reduces its liquidity needs. Therefore, the longer the net operating cycle, the greater the company’s need for liquidity.

### Measures of liquidity

Liquidity ratios provide a measure of a company’s ability to generate cash to meet its immediate needs. There are three commonly used liquidity ratios:

1. **The current ratio** is the ratio of current assets to current liabilities; Indicates a company’s ability to satisfy its current liabilities with its current assets:

   \[
   \text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}
   \]

2. **The quick ratio** is the ratio of quick assets (generally current assets less inventory) to current liabilities; Indicates a company’s ability to satisfy current liabilities with its most liquid assets

   \[
   \text{Quick ratio} = \frac{\text{Current assets} - \text{Inventory}}{\text{Current liabilities}}
   \]

3. **The net working capital to sales ratio** is the ratio of net working capital (current assets minus current liabilities) to sales; Indicates a company’s liquid assets (after meeting short–term obligations) relative to its need for liquidity (represented by sales)

   \[
   \text{Net working capital to sales ratio} = \frac{\text{Current assets} - \text{Current liabilities}}{\text{Sales}}
   \]

Generally, the larger these liquidity ratios, the better the ability of the company to satisfy its immediate obligations. Is there a magic number that defines good or bad? Not really.

Consider the current ratio. A large amount of current assets relative to current liabilities provides assurance that the company will be able to satisfy its immediate obligations. However, if there are more current assets than the company needs to provide this assurance, the company may be investing too heavily in these non- or low-earning assets and therefore not putting the assets to the most productive use.

### Microsoft Liquidity Ratios, 2005

Current ratio = $37,751 million ÷ $16,877 million = **2.237 times**
Quick ratio = ($48,737 - 491) ÷ $16,877 = 2.859 times

Net working capital-to-sales = ($48,737-16,877) ÷ $39,798 = 0.801

Source of data: Balance Sheet and Income Statement, Microsoft Corporation Annual Report 2005

Another consideration is the operating cycle. A company with a long operating cycle may have more need to liquid assets than a company with a short operating cycle. That's because a long operating cycle indicate that money is tied up in inventory (and then receivables) for a longer length of time.

B. Profitability ratios

Profitability ratios (also referred to as profit margin ratios) compare components of income with sales. They give us an idea of what makes up a company's income and are usually expressed as a portion of each dollar of sales. The profit margin ratios we discuss here differ only by the numerator. It's in the numerator that we reflect and thus evaluate performance for different aspects of the business:

The **gross profit margin** is the ratio of gross income or profit to sales. This ratio indicates how much of every dollar of sales is left after costs of goods sold:

\[
\text{Gross profit margin} = \frac{\text{Gross income}}{\text{Sales}}
\]

**Microsoft's 2005 Profit Margins**

Gross profit margin = ($39,788 – 6,031) ÷ $39,788 = 84.842%

Operating profit margin = $14,561 ÷ $39,788 = 36.596%

Net profit margin = $12,254 ÷ $39,788 = 30.798%

Source of data: Income Statement, Microsoft Corporation Annual Report 2005

The **operating profit margin** is the ratio of operating profit (a.k.a. EBIT, operating income, income before interest and taxes) to sales. This is a ratio that indicates how much of each dollar of sales is left over after operating expenses:

\[
\text{Operating profit margin} = \frac{\text{Operating income}}{\text{Sales}}
\]

The **net profit margin** is the ratio of net income (a.k.a. net profit) to sales, and indicates how much of each dollar of sales is left over after all expenses:

\[
\text{Net profit margin} = \frac{\text{Net income}}{\text{Sales}}
\]

Activity ratios

Activity ratios are measures of how well assets are used. Activity ratios -- which are, for the most part, turnover ratios -- can be used to evaluate the benefits produced by specific assets, such as inventory or accounts receivable. Or they can be use to evaluate the benefits produced by all a company's assets collectively.

These measures help us gauge how effectively the company is at putting its investment to work. A company will invest in assets -- e.g., inventory or plant and equipment -- and then use these assets to generate revenues. The greater the turnover, the more effectively the company is at producing a benefit from its investment in assets.
The most common turnover ratios are the following:

1. **Inventory turnover** is the ratio of cost of goods sold to inventory. This ratio indicates how many times inventory is created and sold during the period:
   \[
   \text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}}
   \]

2. **Accounts receivable turnover** is the ratio of net credit sales to accounts receivable. This ratio indicates how many times in the period credit sales have been created and collected on:
   \[
   \text{Accounts receivable turnover} = \frac{\text{Sales on credit}}{\text{Accounts receivable}}
   \]

3. **Total asset turnover** is the ratio of sales to total assets. This ratio indicates the extent that the investment in total assets results in sales.
   \[
   \text{Total asset turnover} = \frac{\text{Sales}}{\text{Total assets}}
   \]

4. **Fixed asset turnover** is the ratio of sales to fixed assets. This ratio indicates the ability of the company's management to put the fixed assets to work to generate sales:
   \[
   \text{Fixed asset turnover} = \frac{\text{Sales}}{\text{Fixed assets}}
   \]

**Microsoft’s Activity Ratios, 2005**

Accounts receivable turnover = $9,788 ÷ $7,180 = 5.542 times
Total asset turnover = $39,788 ÷ $70,815 = 0.562 times

Source of data: Income Statement and Balance Sheet, Microsoft Corporation Annual Report 2005

Turnovers and numbers of days

You may have noticed that there is a relation between the measures of the operating cycle and activity ratios. This is because they use the same information and look at this information from different angles. Consider the number of days inventory and the inventory turnover:

\[
\text{Number of days inventory} = \frac{\text{Inventory}}{\text{Average day’s cost of goods sold}}
\]

\[
\text{Inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Inventory}}
\]

The number of days inventory is how long the inventory stays with the company, whereas the inventory turnover is the number of times that the inventory comes and leaves – the complete cycle – within a period. So if the number of days inventory is 30 days, this means that the turnover within the year is 365 ÷ 30 = 12.167 times. In other words,

\[
\frac{365}{\text{Number of days inventory}} = \frac{365}{\text{Inventory}} = \frac{\text{Cost of goods sold}}{\text{Inventory}}
\]
Financial leverage ratios

A company can finance its assets either with equity or debt. Financing through debt involves risk because debt legally obligates the company to pay interest and to repay the principal as promised. Equity financing does not obligate the company to pay anything -- dividends are paid at the discretion of the board of directors. There is always some risk, which we refer to as business risk, inherent in any operating segment of a business. But how a company chooses to finance its operations -- the particular mix of debt and equity -- may add financial risk on top of business risk. Financial risk is the extent that debt financing is used relative to equity.

Financial leverage ratios are used to assess how much financial risk the company has taken on. There are two types of financial leverage ratios: component percentages and coverage ratios. Component percentages compare a company's debt with either its total capital (debt plus equity) or its equity capital. Coverage ratios reflect a company's ability to satisfy fixed obligations, such as interest, principal repayment, or lease payments.

C. Component-percentage financial leverage ratios

The component-percentage financial leverage ratios convey how reliant a company is on debt financing. These ratios compare the amount of debt to either the total capital of the company or to the equity capital.

1. The total debt to assets ratio indicates the proportion of assets that are financed with debt (both short-term and long-term debt):
Total debt to assets ratio = \frac{\text{Total debt}}{\text{Total assets}}

Remember from your study of accounting that total assets are equal to the sum of total debt and equity. This is the familiar **accounting identity**: assets = liabilities + equity.

2. The **long-term debt to assets ratio** indicates the proportion of the company’s assets that are financed with long-term debt.

   \[
   \text{Long-term debt to assets ratio} = \frac{\text{Long-term debt}}{\text{Total assets}}
   \]

3. The **debt to equity ratio** (a.k.a. **debt-equity ratio**) indicates the relative uses of debt and equity as sources of capital to finance the company’s assets, evaluated using book values of the capital sources:

   \[
   \text{Total debt to equity ratio} = \frac{\text{Total debt}}{\text{Total shareholders’ equity}}
   \]

One problem (as we shall see) with looking at risk through a financial ratio that uses the book value of equity (the stock) is that most often there is little relation between the book value and its market value. The book value of equity consists of:

- the proceeds to the company of all the stock issued since it was first incorporated, less any treasury stock (stock repurchased by the company); and

- the accumulation of all the earnings of the company, less any dividends, since it was first incorporated.
DEBT RATIOS AND DEBT-TO-TOTAL ASSETS

Note that the debt-equity ratio is related to the debt-to-total assets ratio because they are both measures of the company’s capital structure. The **capital structure** is the mix of debt and equity that the company uses to finance its assets.

Let’s use short-hand notation to demonstrate this relationship. Let D represent total debt and E represent equity. Therefore, total assets are equal to D+E.

If a company has a debt-equity ratio of 0.25, this means that is debt-to-asset ratio is 0.2. We calculate it by using the ratio relationships and Algebra:

\[
\frac{D}{E} = 0.25
\]

\[
D = 0.25 \times E
\]

Substituting 0.25E for D in the debt-to-assets ratio D/(D+E):

\[
\frac{D}{D+E} = \frac{0.25E}{0.25E+E} = \frac{0.25E}{1.25E} = 0.2
\]

In other words, a debt-equity ratio of 0.25 is equivalent to a debt-to-assets ratio of 0.2.

This is a handy device: if you are given a debt-equity ratio and need the debt-assets ratio, simply:

\[
\frac{D}{D+E} = \frac{D}{E} \div (1 + \frac{D}{E})
\]

Why do we bother to show this? Because many financial analysts discuss or report a company’s debt-equity ratio and you are left on your own to determine what this means in terms of the proportion of debt in the company’s capital structure.

Let's look at an example of the book value vs. market value of equity. IBM was incorporated in 1911. So its book value of equity represents the sum of all its stock issued and all its earnings, less all dividends paid since 1911. As of the end of 2003, IBM's book value of equity was approximately $28 billion and its market value of equity was approximately $162 billion. The book value understates its market value by over $130 billion. The book value generally does not give a true picture of the investment of shareholders in the company because:

- earnings are recorded according to accounting principles, which may not reflect the true economics of transactions, and
- due to inflation, the dollars from earnings and proceeds from stock issued in the past do not reflect today's values.

The market value, on the other hand, is the value of equity as perceived by investors. It is what investors are willing to pay, its worth. So why bother with the book value of equity? For two reasons: first, it is easier to obtain the book value than the market value of a company's securities, and second, many financial services report ratios using the book value, rather than the market value.

We may use the market value of equity in the denominator, replacing the book value of equity. To do this, we need to know the current number of shares outstanding and the current market price per share of stock and multiply to get the market value of equity.
D. Coverage financial leverage ratios

In addition to the leverage ratios that use information about how debt is related to either assets or equity, there are a number of financial leverage ratios that capture the ability of the company to satisfy its debt obligations. There are many ratios that accomplish this, but the two most common ratios are the times interest coverage ratio and the fixed charge coverage ratio.

The times-interest-coverage ratio, also referred to as the interest coverage ratio, compares the earnings available to meet the interest obligation with the interest obligation:

\[
\text{Times - interest - coverage ratio} = \frac{\text{Earnings before interest and taxes}}{\text{Interest}}
\]

The fixed charge coverage ratio expands on the obligations covered and can be specified to include any fixed charges, such as lease payments and preferred dividends. For example, to gauge a company's ability to cover its interest and lease payments, you could use the following ratio:

\[
\text{Fixed - charge coverage ratio} = \frac{\text{Earnings before interest and taxes} + \text{Lease payment}}{\text{Interest} + \text{Lease payment}}
\]

Coverage ratios are often used in debt covenants to help protect the creditors.

Microsoft’s Financial Leverage Ratios, 2005

Total debt to total assets = ($70,815 – 48,115) ÷ $70,815 = 32.055%

Debt to equity ratio = ($70,815 – 48,115) ÷ $48,115 = 47.179%

Source of data: Balance sheet, Microsoft Corporation Annual Report 2005

E. Shareholder ratios

The ratios we have explained to this point deal with the performance and financial condition of the company. These ratios provide information for managers (who are interested in evaluating the performance of the company) and for creditors (who are interested in the company's ability to pay its obligations). We will now take a look at ratios that focus on the interests of the owners -- shareholder ratios. These ratios translate the overall results of operations so that they can be compared in terms of a share of stock:

**Earnings per share (EPS)** is the amount of income earned during a period per share of common stock.

\[
\text{Earnings per share} = \frac{\text{Net income available to shareholders}}{\text{Number of shares outstanding}}
\]

As we learned earlier in the study of Financial Statement Information, two numbers of earnings per share are currently disclosed in financial reports: basic and diluted. These numbers differ with respect to the definition of available net income and the number of shares outstanding. Basic earnings per share are computed using reported earnings and the average number of shares outstanding. Diluted earnings per share are computed assuming that all potentially dilutive securities are issued. That means we look at a “worst case” scenario in terms of the dilution of earnings from factors such as executive stock options, convertible bonds, convertible preferred stock, and warrants.

Suppose a company has convertible securities outstanding, such as convertible bonds. In calculating diluted earnings per share, we consider what would happen to both earnings and the number of shares
outstanding if these bonds were converted into common shares. This is a "What if?" scenario: what if all the bonds are converted into stock this period. To carry out this "What if?" we calculate earnings considering that the company does not have to pay the interest on the bonds that period (which increases the numerator of earnings per share), but we also add to the denominator the number of shares that would be issued if these bonds were converted into shares.³

Another source of dilution is executive stock options. Suppose a company has 1 million shares of stock outstanding, but has also given its executives stock options that would result in 0.5 million new shares issued if they chose to exercise these options. This would not affect the numerator of the earnings per share, but would change the denominator to 1.5 million shares. If the company had earnings of $5 million, its basic earnings per share would be $5 million / 1 million shares = $5.00 per share and its diluted earnings per share would be $5 million / 1.5 million shares = $3.33 per share.

As an example, consider Yahoo!’s earnings per share reported in their 2007 annual report:

<table>
<thead>
<tr>
<th>Item</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic EPS</td>
<td>$0.54</td>
<td>$0.49</td>
</tr>
<tr>
<td>Diluted EPS</td>
<td>$0.52</td>
<td>$0.47</td>
</tr>
</tbody>
</table>

The difference between the basic and diluted earnings per share in Yahoo!’s case is attributable to its extensive use of stock options in compensation programs.

**Book value equity per share** is the amount of the book value (a.k.a. carrying value) of common equity per share of common stock, calculated by dividing the book value of shareholders’ equity by the number of shares of stock outstanding. As we discussed earlier, the book value of equity may differ from the market value of equity. The market value per share, if available, is a much better indicator of the investment of shareholders in the company.

The **price-earnings ratio** (P/E or PE ratio) is the ratio of the price per share of common stock to the earnings per share of common stock:

\[
\text{Price-earnings ratio} = \frac{\text{Market price per share}}{\text{Earnings per share}}
\]

Though earnings per share are reported in the income statement, the market price per share of stock is not reported in the financial statements and must be obtained from financial news sources. The P/E ratio is sometimes used as a proxy for investors’ assessment of the company’s ability to generate cash flows in

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³ A “catch” is that diluted earnings per share can never be reported to be greater than basic earnings per share. In some cases (when a company has many convertible securities outstanding), we may calculate a diluted earnings per share greater than basic earnings per share, but in this case we cannot report diluted earnings per share because it would be anti-dilutive.
the future. Historically, P/E ratios for U.S. companies tend to fall in the 10-25 range, but in poor economic environments, P/Es tend to be inflated. Examples of P/E ratios (P/E ratios as of July 15, 2008): ⁴

<table>
<thead>
<tr>
<th>Company</th>
<th>Ticker symbol</th>
<th>P/E ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon.com</td>
<td>AMZN</td>
<td>54</td>
</tr>
<tr>
<td>Time Warner Inc.</td>
<td>TWX</td>
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<td>13</td>
</tr>
<tr>
<td>General Electric</td>
<td>GE</td>
<td>12</td>
</tr>
</tbody>
</table>

We are often interested in the returns to shareholders in the form of cash dividends. Cash dividends are payments made by the company directly to its owners. There is no requirement that a company pay dividends to its shareholders, but many companies pay regular quarterly or annual dividends to the owners. The decision to pay a dividend is made by the company’s board of directors. Note that not all companies pay dividends.

**Dividends per share (DPS)** is the dollar amount of cash dividends paid during a period, per share of common stock:

\[
\text{Dividends per share} = \frac{\text{Dividends paid to shareholders}}{\text{Number of shares outstanding}}
\]

The **dividend payout ratio** is the ratio of cash dividends paid to earnings for a period:

\[
\text{Dividend payout ratio} = \frac{\text{Dividends}}{\text{Earnings}}
\]

The complement to the dividend payout ratio is the **retention ratio** or the plowback ratio:

\[
\text{Retention ratio} = \frac{\text{Earnings} - \text{Dividends}}{\text{Earnings}}
\]

We can also convey information about dividends in the form of a yield, in which we compare the dividends per share with the market price per share:

\[
\text{Dividend yield} = \frac{\text{Dividends per share}}{\text{Market price per share}}
\]

The **dividend yield** is the return to shareholders measured in terms of the dividends paid during the period.

We often describe a company’s dividend policy in terms of its dividend per share, its dividend payout ratio, or its dividend yield. Some companies’ dividends appear to follow a pattern of constant or constantly growing dividends per share. And some companies’ dividends appear to be a constant percentage of earnings.

---

⁴ Source: Yahoo! Finance
3. Return ratios and the Du Pont system

A. Return-on-investment ratios

Return-on-investment ratios, more commonly called return-on-asset ratios, compare measures of benefits we have not yet considered with measures of investment. What we want to evaluate will determine the benefit that is represented in the numerator and the resources affecting that benefit, represented in the denominator. What distinguishes return-on-investment ratios from the activity ratios (such as an inventory turnover or receivable turnover) is that the numerator is the net benefit, rather than the gross benefit from an activity.

The **operating return on assets ratio** (a.k.a. **basic earning power ratio**) is the ratio of operating earnings to assets:

\[
\text{Basic earning power ratio} = \frac{\text{Operating income}}{\text{Total assets}}
\]

It is a measure of the operating income resulting from the firm's investment in total assets.

The **return on assets**, ROA, is the ratio of net income to assets and indicates the firm's net profit generated per dollar invested in total assets:

\[
\text{Return on assets} = \frac{\text{Net income}}{\text{Total assets}}
\]

The **return on equity**, ROE, is the ratio of net income to shareholders' equity and represents the profit generated per dollar of shareholders' investment (that is, shareholders' equity):

\[
\text{Return on equity} = \frac{\text{Net income}}{\text{Shareholders' equity}}
\]

Microsoft's 2005 Return Ratios

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic earning power</td>
<td>$14,561 \div $70,815 = 20.562%</td>
</tr>
<tr>
<td>Return on assets</td>
<td>$12,254 \div $70,815 = 17.304%</td>
</tr>
<tr>
<td>Return on equity</td>
<td>$12,254 \div $48,115 = 25.468%</td>
</tr>
</tbody>
</table>

Source of data: Microsoft Corporation 2005 Annual Report, fiscal year ended June 30, 2005

B. The DuPont System

The **Du Pont system** was developed by E.I. du Pont Nemours, the system is a method of decomposing the return ratios into their profit margin and turnover components. Suppose the return on assets changes from 20% to 10%. We do not know whether this decreased return is due to a less efficient use of the firm's assets -- that is, due to lower activity or to lower profit margins. A lower return on assets could be due to lower activity, lower margins, or both. Since we are interested in evaluating past operating performance to evaluate different aspects of the management of the firm or to predict future performance, knowing the source of these returns is valuable information. The DuPont system allows us to breakdown the return ratios into components, identifying the sources of the changes in returns.

For example, we can breakdown the operating return on assets and the return on assets to two components, operating margin and total asset turnover:

\[
\text{Operating return on assets} = \frac{\text{Operating income}}{\text{Total assets}} = \frac{\text{Operating income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}}
\]
By looking at the components, turnover and profit margin, and their changes from year to year, we get a better idea of what is behind changes in returns from year to year. Similarly, the return on shareholders' equity can be broken down into three components:

\[
\text{Return on equity} = \frac{\text{Net income}}{\text{Total assets}} \times \frac{\text{Sales}}{\text{Shareholder's equity}}
\]

Applying the Du Pont System to Microsoft, 2005

\[
\text{Operating return on assets} = \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Operating income}}{\text{Sales}} = \frac{\$39,788}{\$70,815} \times \frac{\$14,561}{\$39,788} = 20.562\%
\]

The task of breaking down ratios into components can be performed on any return ratio and can reduce the ratios to their smallest components. For example, the return on equity can be broken down into five components: net profit margin, asset turnover, equity multiplier, equity's share of income, and tax burden. A breakdown of the return on assets into four components (i.e., asset turnover, operating profit margin, interest burden, and tax burden) is diagrammed in Exhibit 1. In a similar manner, the return on equity can be broken down into five components: asset turnover, operating profit margin, interest burden, tax burden, and the equity multiplier.

Why is it useful to do such a breakdown? The system of looking at the components of the returns of a company help in:

1. Comparing the performance and condition of a company against its competitors;
2. Analyzing trends in the returns of a company in the context of trends of the components; and
3. Forecasting the returns of a company based on forecasts of the components.

Regarding comparisons with competitors, consider that companies in the same line of business should have similar operating profit margins and asset turnovers. Focusing on these ratios may help explain why companies in the same industry have different returns. Further, the interest burden is influenced by the company’s financial decisions. By comparing these dimensions across companies in the same industry, we get a better sense of how these decisions affect a company’s fortunes.
Regarding the source of changes in returns, consider Kmart prior to its bankruptcy filing in 2002. It’s total asset turnover, profit margin, and return on assets are graphed in Exhibit 2.

We can see in Exhibit 2, Panel A, that Kmart’s return on assets changed over time: dramatic decreases in 1993 and 1995, some recovery in 1997-1998, and then a decline as it approached bankruptcy.⁶

What was the source of Kmart's woes? There is usually not just one source of a company's financial difficulties, but the use of the du Pont system allows us to get some idea of what led to Kmart's challenges.

We can see in Panel B that the total asset turnover did not change much during the 1990-2000. If we were to compare this turnover with that of its competitors, we would see that Kmart's turnover was quite similar.

Looking at Kmart's net profit margin, as shown in Panel C, we see that the changes in the net profit margin appear to have been a strong influence on Kmart's returns.

What does this mean? What we surmise from this analysis is that Kmart's difficulties are related to the management of expenses, rather than the deployment and use of its assets. If we wanted to get a more detailed look, we could break the net profit margin into components of the operation profit margin, the interest burden, and the tax burden to see what why the net profit margin changed over time.

4. Common size analysis

Common size analysis is the analysis of financial statement items through comparisons among these items. In common size analysis, we compare each item in a financial statement with a benchmark item. There are two forms of benchmarking:

- **Vertical common size analysis**; and
- **Horizontal common size analysis**.

In vertical common size analysis, the benchmark is an account for the period:

- For the income statement, the benchmark is sales. For a given period, each item in the income statement is restated as a percentage of sales.
- For the balance sheet, the benchmark is total assets. For a given point in time, each item in the balance sheet is restated as a percentage of total assets.

In horizontal common size analysis, the benchmark is a period. In this case, each account for a given year is stated as a percentage of the base year's same account value.

A. Vertical common size analysis

To see how vertical common size analysis works, consider The Acme Company's financial statements below. The reported financial data in the right-most columns has been converted into percentages of sales revenues (i.e., common size statements), shown in the left-most columns:

<table>
<thead>
<tr>
<th>Acme Company Income Statements</th>
<th>Common-size statement stated as a % of Sales</th>
<th>Amount in millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>73.0%</td>
<td>75.1%</td>
</tr>
<tr>
<td>Gross profit</td>
<td>27.0%</td>
<td>24.9%</td>
</tr>
<tr>
<td>Selling, general, and administrative expenses</td>
<td>21.2%</td>
<td>20.2%</td>
</tr>
<tr>
<td>Operating income</td>
<td>5.8%</td>
<td>4.7%</td>
</tr>
<tr>
<td>Taxes</td>
<td>2.0%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Net income</td>
<td>3.8%</td>
<td>3.0%</td>
</tr>
</tbody>
</table>
We can restate also Acme’s reported balance sheet items in terms a percentage of total assets:

<table>
<thead>
<tr>
<th>Acme Company Balance Sheets</th>
<th>Common-sized statement stated as a % of total assets</th>
<th>Amount in millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash, cash equiv., and marketable securities</td>
<td>10.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Finance receivables</td>
<td>25.7%</td>
<td>25.9%</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>3.3%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Inventories</td>
<td>5.3%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Deferred income taxes</td>
<td>9.8%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Equipment on operating leases</td>
<td>14.5%</td>
<td>13.6%</td>
</tr>
<tr>
<td>Property</td>
<td>15.1%</td>
<td>16.9%</td>
</tr>
<tr>
<td>Intangible assets</td>
<td>5.0%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Other assets</td>
<td>11.2%</td>
<td>10.8%</td>
</tr>
<tr>
<td>Total assets</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

In a similar manner, the liabilities and equity can be restated in terms of total assets:

<table>
<thead>
<tr>
<th>Acme Company’s Balance Sheets, continued</th>
<th>Common-sized statement stated as a % of total assets</th>
<th>Amount in millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts payable</td>
<td>6.9%</td>
<td>6.4%</td>
</tr>
<tr>
<td>Notes and loans payable</td>
<td>40.6%</td>
<td>38.4%</td>
</tr>
<tr>
<td>Deferred income taxes</td>
<td>1.3%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Postretirement benefits other than pensions</td>
<td>18.0%</td>
<td>19.4%</td>
</tr>
<tr>
<td>Pensions</td>
<td>3.1%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Accrued expenses and other liabilities</td>
<td>22.1%</td>
<td>20.3%</td>
</tr>
<tr>
<td>Minority interests</td>
<td>0.3%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Debentures</td>
<td>0.1%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Stockholders' equity</td>
<td>7.6%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Total liabilities and equity</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

B. Horizontal common size analysis

To see how horizontal common size analysis works, let’s use the same statements of Acme, but use 2007 as the base year. In this case, each account in the income statement for 2008 is restated as a percentage of 2007 values:

<table>
<thead>
<tr>
<th>Acme Company Income Statements</th>
<th>Common-size statement stated as a % of 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2008</td>
</tr>
<tr>
<td>Sales</td>
<td>108.63%</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>105.55%</td>
</tr>
<tr>
<td>Gross profit</td>
<td>117.95%</td>
</tr>
<tr>
<td>Selling, general, and administrative expenses</td>
<td>114.04%</td>
</tr>
<tr>
<td>Operating income</td>
<td>134.97%</td>
</tr>
<tr>
<td>Taxes</td>
<td>133.54%</td>
</tr>
<tr>
<td>Net income</td>
<td>134.96%</td>
</tr>
</tbody>
</table>
Using this approach, we can see that sales and cost of sales rose at a slower rate than did selling, general, and administrative expenses. Extending this analysis for several years helps identify trends in key accounts and allows comparison in the growth of these accounts.
EXHIBIT 3  GRAPHICAL REPRESENTATION OF THE VERTICAL COMMON-SIZE STATEMENTS FOR HARLEY DAVIDSON, 1991-2004

Panel A  Income statement

Panel B  Assets

Panel C  Liabilities

Source of data: Mergent Online
We can also represent this information in graphical form, which allows us to see trends in these components over time. Using Harley-Davidson as an example, consider the income statements for this company of the period 1991-2004, as shown in Exhibit 3, Panel A. Here we can see that the increasing profitability while the cost of goods sold has declined relative to total revenues. Looking at the company’s product line and business operations, we see that this increase in profitability corresponds to the shift in generating profits not just from the sale of motorcycles, but from the financing of these sales and licensing.

We can see this shift in business purpose in the asset composition over time, as shown in Panel B. Finance receivables have become increasingly more important as a use of funds. This is understandable because the financing of its cycles has increased the profitability of the company.

In Panel C, which is the representation of the company’s liabilities and equity, we see that the capital structure -- that is, how the business chooses to finance its business, is rather stable over time.

Common size analysis is useful in analyzing trends in profitability (using the common size income statements) and trends in investments and financing (using the common size balance sheet).

5. Effective use of financial analysis

As we learned in the discussion of financial ratios, we can use financial ratios along with other pertinent data to evaluate the financial condition and operating performance of a company. Though a single ratio for a given company at a point in time tells us very little, if we examine the trends in the ratios over time and compare these trends with those of firms in similar lines of business, we can get a good idea of where this company has been -- financially speaking -- and where it may be heading. Therefore, the analysis of financial ratios and other information involves examining:

- trends over time for the company,
- trends over time for companies in similar lines of business, and
- economic and market conditions.

A. Choosing a benchmark

To make comparisons, the analyst most likely will want to compare the firm with other firms. But identifying the other firms in the same or similar lines of business presents a challenge. A system that has been used for many years for classifying firms by lines of business is the Standard Industrial Classification system, SIC, which was developed by the Office of Management and Budget. However, starting in 1997, another classification system, North American Industry Classification System, NAICS, replaces SIC codes with a system that better represents the current lines of business. Using the NAISC, we can classify a firm and then compare this firm with other of that class.

Classifying firms into industry groups is difficult because most firms have more than one line of business. Most large corporations operate in several lines of business. Do we classify a firm into an industry by the line of business that represents:

- the most sales revenue generated?
- the greatest investment in assets?
- the greatest share of the firm’s profits?

It is not clear which is the most appropriate method and a firm may be classified into different industries by different financial services and analysts.
In making comparisons, there is an issue of whether the benchmark should be all other firms in the industry (say, an average), or the leading firms in the industry. Consider the case of Pepsico, Inc. Pepsico, Inc. is a producer of beverages and snacks. The primary competitors to Pepsico in this industry are Coca-Cola, Cadbury Schweppes, and Cott Corporation. The breakdown of sales in this industry for 2005 is shown in Exhibit 4.

When comparing PepsiCo to the industry,

- Should we use just the two major domestic competitors as the industry benchmark? If so, so we simply average Cadbury’s, Cott’s and Coca Cola’s ratios or do we weight them in some manner (e.g., by market share)?
- Should we include competitors in the global market?
- Should we consider the smaller competitors at all?
- Should we compare PepsiCo with the other large firm in the industry, Coca-Cola?

The benchmark that we choose may affect the conclusions that we draw with respect to a firm's operating performance.

Let's see how we would use information over time for PepsiCo (PEP) and Coca-Cola (KO). Consider the net profit margins for both companies, as shown in Exhibit 5.
Looking at the net profit margin, we see that the profit margin of PepsiCo has improved over time and that of Coca-Cola has improved slightly.

The net profit margin measures the company’s ability to manage its expenses. Both companies are subject to similar operating risk, but PepsiCo relies more on debt financing than does Coca-Cola, as indicated by the higher debt to equity ratio; PepsiCo has a debt to equity ratio of 18 percent in 2004, compared to Coca-Cola’s 7 percent. However, both companies have debt-to-equity ratios much lower than the next two largest competitors: Cott Corporation has a debt-equity ratio of 60 percent, whereas Cadbury Schweppes has a debt-equity ratio of 95 percent.

Comparing the return on equity for the two companies, as shown in Exhibit 6, we get a slightly different picture: PepsiCo’s return on equity has remained about the same over the 1995-2004 period, yet the return on equity for Coca-Cola has declined over this same period.

**B. Evaluating creditworthiness**

One use of financial analysis is to evaluate the credit-worthiness or debt quality of a business. Credit-rating services (e.g., Dun & Bradstreet, Standard & Poor’s, and Moody’s Investor Service) provide an
evaluation of a firm’s ability to meet its obligations. Rating services use both financial analysis and the characteristics of the obligations to evaluate credit-worthiness.

Bond ratings reflect the credit quality of a particular debt issue. These ratings reflect not only the credit-worthiness of the issuer, but also the features of the debt issue, such as security or a sinking fund. Bonds are often classified according to credit quality. Bond ratings for both Moody's and Standard & Poor's are summarized in Appendix B.

We can classify bonds into broader groups based on these ratings: investment grade debt and non-investment grade debt. Investment grade debt is debt with little credit risk -- the borrowers are expected to be able to pay the promised interest and principal. In terms of the bond ratings in Table 1, investment grade debt encompasses the top four rating classes (AAA through BBB for Standard and Poor's and Aaa through Baa for Moody's). Non-investment grade debt, also referred to as junk bonds or speculative grade debt, on the other hand, are debt securities with a great deal of credit risk -- that is, there is a good chance the borrowers will not be able to pay the promised interest and principal.

C. Predicting bankruptcy

Financial analysis is often used to evaluate the likelihood that a firm will be unable to pay its obligations. We can see that there are often indications of a firm’s financial distress prior to the actual declaration of bankruptcy.

Because financial distress is generally signaled through financial characteristics well before a formal bankruptcy, statistical models are often used to discriminate between financially healthy and financially unhealthy firms based on financial ratios or other characteristics over several years.

The general characteristics of a firm used in these models include liquidity, profitability, financial leverage, and asset turnover. Statistical models employ techniques, such as discriminant analysis and regression analysis, to identify the characteristics of firms most likely to experience difficulty meeting financial obligations.

### Exhibit 7

**Delta Airlines and the Altman Z-score**

- A healthy company generally has a Z-score above 2.99
- An unhealthy company generally has a Z-score below 1.81
- A company with a Z-score between 1.81 and 2.99 bears watching.

Source of data: Mergent Online and Delta Air Lines’ 10-K filings
In the case of discriminant analysis, for example, scores are calculated based on financial ratios and these scores are then associated with the likelihood of financial distress. Ed Altman developed a series of models of bankruptcy prediction using discriminant analysis.  

**Altman's Z-score** for a publicly-traded company is calculated as:

\[
Z = 1.2 \left( \frac{\text{Working capital}}{\text{Total assets}} \right) + 1.4 \left( \frac{\text{Retained earnings}}{\text{Total assets}} \right) + 3.3 \left( \frac{\text{Earnings before interest and taxes}}{\text{Total assets}} \right) + 0.6 \left( \frac{\text{Market value of equity}}{\text{Book value of debt}} \right) + 0.999 \left( \frac{\text{Sales}}{\text{Total assets}} \right)
\]

A score greater than 2.99 is generally associated with firms that subsequently go bankrupt. A score less than 1.81 generally indicates a financially healthy company. A score between these two values falls in the grey area and the prediction is indeterminate.

For example, applying his model for publicly-traded non-manufacturing companies to Delta Airlines, as we show in Exhibit 7, we see that Delta Airlines' financial health improved during the 1993 through 1998, but its health deteriorated up until its bankruptcy filing in 2005.

6. Problems and dilemmas in financial analysis

A. Using accounting data

There are a number of issues that arise simply from the fact that much of the financial data we use in analysis is accounting information. The problems associated with using reported accounting data include:

- **USE OF HISTORICAL COSTS AND INFLATION.** Accounting data are not adjusted for inflation and represent historical cost instead of current or replacement costs for most assets. It is likely that the reported book value of assets do not reflect the market value or replacement value of a firm's assets.

- **THE DIFFERENT METHODS OF ACCOUNTING.** Firms can select from alternative accounting procedures (e.g., LIFO vs. FIFO), which makes comparisons among firms difficult. The analyst must often look beyond the basic financial statement information to remove distortions that may arise from specific accounting practices.

- **THE OCCURRENCE OF EXTRAORDINARY AND SPECIAL ITEMS.** The analyst must determine whether the effects of extraordinary and special items should be included in the analysis. In recent years, extraordinary items have become quite "ordinary", with some firms reported extraordinary items each year.

- **THE DIFFICULTY IN CLASSIFYING "FUZZY" ITEMS.** Some accounting items are difficult to classify, especially when distinguishing between liabilities and equity accounts. Therefore, the analyst must understand not only the accounting principles behind the numbers, but also understand business practices. For example, in the case of the deferred taxes, the analyst must understand not only what gives rise to the deferred taxes, but whether this accounting item represents an on-going difference between tax and accounting income (and, hence, is more suitably classified as equity) or whether this item represents a temporary timing difference (and, hence, is more suitably classified as a liability).

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7 For a summary of these models, see *Bankruptcy, Credit Risk, and High Yield Junk Bonds*, by Edward I. Altman, Blackwell Publishing, 2002.
B. Selecting and interpreting ratios

Interpretation of ratios one at a time is difficult since there is no "good" or "bad" value when viewed in isolation. Ratios should be selected that have meaning for that firm. For example, inventory turnover for a hospital doesn't make much sense. What is inventory for a hospital? Bed pans? But inventory turnover is very important for, say, a retailer such as Wal-Mart.

Further, some ratios do not make sense under certain circumstances. For example, if a firm has negative earnings, the price-earnings ratio is meaningless. As another example, consider a firm that has negative book value of equity (and, yes, this can happen). In this case, any ratio that uses book value of equity, such as the debt-equity ratio, is meaningless.

C. Forecasting

We often examine trends in ratios and other financial data to predict the future, forecasting the future based on historical trends. For example, we may extrapolate a trend in sales or a trend in operating profit. And though this may result in a reasonable forecast for the immediate future, the business environment is very complex and many factors can affect the future performance or conditions of a company. Therefore, we generally develop forecasts using information in addition to the basic trend, such as forecasts of economic and market conditions.

But we need to be careful in predicting the future revenues or income of a company based solely on the past. As companies mature, growth slows and this needs to be considered in making any forecasts. How much does growth slow? It depends on many factors, including industry structure (e.g., degree of competition), changing demographics, and government regulation.

We can also look to analysts' forecasts. We could look to individual analysts' forecasts or look at consensus forecasts collected by financial service firms including IBES, Zack's, and First Call. These forecasts are typically in the form of forecasts of earnings per share. This information is reported by many web-based services, including Yahoo! Finance. For example, we can see the consensus forecasts for USX-U.S. Steel, as reported by Yahoo!, which tells us not only whether there was an earnings surprise (that is, actual earnings deviated from consensus or expected earnings) for the latest quarter, but the consensus forecast for the next quarter, the next reported fiscal year, and one-year ahead. 8

7. Summary

Financial analysis of a company requires a wealth of information. There is so much information available and so much of the analysis can be computerized, that the task of the analyst is to select the appropriate tools, gather the pertinent information, and interpret the information.

Analysis is becoming more important following the recent scandals as investors and financial managers are learning to become more skeptical of accounting information and look more closely at trends in data, comparisons with other firms, the relation between management compensation and earnings, and footnote disclosures. It is not necessarily the case that all of the scandals could have been detected with closer scrutiny, but there were warning signs in the trends and hints in footnotes that should have at least raised the caution flags among analysts.

8 The desire to meet and beat analysts’ forecasts of earnings put a great deal of pressure on the management of some companies, resulting in unethical management of reported earnings.
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Problems
Calculate the following ratios for Microsoft for 2006, using the financial statements in Appendix A:
1) Number of days inventory
2) Number of days receivable
3) Number of days payables
4) Operating cycle
5) Net operating cycle
6) Current ratio
7) Quick ratio
8) Gross profit margin
9) Operating profit margin
10) Net profit margin
11) Inventory turnover
12) Accounts receivable turnover
13) Total asset turnover
14) Total debt to assets
15) Debt-equity
16) Dividend payout
17) Retention rate
18) Basic earning power
19) Return on assets
20) Return on equity
# Solutions to problems

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Number of days inventory</td>
<td>$1,478 ÷ ($7,650/365)</td>
<td>70.519 days</td>
</tr>
<tr>
<td>2) Number of days receivable</td>
<td>$9,316 ÷ ($44,282/365)</td>
<td>76.788 days</td>
</tr>
<tr>
<td>3) Number of days payables</td>
<td>$2,909 ÷ ($8,637/365)</td>
<td>122.934 days</td>
</tr>
<tr>
<td>4) Operating cycle</td>
<td>70.519 + 76.788</td>
<td>147.307 days</td>
</tr>
<tr>
<td>5) Net operating cycle</td>
<td>147.307 - 122.934</td>
<td>24.373 days</td>
</tr>
<tr>
<td>6) Current ratio</td>
<td>$49,010 ÷ $22,442</td>
<td>2.184</td>
</tr>
<tr>
<td>7) Quick ratio</td>
<td>($40,010 - 1,478) ÷ $22,442</td>
<td>2.118</td>
</tr>
<tr>
<td>8) Gross profit margin</td>
<td>$36.632 ÷ $44,282</td>
<td>82.724%</td>
</tr>
<tr>
<td>9) Operating profit margin</td>
<td>$16,472 ÷ $44,282</td>
<td>37.198%</td>
</tr>
<tr>
<td>10) Net profit margin</td>
<td>$12,599 ÷ $44,282</td>
<td>28.452%</td>
</tr>
<tr>
<td>11) Inventory turnover</td>
<td>$7,650 ÷ $1,478</td>
<td>5.176 times</td>
</tr>
<tr>
<td>12) Accounts receivable turnover</td>
<td>$44,282 ÷ $9,316</td>
<td>4.753 times</td>
</tr>
<tr>
<td>13) Total asset turnover</td>
<td>$44,282 ÷ $69,597</td>
<td>0.636 times</td>
</tr>
<tr>
<td>14) Total debt to assets</td>
<td>$29,493 ÷ $69,597</td>
<td>0.424</td>
</tr>
<tr>
<td>15) Debt-equity</td>
<td>$29,493 ÷ $40,104</td>
<td>0.735</td>
</tr>
<tr>
<td>16) Dividend payout</td>
<td>$0.35 ÷ $1.21</td>
<td>28.926%</td>
</tr>
<tr>
<td>17) Retention rate</td>
<td>$0.86 ÷ $1.21</td>
<td>71.074%</td>
</tr>
<tr>
<td>18) Basic earning power</td>
<td>$16,472 ÷ $69,597</td>
<td>23.668%</td>
</tr>
<tr>
<td>19) Return on assets</td>
<td>$12,599 ÷ $69,597</td>
<td>18.103%</td>
</tr>
<tr>
<td>20) Return on equity</td>
<td>$12,599 ÷ $40,104</td>
<td>31.416%</td>
</tr>
</tbody>
</table>
Appendix A  Microsoft Financial Statements, 2005-06

INCOME STATEMENTS
(In millions, except per share amounts)

<table>
<thead>
<tr>
<th>Year Ended June 30</th>
<th>2006</th>
<th>2005</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>$44,282</td>
<td>$39,788</td>
<td>$36,835</td>
</tr>
<tr>
<td>Operating expenses:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of revenue</td>
<td>7,650</td>
<td>6,031</td>
<td>6,596</td>
</tr>
<tr>
<td>Research and develop</td>
<td>6,584</td>
<td>6,097</td>
<td>7,735</td>
</tr>
<tr>
<td>Sales and marketing</td>
<td>9,818</td>
<td>8,563</td>
<td>8,195</td>
</tr>
<tr>
<td>General and administrative</td>
<td>3,758</td>
<td>4,536</td>
<td>5,275</td>
</tr>
<tr>
<td>Total operating expenses</td>
<td>27,810</td>
<td>25,227</td>
<td>27,801</td>
</tr>
<tr>
<td>Operating income</td>
<td>16,472</td>
<td>14,561</td>
<td>9,034</td>
</tr>
<tr>
<td>Investment income and other</td>
<td>1,790</td>
<td>2,067</td>
<td>3,162</td>
</tr>
<tr>
<td>Income before income taxes</td>
<td>18,262</td>
<td>16,628</td>
<td>12,196</td>
</tr>
<tr>
<td>Provision for income taxes</td>
<td>5,663</td>
<td>4,374</td>
<td>4,028</td>
</tr>
<tr>
<td>Net income</td>
<td>$12,599</td>
<td>$12,254</td>
<td>$ 8,168</td>
</tr>
</tbody>
</table>

Earnings per share:

<table>
<thead>
<tr>
<th>Basic</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$ 1.21</td>
<td>$ 1.13</td>
<td>$ 0.76</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diluted</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$ 1.20</td>
<td>$ 1.12</td>
<td>$ 0.75</td>
</tr>
</tbody>
</table>

Weighted average shares outstanding:

<table>
<thead>
<tr>
<th>Basic</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10,438</td>
<td>10,839</td>
<td>10,803</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diluted</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10,531</td>
<td>10,906</td>
<td>10,894</td>
</tr>
</tbody>
</table>

Cash dividends declared per common share

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$ 0.35</td>
<td>$ 3.40</td>
<td>$ 0.16</td>
</tr>
</tbody>
</table>
### BALANCE SHEETS

**(In millions)**

#### June 30

<table>
<thead>
<tr>
<th>Assets</th>
<th>2006</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current assets:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and equivalents</td>
<td>$6,714</td>
<td>$4,851</td>
</tr>
<tr>
<td>Short-term investments (including securities pledged as collateral of $3,065 and $)</td>
<td>27,447</td>
<td>32,900</td>
</tr>
<tr>
<td><strong>Total cash and short-term investments</strong></td>
<td>34,161</td>
<td>37,751</td>
</tr>
<tr>
<td>Inventories, net</td>
<td>1,478</td>
<td>491</td>
</tr>
<tr>
<td>Deferred income taxes</td>
<td>1,940</td>
<td>1,701</td>
</tr>
<tr>
<td>Other</td>
<td>2,115</td>
<td>1,614</td>
</tr>
<tr>
<td><strong>Total current assets</strong></td>
<td>49,010</td>
<td>48,737</td>
</tr>
<tr>
<td>Property and equipment, net</td>
<td>3,044</td>
<td>2,346</td>
</tr>
<tr>
<td>Equity and other investments</td>
<td>9,232</td>
<td>11,004</td>
</tr>
<tr>
<td>Goodwill</td>
<td>3,866</td>
<td>3,309</td>
</tr>
<tr>
<td>Intangible assets, net</td>
<td>539</td>
<td>499</td>
</tr>
<tr>
<td>Deferred income taxes</td>
<td>2,611</td>
<td>3,621</td>
</tr>
<tr>
<td>Other long-term assets</td>
<td>1,295</td>
<td>1,299</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td>$69,597</td>
<td>$70,815</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liabilities and stockholders’ equity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current liabilities:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts payable</td>
<td>$2,909</td>
<td>$2,086</td>
</tr>
<tr>
<td>Accrued compensation</td>
<td>1,938</td>
<td>1,662</td>
</tr>
<tr>
<td>Income taxes</td>
<td>1,557</td>
<td>2,020</td>
</tr>
<tr>
<td>Short-term unearned revenue</td>
<td>9,138</td>
<td>7,502</td>
</tr>
<tr>
<td>Securities lending payable</td>
<td>3,117</td>
<td>–</td>
</tr>
<tr>
<td>Other</td>
<td>3,783</td>
<td>3,607</td>
</tr>
<tr>
<td><strong>Total current liabilities</strong></td>
<td>22,442</td>
<td>16,877</td>
</tr>
<tr>
<td>Long-term unearned revenue</td>
<td>1,764</td>
<td>1,665</td>
</tr>
<tr>
<td>Other long-term liabilities</td>
<td>5,287</td>
<td>4,158</td>
</tr>
<tr>
<td><strong>Total liabilities</strong></td>
<td>33,937</td>
<td>28,798</td>
</tr>
<tr>
<td><strong>Stockholders’ equity:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common stock and paid-in capital – shares authorized 24,000; outstanding 10,062 and 10,710</td>
<td>59,005</td>
<td>60,413</td>
</tr>
<tr>
<td>Retained earnings (deficit), including accumulated other comprehensive income of $1,119 and $1,426</td>
<td>(18,901)</td>
<td>(12,298)</td>
</tr>
<tr>
<td><strong>Total stockholders’ equity</strong></td>
<td>40,104</td>
<td>48,115</td>
</tr>
<tr>
<td><strong>Total liabilities and stockholders’ equity</strong></td>
<td><strong>$69,597</strong></td>
<td><strong>$70,815</strong></td>
</tr>
</tbody>
</table>
CASH FLOWS STATEMENTS

(In millions)

<table>
<thead>
<tr>
<th>Year Ended June 30</th>
<th>2006</th>
<th>2005</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net income</td>
<td>$12,599</td>
<td>$12,254</td>
<td>$8,168</td>
</tr>
<tr>
<td>Depreciation, amortization, and other noncash items</td>
<td>903</td>
<td>855</td>
<td>1,186</td>
</tr>
<tr>
<td>Stock-based compensation</td>
<td>1,715</td>
<td>2,448</td>
<td>5,734</td>
</tr>
<tr>
<td>Net recognized gains on investments</td>
<td>(270)</td>
<td>(527)</td>
<td>(1,296)</td>
</tr>
<tr>
<td>Stock option income tax benefits</td>
<td>–</td>
<td>668</td>
<td>1,100</td>
</tr>
<tr>
<td>Excess tax benefits from stock-based payment arrangements</td>
<td>(89)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Deferred income taxes</td>
<td>219</td>
<td>(179)</td>
<td>(1,479)</td>
</tr>
<tr>
<td>Unearned revenue</td>
<td>16,453</td>
<td>13,831</td>
<td>11,777</td>
</tr>
<tr>
<td>Recognition of unearned revenue</td>
<td>(14,729)</td>
<td>(12,919)</td>
<td>(12,527)</td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>(2,071)</td>
<td>(1,243)</td>
<td>(687)</td>
</tr>
<tr>
<td>Other current assets</td>
<td>(1,405)</td>
<td>(245)</td>
<td>478</td>
</tr>
<tr>
<td>Other long-term assets</td>
<td>(49)</td>
<td>21</td>
<td>34</td>
</tr>
<tr>
<td>Other current liabilities</td>
<td>(145)</td>
<td>396</td>
<td>1,529</td>
</tr>
<tr>
<td>Other long-term liabilities</td>
<td>1,273</td>
<td>1,245</td>
<td>609</td>
</tr>
<tr>
<td><strong>Net cash from operations</strong></td>
<td>14,404</td>
<td>16,605</td>
<td>14,626</td>
</tr>
<tr>
<td><strong>Financing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common stock issued</td>
<td>2,101</td>
<td>3,109</td>
<td>2,748</td>
</tr>
<tr>
<td>Common stock repurchased</td>
<td>(19,207)</td>
<td>(8,057)</td>
<td>(3,383)</td>
</tr>
<tr>
<td>Common stock cash dividends</td>
<td>(3,545)</td>
<td>(36,112)</td>
<td>(1,729)</td>
</tr>
<tr>
<td>Excess tax benefits from stock-based payment arrangements</td>
<td>89</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Other</td>
<td>–</td>
<td>(18)</td>
<td>–</td>
</tr>
<tr>
<td><strong>Net cash used for financing</strong></td>
<td>(20,562)</td>
<td>(41,078)</td>
<td>(2,364)</td>
</tr>
<tr>
<td><strong>Investing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additions to property and equipment</td>
<td>(1,578)</td>
<td>(812)</td>
<td>(1,109)</td>
</tr>
<tr>
<td>Acquisition of companies, net of cash acquired</td>
<td>(649)</td>
<td>(207)</td>
<td>(4)</td>
</tr>
<tr>
<td>Purchases of investments</td>
<td>(51,117)</td>
<td>(68,045)</td>
<td>(95,005)</td>
</tr>
<tr>
<td>Maturities of investments</td>
<td>3,877</td>
<td>29,153</td>
<td>5,561</td>
</tr>
<tr>
<td>Sales of investments</td>
<td>54,353</td>
<td>54,938</td>
<td>87,215</td>
</tr>
<tr>
<td>Net proceeds from securities lending</td>
<td>3,117</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Net cash from (used in) investing</strong></td>
<td>8,003</td>
<td>15,027</td>
<td>(3,342)</td>
</tr>
<tr>
<td><strong>Net change in cash and equivalents</strong></td>
<td>1,845</td>
<td>(9,446)</td>
<td>8,920</td>
</tr>
<tr>
<td>Effect of exchange rates on cash and equivalents</td>
<td>18</td>
<td>(7)</td>
<td>27</td>
</tr>
<tr>
<td>Cash and equivalents, beginning of period</td>
<td>4,851</td>
<td>14,304</td>
<td>5,357</td>
</tr>
<tr>
<td><strong>Cash and equivalents, end of period</strong></td>
<td>$6,714</td>
<td>$4,851</td>
<td>$14,304</td>
</tr>
</tbody>
</table>
Appendix B: Bond Rating Classifications: Standard & Poor’s, Moody’s

Standard & Poor’s

**Investment grade**

AAA  Highest quality. Ability to pay interest and principal very strong.
AA   High quality. Ability to pay interest and principal strong.
A    Medium to high quality. Ability to pay interest and principal, but more susceptible to changes in circumstances and the economy.
BBB  Medium quality. Adequate ability to pay, but highly susceptible to adverse circumstances.

**Speculative grade**

BB  Speculative. Less near-term likelihood of default relative to other speculative issues.
B   Current capacity to pay interest and principal, but highly susceptible to changes in circumstances.
CCC Likely to default, where payment of interest and principal is dependent on favorable circumstances.
CC  Debt subordinate to senior debt rated CCC
C   Debt subordinate to senior debt rated CCC-
D   Currently in default, where interest or principal has not been made as promised.


Moody’s

**Investment Grade**

Aaa  Best quality. Smallest investment risk.
Aa   High quality.
A    Upper to medium grade. Favorable investment attributes.
Baa  Medium grade. Adequate ability to pay interest and principal.

**Speculative grade**

Ba  Speculative. Ability to pay interest and principal uncertain in the future
B   Lack of desirable investment characteristics. Likelihood of paying interest and principal in the future is small.
Caa Poor standing. May be in default or other problems with respect to payment of interest and principal.
Ca  Very speculative. May be in default
C   Poor prospects of becoming investment standing