



This is “Financial Statements and Ratio Analysis”, chapter 4 from the book [Finance for Managers \(index.html\)](#) (v. 0.1).

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Chapter 4

Financial Statements and Ratio Analysis

Financial Statements

PLEASE NOTE: This book is currently in draft form; material is not final.

Firms with publicly-traded securities must submit certain financial statements to the Securities Exchange Commission (SEC). Companies must submit a 10-K, which is a summary of the firm's financial performance using specific data following detailed rules. The 10-K includes the balance sheet, the statement of cash flows, and the income statement. Firms also must submit an annual report to their shareholders, which is a slightly different version of the firm's performance, as managers have a bit more flexibility in conveying the information. Financial statements are typically constructed by internal employees and then audited by an outside body. A quick review of the construction of financial statements will be helpful before we analyze and interpret these statements.

For those who like to cook, financial statements share some attributes with recipes. A lasagna recipe might list the ingredients and detail the steps involved, but it might not explain how to know exactly when the noodles were done (but not overdone) and how to know when the cheese has melted to perfection, opting instead for "cook for about 35 minutes." In order to better understand what makes a delicious lasagna, we need to know not only the ingredients and steps, but how to interpret the recipe and a basic understanding of cooking in general. In finance, a fundamental analysis of financial statements would be to review them and then perform some type of analysis of them. A fundamental analysis combines economics and accounting. The accounting provides the data on the financial statements; the economics provides the tools to analyze these statements. A successful analysis includes both the quantitative data (the financial statements) and analysis of this data (using, for example, ratio analysis). In this chapter we review the basic financial statements provided to us by the accountants and use economic analysis to analyze these statements.

4.1 Income Statement

PLEASE NOTE: This book is currently in draft form; material is not final.

LEARNING OBJECTIVES

1. Describe what an income statement is.
2. Explain how to read an income statement.
3. Describe what factors influence the income statement.

1. Income or the amount of money received by a company during a specific period.
2. Direct costs attributable to the production of goods or services including raw materials and labor.
3. The total amount of profit. The difference between revenue and costs before accounting for other items such as interest, depreciation, taxes and amortization.
4. Expenditures that result from normal business operations.
5. A way to allocate the cost of an asset over its useful life.
6. Paying off a debt in regular installments over time.
7. A company's profitability as calculated by revenues minus expenses, excluding tax and interest.

The first financial statement we examine is the income statement. An income statement includes revenues earned, expenses paid, and the bottom line to the investors: net income. The income statement is like a movie: it provides a financial film of a firm over a period of time. It is a moving picture of the firm's financial performance during a given time period, typically a year, but monthly and quarterly financial statements are also prepared. And, while the calendar year ends December 31, companies often pick other dates as their fiscal year end, depending on their industry or selling cycle.

The first line (top line) of an income statement is **revenue**¹ (also called sales revenue or sales). This is the total dollar amount of goods and services sold during the given time period. From this, direct expenses incurred to make the good are deducted as **cost of goods sold (COGS)**². This results in **gross profit**³, also known as Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA). Gross profit is what the company made by making and selling its product. From gross profit we need to pay operating, financial (interest) and tax expenses. **Operating expenses**⁴ include selling, general and administrative expenses (SG&A), lease expenses, depreciation and amortization and are the typical cost of doing business. While fixed assets aren't directly "used up" over time, a machine or building will wear out over time and eventually need to be replaced. **Depreciation**⁵ and **amortization**⁶ are annual charges that reflect the legal portion of costs of the assets allowed to be deducted. Depreciation relates to tangible assets such as machines and amortization relates to intangible assets such as patents.

Once we subtract the operating expenses from gross profit our result is **earnings before interest and taxes (EBIT)**⁷. EBIT shows us the firm's ability to generate cash

flow. From EBIT we subtract factors from outside the firm's operations such as taxes and interest charges. Subtracting interest leaves **net profit before taxes**⁸ also known as Earnings Before Taxes (EBT). Finally we must pay the tax man. After taxes are taken out then **net income**⁹ (or **profit**¹⁰) is left. A pro-forma income statement is shown in Figure 4.1 "Pro-Forma Income Statement".

Figure 4.1 Pro-Forma Income Statement

Depreciation and Taxes

Is depreciation a good or bad thing for companies? When equipment or property that will be used over time for operations is purchased, the company is typically not allowed to count the purchase as an expense. If it was allowed, then they EBT would be lower by the cost, and thus taxes due would be lower. Instead, the government makes companies "write down" then machine over time (under the "matching principle" of accounting), which leads to the tax reduction being spread out over time as well. From one point of view, depreciation is nothing more than a legally mandated loan to the government: the tax effect spread out over time instead of taken in the year the fixed asset was purchased!

KEY TAKEAWAYS

- Income statements provide a moving picture of a company's financial position over a period of time.
- An income statement includes revenues earned and expenses paid and the bottom line to the investors: net income.

8. Revenues minus all expenses except taxes.
9. A company's total profit calculated by revenue minus expenses, depreciation, interest and taxes.
10. The financial gain when revenue exceeds costs.

EXERCISES

1. Review the following 10-K statements

a. Here is a link to Nike's 10-K.

[http://nike.q4cdn.com/
25140a27-0622-47e1-9f85-99892a766984.pdf?noexit=true](http://nike.q4cdn.com/25140a27-0622-47e1-9f85-99892a766984.pdf?noexit=true)

Look at the Income Statement on page 56. Can you identify revenues? Net income?

b. Here is a link to Starbuck's 2011 10-K.

[http://investor.starbucks.com/
phoenix.zhtml?c=99518&p=irol -
SECText&TEXT=aHR0cDovL2lyLmludC53ZXN0bGF3Yn
VzaW5lc3MuY29tL2RvY3VtZW50L3YxLzAwMDExOTM
xMjUtMTUzMzE3MTc1L3htbA%3d%3d](http://investor.starbucks.com/phoenix.zhtml?c=99518&p=irol-SECText&TEXT=aHR0cDovL2lyLmludC53ZXN0bGF3YnVzaW5lc3MuY29tL2RvY3VtZW50L3YxLzAwMDExOTMxMjUtMTUzMzE3MTc1L3htbA%3d%3d)

Look at the Income Statement on page 43. Can you identify Net Income? Sales revenue? Taxes?

2. Using this data below, construct an income statement.

Last year Sun Skateboards had \$200,000 in revenues. The company had \$70,000 in COGS and \$30,000 is SG&A. It was in the 40% corporate tax rate. They had depreciation expense of \$35,000 and interest expense of \$20,000.

4.2 The Balance Sheet

PLEASE NOTE: This book is currently in draft form; material is not final.

LEARNING OBJECTIVES

1. Describe what a balance sheet is.
2. Explain how to read a balance sheet.
3. Describe what factors influence a balance sheet.

Unlike the financial movie the income statement, a balance sheet is a snapshot of a company's financial position. A balance statement represents a company's financial position at a specific date in time (the company's year end). During different times of the year the balance sheet may change as sales, assets and receivables change. If a firm does seasonal business such as Toro (lawnmowers and snowblowers), its inventory levels, sales and receivables will all vary dramatically throughout the year.

The balance sheet is divided into two sections: **assets**¹¹ on the left side and **liabilities**¹² and equity on the right side. The left side lists all assets including cash, accounts receivable and investments. The right side lists the firm's liabilities including accounts payable and debts. The right side also includes **shareholder's equity**¹³ which is the value of the firm held by its stockholders and **retained earnings**¹⁴.

11. A resource with value.
12. A company's debts or legal obligations.
13. The equity stake in a firm held by the firm's investors.
14. Earnings not paid out as dividends but retained by the firm to pay its debt or reinvest in firm.
15. Ease with which an asset can be converted to cash.

Items on the balance sheet are listed in order of **liquidity**¹⁵, or the length of time it takes to convert them to cash. The longest term items are listed last because they are the least liquid. On the right side, stockholders are listed last because they are the least liquid and will be paid in the event of bankruptcy only after all other debts have been satisfied. The values listed on a balance sheet are book values which are based on purchase price. Book values (purchase price) may be very different from market value (current fair market values).

Assets

Assets are divided by liquidity into two categories: **current assets**¹⁶ and **fixed assets**¹⁷. Current assets consist of cash, accounts receivable and inventories. These items can be expected to be converted to cash in under one year. Inventory includes raw materials, work-in-progress and actual product. Accounts receivable generate when a company sells its product to a customer but it is waiting to receive payment. Fixed assets are both tangible such as buildings, machinery and land and intangible such as patents. Companies also may hold investments in other companies or other securities. These assets are also included on the balance sheet and are listed in order of liquidity. The sum of all of these assets is a company's total asset number.

Liabilities and Equity

The right side of the balance sheet is for liabilities and equity and are also listed in order of liquidity. Liabilities are listed first and are money owed. **Current liabilities**¹⁸ are payments due within one year. Accounts payable are generated when a company makes a purchase for raw materials or advertising but does not pay for it immediately. Listed next are longer term liabilities such as notes payable and accruals. Accruals are wages owed to employees and taxes owed to the government. Notes payable are loans taken out by the company. These may also be longer term and listed under long term debt.

The equity component includes Shareholder's Equity and Retained Earnings. Retained earnings are the cumulative amount of earnings earned by a firm since inception that have not been paid out as dividends. Retained earnings are not cash but rather earnings used to finance corporate activities. Stockholder's equity is stockholder's claim on the firm. The sum of common stock and retained earnings is called 'common equity' or simply equity. Sometimes common equity is also referred to as net worth, a company's assets net of its liabilities. A pro-forma balance sheet is shown in [Figure 4.2 "Pro-Forma Balance Sheet"](#).

Figure 4.2 Pro-Forma Balance Sheet

16. Items that can be expected to be converted to cash in under one year.
17. Items not expected to be converted to cash in under one year.
18. Liability items that are expected to be converted to cash in under one year.

KEY TAKEAWAYS

- A balance sheet is a snapshot of a company's financial position.
- Balance sheet lists assets on the left side and liabilities and shareholder's equity on the right.

EXERCISES

1. Review the following 10-K statements

a. Here is a link to Nike's 10-K.

[http://nike.q4cdn.com/
25140a27-0622-47e1-9f85-99892a766984.pdf?noexit=true](http://nike.q4cdn.com/25140a27-0622-47e1-9f85-99892a766984.pdf?noexit=true)

Look at the Balance Sheet on page 57. Can you identify current assets? Current liabilities? Shareholder's equity?

b. Here is a link to Starbucks's 2011 10-K.

[http://investor.starbucks.com/
phoenix.zhtml?c=99518&p=irol-
SECText&TEXT=aHR0cDovL2lyLmludC53ZXN0bGF3Yn
VzaW5lc3MuY29tL2RvY3VtZW50L3YxLzAwMDExOTM
xMjUtMTUtMzE3MTc1L3htbA%3d%3d#toc232803_21](http://investor.starbucks.com/phoenix.zhtml?c=99518&p=irol-SECText&TEXT=aHR0cDovL2lyLmludC53ZXN0bGF3YnVzaW5lc3MuY29tL2RvY3VtZW50L3YxLzAwMDExOTMxMjUtMTUtMzE3MTc1L3htbA%3d%3d#toc232803_21)

Look at the Balance Sheet on page 44. Can you identify total assets? Total liabilities? Shareholder's equity?

2. Last year Sun Skateboards had \$80,000 in current assets and \$95,000 in current liabilities. It had \$40,000 in fixed assets. Determine the amount of shareholder's equity and construct a balance sheet for Sun Skateboards.

4.3 Cash Flow Statement

PLEASE NOTE: This book is currently in draft form; material is not final.

LEARNING OBJECTIVES

1. Describe what a statement of cash flows is.
2. Explain how to read a cash flow statement.
3. Describe what factors influence a cash flow statement.

The ability to generate cash is vital to the success of a company. The statement of cash flows is a summary of cash flows over the period of time reported. Cash flows are the difference between what a company brings in and what it pays out. Companies need to generate enough income from operations to fund the future growth of the firm and any future investments in capital or securities and provide a solid investment for investors.

The statement of cash flows includes cash flows from operating, investing and financing cash flows. **Operating cash flows**¹⁹ are cash flows provided from normal business operations. Operating cash flows also accounts for non-cash items such as depreciation and the change in working capital. **Investing cash flows**²⁰ are cash flows received from investments such as the buying and selling of fixed assets in our own firm or financial investments in other firms. **Financing cash flows**²¹ are those received from financing activities. This includes debt such as principal payments on loans, equity or selling investments. This section also includes dividend payments and stock repurchases.

19. Revenues generated from the operations of a company. Generally defined as revenues less all operating expenses.
20. Cash flows received from investments or other non-day to day activities.
21. Cash flows generated from external activities.

Cash flow from operating activities can be either positive or negative: when a firm earns revenue, cash flows are positive, when it pays expenses, cash flows are negative. Of great importance to investors is the ability of the firm to generate positive cash flow. If not, survival will not be for long. A pro-forma statement of cash flows is shown in [Figure 4.3 "Pro-Forma Statement of Cash Flows"](#).

Figure 4.3 Pro-Forma Statement of Cash Flows

KEY TAKEAWAYS

- Cash flows are vital to the health of a business.
- The statement of cash flows consists of cash from operating, investing and financing activities.

EXERCISES

1. Review the following 10-K statements

a. Here is a link to Nike's 10-K.

[http://nike.q4cdn.com/
25140a27-0622-47e1-9f85-99892a766984.pdf?noexit=true](http://nike.q4cdn.com/25140a27-0622-47e1-9f85-99892a766984.pdf?noexit=true)

Look at the Statement of Cash Flows on page 58. Can you identify the cash from operating activities? From financing activities? From investing activities?

b. Here is a link to Starbucks's 2011 10-K.

[http://investor.starbucks.com/
phoenix.zhtml?c=99518&p=irol -
SECText&TEXT=aHR0cDovL2lyLmludC53ZXN0bGF3Yn
VzaW5lc3MuY29tL2RvY3VtZW50L3YxLzAwMDExOTM
xMjUtMTFtMzE3MTc1L3htbA%3d%3d#toc232803_21](http://investor.starbucks.com/phoenix.zhtml?c=99518&p=irol-SECText&TEXT=aHR0cDovL2lyLmludC53ZXN0bGF3YnVzaW5lc3MuY29tL2RvY3VtZW50L3YxLzAwMDExOTMxMjUtMTFtMzE3MTc1L3htbA%3d%3d#toc232803_21)

Look at the Statement of Cash Flows on page 45. Can you identify cash from operating activities? Cash from investing activities? Cash from financing activities?

2. Last year, Sun Skateboards had \$50,000 in operating cash flow, \$45,000 in financing cash flow and \$30,000 in investing cash flow. Generate a statement of cash flows for Sun Skateboards.

4.4 Other Statements

PLEASE NOTE: This book is currently in draft form; material is not final.

LEARNING OBJECTIVES

1. Define additional financial statements
2. Understand the importance of these additional financial statements.

Statement of Shareholder Equity

The **statement of shareholder equity**²² describes the changes to a company's equity section of the balance sheet over a year. This includes any equity account transactions such as retained earnings, common and preferred stock as well as other income. It shows the beginning balance, any additions or deductions and the ending balance of shareholder equity. A pro-forma statement of shareholder equity is shown in Figure 4.4 "Pro-Forma Statement of Shareholder Equity".

Figure 4.4 Pro-Forma Statement of Shareholder Equity

Statement of Retained Earnings

The **statement of retained earnings**²³ reports the change in retained earnings over a year. In essence it is an abbreviated form of the statement of shareholders equity. This statement explains the changes in retained earnings from net income (or loss) and from any dividends over a period of time. A pro-forma statement of retained earnings is shown in Figure 4.5 "Pro-Forma Statement of Retained Earnings".

Figure 4.5 Pro-Forma Statement of Retained Earnings

22. The changes to a company's equity section of the balance sheet over a year.

23. Abbreviated statement that states the changes to retained earnings over a year.

Notes to Financial Statements

Just as the endnotes to a paper or the notes in a margin of a novel may be the most important and thought provoking pieces, the **notes to financial statements**²⁴ may be the most interesting as well. Financial statements will often include explanatory notes about important parts of the statement. These notes provide more detailed information about the transactions occurring in the statements. Common issues discussed include income taxes, revenue discussion, details about fixed assets, pension plan details, stock options and debt terms. Since the passage of Sarbanes-Oxley the financial statement notes also include information about compliance to the law. Because these items can have an effect on the bottom line of a company these notes are very important to read.

KEY TAKEAWAYS

- Sometimes the most important information is not in the main financial statements. Be sure to look at all of the financial information—especially the notes! Management will explain (or try to explain!) the company's actions in places other than the main financial statements.
- Statement of Shareholder Equity describes any changes to the equity section of a firm's balance sheet over a year.
- Statement of retained earnings reports the change in retained earnings over the year.
- The notes to financial statements are also very important as they contain explanations about certain financial actions taken by the company.

24. Important information describing what occurs in financial statements.

EXERCISE

1. Review the following 10-K statements

a. Here is a link to Nike's 10-K.

http://investors.nikeinc.com/Theme/Nike/files/doc_financials/AnnualReports/2010/docs/NIKE_2010_10-K.pdf . Can you find the statement of shareholder equity? The statement of retained earnings? Any notes to financial statements?

b. Here is a link to Starbuck's 2011 10-K.

<http://investing.businessweek.com/research/stocks/financials/drawFiling.asp?docKey=136-000119312511317175-4GD90P5S78QNVSI18877OC4HLR&docFormat=HTM&formType=10-K>

What does the statement of retained earnings say about the company?

c. Here is a link to McDonald's 10-K.

http://www.aboutmcdonalds.com/mcd/investors/sec_filings.html

Can you find any notes to financial statements?

4.5 Ratio Analysis

PLEASE NOTE: This book is currently in draft form; material is not final.

LEARNING OBJECTIVES

1. Understand how to analyze financial statements.
2. Use the categories of ratios to gain knowledge about the strength of a company.

This Sunday's paper has a big ad for a toolbox. Jim was impressed and wanted to buy one for her father. Inside of it were all kinds of things: screwdrivers, hammers, pliers, etc. Some items looked easy to use (hammer and screwdriver), while some items looked a bit more complicated (this big heavy looking drill). This toolbox had a bunch of incredibly useful stuff in it and Jim knew his dad knew how to use all of it.

Ratio analyses are also tools. They can be very useful, if you know how to properly use them (like Jim's father) or dangerous if you don't (like Jim). Some are easy to understand, others a bit more complicated. Instead of the toolbox from the newspaper ad, in this section we focus on the financial manager's toolkit and the items inside.

Ratio analysis²⁵ is one of the most important tools for evaluating a company's financial health (and it can be fun too!). It's not just about calculating ratios, it's about interpretation of the ratios and seeing changes, opportunities and threats. Ratios are only as good as the mind (yours) that analyzes them.

Ratios are divided into categories depending on what they analyze. The first category is Liquidity Ratios.

Liquidity Ratios

Liquidity ratios²⁶ measure the ability of a business to meet its short-term financial obligations. These ratios are associated with a firm's working capital.

25. A quantitative tool used to analyze a company's financial statements.

26. Ratios that measure the ability of a company to meet its short-term financial obligations.

Current Ratio

Our first ratio is called the **current ratio**²⁷. This is computed by dividing current assets by current liabilities. The current ratio measures the ability of a company to repay its current liabilities.

$$\text{Current Ratio} = \frac{\text{Total Current Assets}}{\text{Total Current Liabilities}}$$

Quick Ratio (Acid Test)

A second liquidity ratio is the **Quick Ratio**²⁸ also known as the “acid test”. It was given the nickname “acid test” after a method used by gold miners to confirm their nuggets were real gold. Nuggets gold miners discovered were dipped in acid. Most metals will dissolve in acid and fail the test—except the real deal: gold. Financially, the ‘acid test’ measures the ability of a firm to pay its liabilities with the real deal: cash. The acid test measures if a company can pay its current liabilities without relying on the sale of its inventory. In the acid test, we subtract inventories from current assets and then divide by current liabilities. The acceptance range for the actual value depends on the industry but a quick ratio greater than 1 is usually recommended. The quick ratio is a better measure when a firm’s inventory cannot quickly be converted to cash. If a firm has inventory that is liquid, the current ratio is preferred.

$$\text{Quick Ratio} = \frac{\text{Total Current Assets} - \text{Inventories}}{\text{Total Current Liabilities}}$$

Asset Management Ratios

The second category is **asset management ratios**²⁹ (or activity ratios) which measure how well a firm manages its assets.

First, let’s discuss averages. For many of the asset management ratios, we use an average. In some cases average sales, average inventory or average purchases. For these numbers we are looking for an average per day. In each of these situations, to calculate the average per day take the annual number (year end) and divide by 365. Some textbooks use 360 to simplify the math but we use 365 here. For example here’s a calculation for average sales:

$$\text{Average Sales} = \frac{\text{Annual Sales}}{365}$$

27. Current assets divided by current liabilities.

28. Current assets less inventories divided by current liabilities.

29. Ratios used to measure the effectiveness of a firm in managing its assets.

That's it! So any time you see an average in the next section remember to divide the annual number by 365.

Inventory Turnover Ratio

The **inventory turnover ratio**³⁰ tells how many times during a year the firm's inventory is bought and sold. Once again, this ratio is industry specific but a relatively high ratio is preferred. This result is most meaningful when compared to competitors and can be influenced by technology and distribution techniques.

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

Another meaningful measure is **average age of inventory**³¹. This is easily converted from the inventory turnover ratio by dividing the inventory turnover ratio into 365. Note that this is a different calculation than the averages computed above.

$$\text{Average Age of Inventory} = \frac{365}{\text{Inventory Turnover Ratio}}$$

Average Payment Period

The **average payment period**³² measures how long it takes a company to pay its suppliers. It is calculated by dividing accounts payable by the average purchases per day. If average payment period increases then cash should increase as well. Companies usually pay their biggest suppliers first and some companies will pay faster to take advantage of trade discounts.

$$\text{Average Payment Period} = \frac{\text{Accounts Payable}}{\text{Average Purchases per Day}}$$

Receivables Turnover Ratio

The **receivables turnover ratio**³³ is the other side of the coin. It measures how effective the company is in collecting money owed to them or how efficient they are in extending credit and collecting debts. It is the total revenue divided by the average receivables. Obviously we would like to get our money and sooner is better than later!

$$\text{Receivables Turnover Ratio} = \frac{\text{Sales}}{\text{Average Receivables}}$$

30. How many times during a year a firm's inventory is bought and sold. Defined as the cost of goods sold divided by the average inventory.

31. Defined as 365 divided by the inventory turnover ratio.

32. Measures how long it takes a company to pay its suppliers. Defined as accounts payable divided by average purchases per day.

33. Measures how effective a company is in collecting money owed to them. Defined as sales divided by accounts receivable.

Total Asset Turnover Ratio

Total asset turnover ratio³⁴ gives us an idea how effectively a firm uses its assets to generate sales. It is computed by dividing total revenues by total assets for the same time period. If the asset turnover ratio is relatively high, then the firm is efficiently using its assets to generate sales. If it is relatively low, then the firm is not using assets effectively and may want to consider selling some assets if sales do not increase.

$$\text{Total Asset Turnover} = \frac{\text{Sales}}{\text{Total Assets}}$$

Fixed Asset Turnover Ratio

Sometimes we also calculate the turnover on just our fixed assets such as plant and equipment. Because variable costs vary (that's why they are variable costs!) these costs have different impacts on financial statements. **Fixed asset turnover**³⁵ focuses on our long term assets and is calculated by dividing sales by net fixed assets (remember net means with depreciation taken out).

$$\text{Fixed Asset Turnover} = \frac{\text{Sales}}{\text{Net Fixed Assets}}$$

Debt Management Ratios

Debt management ratios³⁶ measure how much a firm uses debt as a source of financing. When a company uses debt financing, they use other people's money to finance their business activities. Debt has higher risk but also the potential for higher return. Debt has an impact on a company's financial statements. The more debt a company uses, the greater the financial leverage. Because with debt the stockholders maintain control of the firm, the more debt a company uses, the greater the financial leverage and the greater the returns to stockholders. With the debt ratios we try to measure the indebtness the firm which gives us an idea of the riskiness of the firm as an investment. There are two types of measures of debt usage. The first is the ability of the company to pay back its debts. The second is the degree of the indebtness of the firm. The first measure of the amount of debt a firm has is the debt ratio.

Debt Ratio

The **debt ratio**³⁷ is the ratio of debts to assets (in actuality total liabilities to total assets). It measures the percentage of funds provided by current liabilities and by long-term debt. Creditors prefer low debt ratios because a low ratio indicates that

34. A measure of how effective a firm is in using its assets to generate sales. Defined as sales divided by total assets.

35. A measure of how effective a firm is in using its fixed assets to generate sales. Defined as sales divided by total assets.

36. Calculate how much a firm uses debt as a source of funding.

37. The ratio of debt to assets. Defined as total liabilities divided by total assets.

the firm has plenty of assets to pay back its debts. In other words, the firm has a financial ‘airbag’ in case of an accident which will protect against a creditor’s losses in the event of bankruptcy. On the other hand, a stockholder may prefer a higher ratio because that indicates the firm is appropriately using leverage which magnifies the stockholder’s return. Simply put, the debt ratio is a percent. It is the percent of financing in the form of liabilities and is an indicator of financial leverage.

$$\text{Debt Ratio} = \frac{\text{Total Liabilities}}{\text{Total Assets}}$$

Debt-Equity Ratio

A close cousin of the debt ratio and another version of the indebtedness of a firm is the **debt-equity ratio**³⁸. The debt-equity ratio presents the information in a slightly different way. It subtracts total liabilities from total assets in the denominator. This calculation is easy to comprehend because it shows us dollars of debt for every dollar of equity.

$$\text{Debt-Equity Ratio} = \frac{\text{Total Liabilities}}{(\text{Total Assets} - \text{Total Liabilities})}$$

Times-Interest-Earned (TIE, or the Ability to Pay Interest or Interest Coverage Ratio)

The first measure of how able a firm is to pay back its debt is the **time-interest-earned**³⁹ or TIE. TIE measures the extent to which operating income can decline before the firm is unable to meet its annual interest costs. It is determined by dividing earnings before interest and taxes by interest expense. If a company fails to meet their interest payments then they can be sought after by creditors. The higher the number the more able a firm is to pay back its debts. A value of at least 3.0 or preferably closer to 5.0 is preferred. (leave in?) The TIE number give us a percentage which is the percent that EBIT could fall by and the firm would still be able to make its interest payments.

$$\text{Times-Interest-Earned} = \frac{\text{EBIT}}{\text{Interest Expense}}$$

EBITDA Coverage Ratio

Another measure of a firm’s ability to pay back debt is **EBITDA coverage ratio**⁴⁰. The EBITDA Coverage ratio improves upon the TIE ratio because it includes lease payments and because more cash is available for debt than just EBIT. This ratio is

38. The ratio of dollars of debt for every dollar of equity. Calculated by total liabilities divided by the difference between total assets and total liabilities.

39. A measure of the firm’s ability to pay interest. Is EBIT divided by interest expense.

40. Improves upon TIE by including other variables such as lease payments. It is calculated by the sum of EBITDA and lease payments divided by the sum of interest plus principal payments plus lease payments.

most useful for short-term lenders because over the short-term depreciation funds can be used to pay off debt.

$$\text{EBITDA Coverage Ratio} = \frac{(\text{EBITDA} + \text{Lease Payments})}{(\text{Interest} + \text{Principal Payments} + \text{Lease Payments})}$$

Fixed Payments Coverage Ratio

Another way to measure risk and the firm's ability to pay back its debtors is the **fixed-payments coverage ratio**⁴¹. This ratio measures the firm's ability to payback all of its fixed-payment obligations such as loans and leases. The higher the value the better as that indicates the more the firm is able to cover its fixed payments. The lower the ratio, the greater the risk to lenders and owners.

$$\text{Fixed Payments Coverage Ratio} = \frac{\text{EBITDA}}{\text{Interest} + \text{Lease Payments} + \{(\text{Principal Payments})\}}$$

Profitability Ratios

We love to focus on profit, the so called 'bottom line'. Ratio analysis helps us to put our profit number into context. These ratios used together can help give a clear picture of the profitability of a firm.

Profit Margin

Profit margin⁴² is the amount of profit left over from each dollar of sales after expenses are paid. The higher the number the better as it indicates that the firm retains more of each sales dollar.

$$\text{Profit Margin} = \frac{\text{Sales} - \text{Cost of Goods Sold}}{\text{Sales}}$$

Operating Profit Margin

Operating profit margin⁴³ only uses operating expenses to calculate. It does not consider items such as depreciation, interest or taxes. In this case, higher is also better.

$$\text{Operating Profit Margin} = \frac{\text{Operating Profits}}{\text{Sales}}$$

41. Measures the firm's ability to payback all of its fixed-payment obligations such as loans and leases.

42. The amount of profit left over after all expenses are paid. Defined by the difference between sales and cost of goods sold divided by sales.

43. Profit margin using only operating expenses. Defined as operating profits divided by sales.

Net Profit Margin

Net profit margin⁴⁴ is the percentage of each sales dollar that remains after all expenses have been deducted. Expenses including interest, taxes and preferred stock dividends. This can sometimes be referred to as net profits after taxes divided by sales. In this situation, higher is also better but what is considered a 'good' profit margin varies greatly across industries.

$$\text{Net Profit Margin} = \frac{\text{Earnings Available for Common Stockholders}}{\text{Sales}}$$

Earnings Per Share

Earnings per share⁴⁵ are the amount of earnings generated by each share of stock. It is not necessarily the amount of earnings actually paid out per each share (that's dividends per share). Earnings per share is the dollars earned for each share of stock.

$$\text{Earnings Per Share} = \frac{\text{Earnings Available for Common Stockholders}}{\text{Number of Shares of Common Stock Outstanding}}$$

Basic Earning Power (BEP)

Basic Earning Power⁴⁶ shows the raw earning power of the firm before the influence of taxes and leverage. This is helpful to analyze because firms have very different financing and tax situations.

$$\text{Basic Earning Power} = \frac{\text{EBIT}}{\text{Total Assets}}$$

Return on Equity (ROE)

Two of our favorite (and most famous—if a ratio can be famous) ratios are ROE and ROA. Both ratios are return on an outlay. **Return on Equity**⁴⁷ is the ratio of net income to total equity. This ratio tells us the return investors are earning on their investment. The higher the ratio better.

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Common Equity}}$$

44. Percentage of each dollar that remains after all expenses have been paid. Calculated by earnings available for common stockholders divided by sales.

45. The amount of earnings generated by each share of stock. It is earnings available for common stockholders divided by number of shares of common stock outstanding.

46. The raw earning power of the firm before taxes and leverage. It is EBIT divided by total assets.

47. The return investors are earning on their investment. Defined as net income divided by common equity.

Return on Assets (ROA)

Return on Assets⁴⁸ is the ratio of net income to total assets. This measures the managers overall effectiveness in creating profits with the firms' assets. The higher the ratio the better.

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Total Assets}}$$

Market Value Ratios (Investment Valuation Ratios)

Market Value Ratios⁴⁹ relate a firm's value as measured by stock price to other accounting measures such as earnings and cash flow. These are a way to measure the value of a company's stock relative to another company's stock.

Price/Earnings Ratio

Price / Earnings ratio⁵⁰ is used to show how much investors are willing to pay per dollar of profits.

$$\text{Price/Earnings Ratio} = \frac{\text{Price per share of stock}}{\text{Earnings per share of stock}}$$

Price/Cash Flow Ratio

Cash is king as we stated before. A company's stock price is dependent on its ability to generate and manage cash. A useful ratio is **Price / Cash Flow**⁵¹ which analyzes the company's ability to generate cash.

$$\text{Price/Cash Flow Ratio} = \frac{\text{Price Per Share}}{\text{Cash Flow Per Share}}$$

Market Book Ratio

Market book ratio⁵² is a measure of investor's evaluation of firm performance. It relates the market value of the firm to the book value of the firm. The market value is the firm's current value while the book value is an accounting measure. First the **book value per share**⁵³ of stock is calculated.

$$\text{Book Value Per Share of Stock} = \frac{\text{Common Stock Equity}}{\text{Number of Shares of Stock Outstanding}}$$

- 48. The return managers are earning on assets. Defined by net income divided by total assets.
- 49. These ratios relate a firm's value (measure by stock price) with other variables.
- 50. Shows how much investors are willing to pay per dollar of profit. Calculated by dividing the price per share by the earnings per share of stock.
- 51. Measures the ability of the company to generate cash. Defined as the price per share divided by the cash flow per share.
- 52. Measures the market value of the firm to the book value. Defined as market value per share of stock divided by the book value per share of stock.
- 53. Is the commons stock equity divided by the number of shares of stock outstanding.

This is then substituted in to calculate the Market/Book ratio

$$\text{Market Book Ratio} = \frac{\text{Market Value per share of common stock}}{\text{Book Value per share of common stock}}$$

If a firm is expected to earn a high return relative to its risk will most often sell at a higher Market/Book multiple.

KEY TAKEAWAYS

- Ratio analysis helps analyze the financial strength of a company
- The main categories of ratio analysis are liquidity, debt management, asset management, profitability and market value.

EXERCISE

1. Refer back to the Nike 10-K. What is their Quick Ratio? What is Nike's ROE? Debt ratio? Do the same for Starbucks.

4.6 Final Thoughts on Ratio Analysis

PLEASE NOTE: This book is currently in draft form; material is not final.

LEARNING OBJECTIVES

1. The DuPont equation combines ROE and ROA.
2. Comments and limitations on ratio .

DuPont Equation

The **DuPont equation**⁵⁴ is a handy way to analyze a company's financial position by merging the balance sheet and income statement using measures of profitability. DuPont merges ROA and ROE. ROA is now defined using two other ratios we calculated: net profit margin and total asset turnover. ROA was calculated as net income divided by total assets.

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Total Assets}}$$

ROE was calculated as net income divided by earnings available to shareholders (common equity).

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Common Equity}}$$

The DuPont equation defines ROA as follows:

$$\text{ROA} = \text{Net Profit Margin} \times \text{Total Asset Turnover}$$

Remembering that net profit margin is earnings available for shareholders divided by sales and total asset turnover is sales divided by total assets, we can make the following substitutions:

54. Merges ROA and ROE. Breaks it down into profit on a company's sales and return on a company's assets.

$$\text{ROA} = \frac{\text{earnings available for shareholders}}{\text{sales}} \times \frac{\text{sales}}{\text{total assets}}$$

From this we see that sales will cancel out and ROA will become earnings available for shareholders divided by total assets.

$$\text{ROA} = \frac{\text{earnings available for shareholders}}{\text{total assets}}$$

This will give us the same number for ROA that was calculated using the original formula. However, the DuPont equation breaks it down into two components: profit on a company's sales and return to the use of a company's assets.

Trend Analysis, Comparative Ratios and Benchmarking

Just as important as the actual numbers is the numbers value over time. Trends in ratios tell us a lot about a company and can indicate if a company is trending favorably or unfavorably. Just as time series data is important—so is cross-sectional. We may have what we consider a fantastic ratio, but it may be low for our industry. Ratios are particularly useful to compare to other companies and competitors. Ratios are available for industries and a company can see how it compares to its competitors.

Uses and Limitations of Ratio Analysis

Ratios are only as good as the head who analyzes them. They can be incredibly helpful tools when used properly and create horrible mistakes if misused.

1. A single ratio is generally not enough to judge the overall performance of the firm.
2. Ratios should be used at the same time for each year.
3. Be sure to use audited financial statements.
4. Be aware of different accounting treatments behind the financial data and ratios.

KEY TAKEAWAYS

- Ratio analysis is an important and can be fun tool to use to analyze the financial health of a company. More than just plugging into equations is the actual analysis of a company. Understanding what the ratios tell us and putting them into context is as important as getting the correct number out of the formula.
- The DuPont equation combines ROA and ROE to analyze a company.
- Putting the numbers in context is as important as getting the correct number. Looking at ratios over time and versus competitors gives us insight into the company's financial health.

EXERCISES

1. Calculate the DuPont equation from the following data.
2. Review the company's performance given the following time series and cross-sectional data.

4.7 Worked Problem: CABS Inc.

PLEASE NOTE: This book is currently in draft form; material is not final.

LEARNING OBJECTIVES

1. See ratio analysis in work!
2. Calculate and analyze ratios for a fictional company.

CABS Example

CABS Inc. is a fictional company that makes custom invitations and cards. Below are their financials.

Figure 4.6 CABS, Inc. Balance Sheet

Figure 4.7 CABS, Inc. Income Statement

Figure 4.8 CABS, Inc. Statement of Cash Flows

Figure 4.9 CABS, Inc. Other Data

In this section we pick some *key ratios* to calculate for CABS. Then we will analyze using data over time and versus competitors.

Liquidity Ratios

The two liquidity ratios are the Current Ratio and the Quick Ratio. Both are important to calculate.

Current Ratio

To calculate the current ratio we take the current assets number from the balance sheet and divide it by the current liabilities number, also from the balance sheet. For CABS the calculation is:

$$\text{Current Ratio} = \frac{\text{Total Current Assets}}{\text{Total Current Liabilities}} = \frac{315.7}{169.5} = 1.86$$

Quick Ratio

To calculate the quick ratio we take three numbers from the balance sheet: current assets, inventories and current liabilities.

$$\text{Quick Ratio} = \frac{\text{Total Current Assets} - \text{Inventories}}{\text{Total Current Liabilities}} = \frac{315.7 - 33.6}{169.5} =$$

Asset Management Ratios

Asset management ratios calculate how efficiently the firm uses its assets. Here we calculate average sales per day, total asset turnover and fixed asset turnover.

Average Sales per Day

Average sales per day takes the sales number from the income statement and divides it by 365.

$$\text{average sales} = \frac{\text{annual sales}}{365} = \frac{1680.0}{365}$$

Total Asset Turnover

Total asset turnover is computed by dividing the sales number from the income statement by the total asset number from the balance sheet.

$$\text{Total Asset Turnover} = \frac{\text{Sales}}{\text{Total Assets}} = \frac{1680.0}{458.2} = 3.66$$

Fixed Asset Turnover

Fixed asset turnover focuses just on the fixed assets (for example a factory). It divides the sales number from the income statement by the net fixed assets (note: net!) from the balance sheet.

$$\text{Fixed Asset Turnover} = \frac{\text{Sales}}{\text{Net Fixed Assets}} = \frac{1680.0}{142.5}$$

Debt Ratios

Debt management ratios measure the indebtedness of the firm. The key ratios we analyze here are the debt ratio, debt-equity and TIE.

Debt Ratio

The debt ratio simply divides two numbers from the balance sheet: total liabilities divided by total assets.

$$\text{Debt Ratio} = \frac{\text{Total Liabilities}}{\text{Total Assets}} = \frac{242.1}{458.2} = 0.52$$

Debt-Equity Ratio

The debt-equity ratio changes the denominator by subtracting total liabilities. Debt-equity also uses total assets and total liabilities from the balance sheet.

$$\text{Debt-Equity Ratio} = \frac{\text{Total Liabilities}}{(\text{Total Assets} - \text{Total Liabilities})} = \frac{242.1}{458.20 - 242.1}$$

TIE

TIE measures the ability of a firm to pay back its debt. It uses EBIT and interest expense from the income statement.

$$\text{Times-Interest-Earned} = \frac{\text{EBIT}}{\text{Interest Expense}} = \frac{222.6}{25}$$

Profitability Ratios

Debt management ratios measure the indebtedness of the firm. The key ratios we analyze here are the debt ratio, debt-equity and TIE.

Profit Margin

The amount of money left over after all expenses are paid. It uses sales and cost of goods sold from the income statement.

$$\text{Profit Margin} = \frac{\text{Sales} - \text{Cost of Goods Sold}}{\text{Sales}} = \frac{1680.0 - 910.4}{1680.0} = 0.4$$

Operating Profit Margin

Operating profit margin is a better measure of the actual profit from operations because it ignores items such as depreciation. It is operating profits (EBIT) divided by sales. Both numbers come from the income statement.

$$\text{Operating Profit Margin} = \frac{\text{Operating Profits (EBIT)}}{\text{Sales}} = \frac{222.6}{1680.0} = 0.1$$

Net Profit Margin

Net profit margin is the percentage of each sales dollar that remains after all expenses have been deducted. It is calculated by dividing earnings (net income) by sales. Both numbers come from the income statement.

$$\text{Net Profit Margin} = \frac{\text{Earnings Available for Common Stockholders}}{\text{Sales}} =$$

Earnings Per Share

Is the amount of earnings generated by each share of stock. It is calculated by dividing earnings by the number of shares of stock.

$$\text{Earnings Per Share} = \frac{\text{Earnings Available for Common Stockholders}}{\text{Number of Shares of Common Stock Outstanding}}$$

Basic Earning Power (BEP)

Basic Earning Power is earning power of the firm before taxes and leverage. It is calculated by dividing EBIT from the income statement by total assets from the balance sheet.

$$\text{Basic Earning Power} = \frac{\text{EBIT}}{\text{Total Assets}} = \frac{222.6}{458.2} = 0.49$$

Return on Equity (ROE)

Return on Equity is the ratio of net income to total equity. It is calculated by dividing net income from the income statement by equity, from the balance sheet.

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Common Stock Equity}} = \frac{118.6}{216.1} = 0.55$$

Return on Assets (ROA)

Return on Assets is the ratio of net income to total assets. This is calculated by dividing net income from the income statement by total assets from the balance sheet.

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Total Assets}} = \frac{118.6}{458.2} = 0.26$$

Market Value Ratios (Investment Valuation Ratios)

Market Value Ratios are a way to measure the value of a company's stock relative to another company's stock. Here we focus on P/E ratio and market book ratio.

Price/Earnings Ratio

Price / Earnings ratio is used to show how much investors are willing to pay per dollar of profits. It is calculated by dividing the price per share of stock (in the other information section) by the earnings per share (calculated earlier).

$$\text{Price/Earnings Ratio} = \frac{\text{Price per share of stock}}{\text{Earnings per share of stock}} = \frac{149}{19.77} = 7.54$$

Market Book Ratio

Market book ratio is a measure of investor's evaluation of firm performance. First the book value per share of stock is calculated using the common equity number from the balance sheet and dividing it by the number of shares outstanding from the other information.

$$\text{Book Value Per Share of Stock} = \frac{\text{Common Stock Equity}}{\text{Number of Shares of Stock Outstanding}}$$

This is then substituted in to calculate the Market/Book ratio. This equation uses the market price (selling price) per share of stock from the other information section and the book value calculated above.

$$\text{Market Book Ratio} = \frac{\text{Market Value per share of common stock}}{\text{Book Value per share of common stock}} = \frac{149}{36.0}$$

Comparison Information

Below is a table summarizing the numbers we just calculated in the CABS 2011 column. The table also includes CABS data from last year and also the industry average for 2011.

Figure 4.10 CABS, Inc. Averages

How do you think CABS is doing financially? How are they doing versus other players in their industry?

KEY TAKEAWAYS

- Ratio analysis is easy and fun! It's just a matter of knowing what number to put where. Practice makes perfect!
- Comparing ratios over time and against competitors is an interesting way to analyze a company. It is as much of an art as it is a science.

EXERCISES

1. Calculate the following ratios from the data for CABS (these were not calculated above):
 - a. DuPont equation
 - b. Inventory turnover
 - c. average age of inventory
 - d. average payment period
 - e. net profit
2. Review the 10-K for Starbucks again. Compute some ratios for Starbucks. Then find some already computed ratios on yahoo.finance. Did you get the same numbers as an analyst? Why or why not?

4.8 End-of-Chapter Assessment

End-of-Chapter Assessment Head

First paragraph.

Paragraph.

Paragraph.

Last paragraph.

End-of-Chapter Assessment Head

- 1.
- 2.
- 3.
- 4.
- 5.

End-of-Chapter Assessment Head

1.

- a.
- b.
- c.
- d.
- e.

2.

- a.
- b.
- c.
- d.
- e.

3.

- a.
- b.
- c.
- d.
- e.