



CHAPTER 2

Introduction to Financial Statement Analysis

Chapter Synopsis

2.1 Firms' Disclosure of Financial Information

Publicly listed companies around the world are required to file their financial statements with the relevant listing authorities. For example, U.S. companies with publicly traded securities are required to file financial statements with the Securities and Exchange Commission (SEC). Firms must also include financial statements in the annual report provided for shareholders. The statements must conform to Generally Accepted Accounting Principles (GAAP) or accounting standards and be audited by an independent third-party accounting firm. Investors, financial analysts, managers, and other interested parties such as creditors rely on financial statements to obtain reliable information about a corporation.

The production of financial statements to satisfy reporting requirements is called financial reporting. Firms may also produce different financial statements for the taxation authorities in what is known as tax reporting. For financial reporting, companies are required to produce four financial statements: the balance sheet, the income statement, the statement of cash flows, and the statement of changes in shareholders' (or stockholders') equity.

2.2 The Balance Sheet

The **balance sheet**, or **statement of financial position**, lists the firm's assets and liabilities at a point in time and is divided into two parts (or sides): **assets** and **liabilities and shareholders' equity**. Assets are broken into two categories:

- **Current assets** include cash and assets that can be converted into cash within one year, such as marketable securities, accounts receivable, and inventory.
- **Long-term (or non-current) assets** include property, plant, and equipment, and machinery. **Depreciation** is deducted from the value of long-term assets every year. Depreciation is

not an actual cash expense but reduces an asset's **book value (or carrying amount)**, which equals the price paid for the assets minus accumulated depreciation from prior years.

Total assets = total current assets + book value of long-term assets. The liabilities and shareholders' equity side of the balance sheet shows the firm's obligations to creditors as well as shareholders' equity; it includes:

- **Current liabilities** are obligations that will be paid within one year, such as accounts payable, notes payable, and deferred expenses. **Net working capital** is the difference between current assets and current liabilities.
- **Long-term liabilities** include loans longer than one year and capital leases that obligate a firm to make payments to use a long-term asset.
- **Shareholders' equity**, also known as **book value of equity** or **net worth**, is defined as the difference between total assets and total liabilities in the balance sheet equation:

The Balance Sheet Equation

$$\text{Assets} = \text{Liabilities} + \text{Shareholders' Equity}$$

The book value of equity is distinct from the **market value of equity**, or stock **market capitalization**, which equals the current share price times the number of shares outstanding. The market value of equity is generally different because the book value of assets does not perfectly match the market value of the assets and because many of the firm's intangible assets are not captured on the balance sheet at all, such as its ability to manufacture a proprietary software product.

2.3 Balance Sheet Analysis

Useful measures based on balance sheet information include:

$$\text{Market-to-Book Ratio} = \frac{\text{Market Value of Equity}}{\text{Book Value of Equity}}$$

$$\text{Debt-Equity Ratio} = \frac{\text{Total Debt}}{\text{Total Equity}}$$

$$\text{Enterprise Value} = \text{Market Value of Equity} + \text{Debt} - \text{Cash}$$

Variations in the **market-to-book** ratio reflect differences in firm characteristics, such as the industry in which it operates, as well as its growth prospects and the value added by management. The **debt-equity** ratio is commonly used to assess a firm's **leverage (gearing)**, or the extent to which it relies on debt as a source of financing. As discussed later in the text, a firm's debt-equity ratio has important consequences for the risk and return of its shares, as well the probability of it encountering financial distress. The **enterprise value** of a firm can be used to assess the value of the firm's assets, unencumbered by debt and separate from any cash and marketable securities.

2.4 The Income Statement

The income statement reports a firm's revenues and expenses over a period of time and has the following general form.

	Sales revenue
-	Cost of goods sold (COGS)
=	Gross profit
-	Selling, general and administrative costs (SG&A)
-	Research and development (R&D)
=	Earnings before interest, taxes, depreciation and amortization (EBITDA)
-	Depreciation and amortization
=	Earnings before interest and taxes (EBIT)
-	Interest expense
=	Earnings before taxes (EBT)
-	Taxes
=	Net income

Earnings per share (EPS), which equals (net income) ÷ (shares outstanding), can be measured based on the current amount of shares outstanding or on a fully diluted basis, in which the denominator includes the number of shares that would be issued if all employee share options were exercised and convertible bonds were converted to stock.

2.5 Income Statement Analysis

Useful ratios based on income statement information include:

$$\text{Net Profit Margin} = \frac{\text{Net Income}}{\text{Sales}}$$

$$\text{Return on Equity (ROE)} = \frac{\text{Net Income}}{\text{Book Value of Equity}}$$

$$\text{Price-to-Earnings (P/E) Ratio} = \frac{\text{Market Capitalization}}{\text{Net Income}} = \frac{\text{Share Price}}{\text{Earnings per Share}}$$

Profitability ratios, such as the net profit margin and ROE, are an indication of a firm's efficiency and its pricing strategy. Valuation ratios, such as the P/E ratio and the market-to-book ratio, tend to be high for **growth stocks**, which are expected to have high earnings growth, and to be low for **value stocks**, which have low growth prospects.

The determinants of a firm's ROE can be analyzed using a tool called the **DuPont Identity**, named for the company that popularized its use. The DuPont Identity expresses the ROE in terms of the firm's profitability, asset efficiency, and leverage.

$$\text{ROE} = \underbrace{\left(\frac{\text{Net Income}}{\text{Sales}} \right)}_{\text{Net Profit Margin}} \times \underbrace{\left(\frac{\text{Sales}}{\text{Total Assets}} \right)}_{\text{Asset Turnover}} \times \underbrace{\left(\frac{\text{Total Assets}}{\text{Total Equity}} \right)}_{\text{Equity Multiplier}}$$

The first term in the DuPont Identity is the firm's net profit margin, which measures its overall profitability. The second term is the firm's **asset turnover**, which measures how efficiently the firm is utilizing its assets to generate sales. The final term is a measure of leverage called the **equity multiplier**, which indicates the value of assets held per euro or dollar of shareholder equity. The equity multiplier will be higher the greater the firm's reliance on debt financing.

Analysts use a number of ratios to gauge the market value of the firm. The most common is the firm's price-earnings ratio (P/E).

$$\text{P/E Ratio} = \frac{\text{Market Capitalization}}{\text{Net Income}} = \frac{\text{Share Price}}{\text{Earnings per Share}}$$

The P/E ratio is used to assess whether a stock is over- or undervalued based on the idea that the value of a stock should be proportional to the level of earnings it can generate for its shareholders. P/E ratios tend to be higher for firms with high growth rates.

2.6 The Statement of Cash Flows

The statement of cash flows reclassifies information reported on the balance sheet and income statement and specifies the impact each of three activities has on the firm's cash:

- Cash from **operating activities** = net income + depreciation ± changes in net working capital
- Cash from **investment activities** = capital expenditure – proceeds from sales of long-term assets
- Cash from **financing activities** = new debt + new shares – dividends – shares repurchased

The bottom line of the statement reports the change in the firm's cash over the period, based on the totals from these three activities.

2.7 Other Financial Statement Information

Complete financial reporting statements also include the following.

- The **management discussion and analysis (or business and operating review)** is a preface to the statements in which management discusses recent events and discloses significant developments.
- The **statement of change in shareholders' equity** breaks down the shareholders' equity on the balance sheet into the amount that came from issuing new shares versus retained earnings.
- The **notes to the financial statements** discuss details such as share-based compensation plans for employees and the firm's different types of outstanding debt and leases.

Selected Concepts and Key Terms

Financial Statements

Every public company is required to produce four financial statements: the balance sheet, the income statement, the statement of cash flows, and the statement of changes in shareholders' equity. These financial statements provide investors and creditors with an overview of the firm's financial performance.

Balance Sheet (also called the Statement of Financial Position)

The balance sheet lists the firm's assets and liabilities at a given point in time. It is divided into two parts ("sides"): the assets on the left side and the liabilities and shareholders' equity on the right. The assets list the cash, inventory, property, plant and equipment, and other investments the company has made; the liabilities show the firm's obligations to creditors.

Shareholders' equity, the difference between the firm's assets and liabilities, is an accounting measure of the firm's net worth. The two sides of the balance sheet must balance according to the **balance sheet equation**: $\text{assets} = \text{liabilities} + \text{shareholder's equity}$.

Income Statement (also called the Statement of Comprehensive Income)

The income statement lists the firm's revenues and expenses over a period of time. The last line of the income statement shows the firm's net income, which is a measure of its after-tax profitability during the period.

Statement of Cash Flows

The statement of cash flows measures the change in cash over a period of time. It is divided into three sections: operating activities, investment activities, and financing activities. The first section, operating activities, adjusts net income by adding back all non-cash entries related to the firm's operating activities. The next section, investment activities, lists the net cash flows from investment. The third section, financing activities, shows the flow of cash between the firm and its investors.

Book Value

The book value (or carrying amount) of a long-term asset is equal to its acquisition cost less accumulated depreciation. Depreciation is not an actual cash expense; it is a way of recognizing that buildings and equipment wear out and thus become less valuable as they get older. For example, net property, plant, and equipment is equal to the total book value of a firm's long-term assets after subtracting the total depreciation from previous years. The **book value of equity**, also known as **shareholders' equity** or **net worth**, is defined as the difference between total assets and total liabilities in the balance sheet identity.

Short-term Debt

Debt that will be repaid within one year.

Market Capitalization

Also known as the total market value of equity, it equals the market price per share times the number of shares. The market capitalization does not depend on the historical cost of the firm's assets; instead, it depends on what investors expect those assets to produce in the future. The book value of equity should not be confused with the market value of equity: The market value of equity may be different because the book value of assets does not perfectly match the market value of the assets and because many of the firm's intangible assets are not captured on the balance sheet.

Enterprise Value

The enterprise value of a firm assesses the value of the underlying business assets, unencumbered by debt and separate from any cash and marketable securities. It can be expressed as:

$$\text{Enterprise Value} = \text{Market Value of Equity} + \text{Debt} - \text{Cash}$$

Asset Turnover

A measure of how efficiently the firm is utilizing its assets to generate sales, which is calculated as $\text{Sales} / \text{Total Assets}$.

Equity Multiplier

A measure of leverage that indicates the value of assets held per euro or dollar of shareholder equity; it is calculated as Total Assets/Total Equity. The equity multiplier will be higher the greater the firm's reliance on debt financing.

DuPont Identity

A measurement that summarizes the determinants of a firm's ROE and is calculated as

$$\text{ROE} = \underbrace{\left(\frac{\text{Net Income}}{\text{Sales}} \right)}_{\text{Net Profit Margin}} \times \underbrace{\left(\frac{\text{Sales}}{\text{Total Assets}} \right)}_{\text{Asset Turnover}} \times \underbrace{\left(\frac{\text{Total Assets}}{\text{Total Equity}} \right)}_{\text{Equity Multiplier}}.$$

EBIT Margin

A measure of profitability calculated as EBIT/Sales.

Gross Margin

A measure of profitability calculated as Gross Profit/Sales.

Intangible Assets

The balance sheet item that equals the difference between the price paid for the company and the book value assigned to its tangible assets.

Impairment Charge

A reduction in the amount listed on the balance sheet that reflects the change in value of previously acquired intangible assets.

Inventory Days

A measure of how long inventory is held and is calculated as Inventory/Average Daily Cost of Sales.

Sarbanes-Oxley Act (SOX)

U.S. legislation enacted in 2002 that contains provisions intended to improve the accuracy of information given to both boards and shareholders. SOX attempted to achieve this goal in three ways: (1) by overhauling incentives and the independence in the auditing process; (2) by stiffening penalties for providing false information; and (3) by forcing companies to validate their internal financial control processes.

Concept Check Questions and Answers

2.1.1. What are the four financial statements that all public companies must produce?

All public companies must produce four financial statements: the balance sheet, the income statement, the statement of cash flows, and the statement of changes in shareholders' equity.

2.1.2. What is the role of an auditor?

An auditor is a neutral third party hired by the company to check the annual financial statements, ensure that they are prepared according to the generally accepted accounting principles (GAAP) or accounting standards, and verify that the information is reliable.

2.2.1. What is the balance sheet equation?

Assets = Liabilities + Shareholders' Equity

2.2.2. The book value of a company's assets usually does not equal the market value of those assets. What are some reasons for this difference?

The value of many of the assets listed on the balance sheet is based on their historical cost rather than their true value today. Furthermore, many of the firm's valuable assets, such as the firm's reputation in the marketplace, are not captured on the balance sheet.

2.3.1. What is the difference between a firm's book debt-equity ratio and its market debt-equity ratio?

The book debt-equity ratio uses the values of debt and equity from the balance sheet, while the market debt-equity ratio uses the market values of debt and equity.

2.3.2. What is a firm's enterprise value?

The enterprise value of a firm assesses the value of the underlying business assets, unencumbered by debt and separate from any cash and marketable securities.

It can be expressed as: Enterprise Value = Market Value of Equity + Debt – Cash

2.4.1. What is the difference between a firm's gross profit and its net income (or net profit)?

Gross profit equals sales minus cost of goods sold, while net income equals sales minus all income statement expenses.

2.4.2. What is meant by dilution?

The diluted earnings per share shows the earnings per share the company would have if all the share (stock) options were exercised and all the convertible securities were converted into shares. The diluted EPS must be lower than the basic EPS.

2.5.1. What is the DuPont Identity?

The DuPont Identity is a measurement that summarizes the determinants of a firm's ROE and is calculated as

$$\text{ROE} = \underbrace{\left(\frac{\text{Net Income}}{\text{Sales}} \right)}_{\text{Net Profit Margin}} \times \underbrace{\left(\frac{\text{Sales}}{\text{Total Assets}} \right)}_{\text{Asset Turnover}} \times \underbrace{\left(\frac{\text{Total Assets}}{\text{Total Equity}} \right)}_{\text{Equity Multiplier}}.$$

2.5.2. How do you use the price-earnings (P/E) ratio to gauge the market value of a firm?

The P/E ratio is the ratio of the value of equity to the firm's earnings per share. It is used to assess whether a share is over- or undervalued based on the idea that the value of a share should be proportional to the level of earnings it can generate for its shareholders. P/E ratios tend to be higher for firms with high growth rates.

2.6.1. Why does a firm's net income not correspond to cash generated?

There are two reasons why net income does not correspond to cash earned. First, there are non-cash expenses on the income statement, such as depreciation and amortization.

Second, certain uses of cash, such as purchasing a building, are not reported on the income statement.

2.6.2. What are the components of the statement of cash flows?

The statement of cash flows is divided into three sections: operating activities, investment activities, and financing activities.

2.7.1. Where do off-balance sheet transactions appear in a firm's financial statements?

Management is required to disclose any off-balance sheet transactions in the management discussion and analysis (MD&A) or business and operating review. Even though off-balance sheet transactions do not appear on the balance sheet, they can have a material impact on the firm's future performance.

2.7.2. What information do the notes to financial statements provide?

The notes to financial statements provide additional information that is very important in fully interpreting the firm's financial statements. For example, the notes show accounting assumptions that were used in preparing the statements. Details of acquisitions, spin-offs, leases, taxes, and risk management activities are also given.

2.8.1. Describe the transactions Enron used to increase its reported earnings.

Enron sold assets at inflated prices to other firms, together with the promise to buy back those assets at even higher future prices. Thus, Enron received cash today in exchange for a promise to pay more cash in the future. But Enron recorded the incoming cash as revenue, and then hid the promises to buy back the assets in a variety of ways.

2.8.2. What is the Sarbanes-Oxley Act?

In the United States in 2002, Congress passed the Sarbanes-Oxley Act, which requires, among other things, that CEOs and CFOs certify the accuracy and appropriateness of their firm's financial statements and increases the penalties against them if their financial statements later prove to be fraudulent.

Examples with Step-by-Step Solutions

Solving Problems

Problems using the concepts in this chapter generally involve understanding the basic format used in simple financial statements. For example, you should be able to identify which statements would be affected by specific events and what effect the events would have on variables such as earnings per share and book value of equity. You may also have to calculate ratios based on the financial statement information.

Examples

- 1. Your firm is considering purchasing a machine for \$2.5 million, which would be depreciable straight line over 5 years. The machine will allow you to sell products that increase sales by \$5 million per year. The cost of goods sold would increase by 50% of sales, but other costs would not change. If the firm has 1 million shares outstanding and pays 35% in taxes, what affect would this project have on earnings per share in each of the next 5 years?**

Step 1. Determine what financial statements would be affected and what statement(s) need to be forecasted to answer the question.

The question asks for the effect on earnings per share, which depends on net income, so the incremental income statements must be forecasted each year.

Step 2. Forecast the income statements for years 1 through 5 using the fact that depreciation would be $\$2.5 \text{ million} / 5 = \$500,000$ million per year.

	1	2	3	4	5
Sales revenue	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000
- Cost of goods sold	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
= Gross profit	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
- Depreciation	500,000	500,000	500,000	500,000	500,000
= EBT	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
- Taxes	700,000	700,000	700,000	700,000	700,000
= Net income	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000

Step 3. Calculate EPS by dividing net income by 1 million shares.

	1	2	3	4	5
Net income	1,300,000	1,300,000	1,300,000	1,300,000	1,300,000
Number of shares	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Earnings per share	\$1.30	\$1.30	\$1.30	\$1.30	\$1.30

So, earnings per share would increase by \$1.30 each year.

- 2. Your firm is considering purchasing the machine in problem 1 for \$2.5 million, which would be depreciable straight line over 5 years. To finance the purchase, you will issue \$2.5 in new shares. Working capital would not change. If your firm pays no dividends, what affect will the project have on the book value of equity in each of the next 5 years?**

Step 1. Determine what financial statements would be affected and what statement(s) need to be forecasted to answer the question.

The book value of equity is on the balance sheet, so that must be forecasted. In addition, retained earnings need to be determined, so the income statements must also be forecasted—which is already done in the solution to problem 1.

Step 2. Forecast the balance sheets using the fact that retained earnings will be \$1,300,000 each year because no net income is paid as dividends.

Cash	0	1,300,000	2,600,000	3,900,000	5,200,000	6,500,000
Total current assets	0	1,300,000	2,600,000	3,900,000	5,200,000	6,500,000
Non-current assets	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
Less: Accumulated depr.	0	500,000	1,000,000	1,500,000	2,000,000	2,500,000
Net Long-term assets	2,500,000	2,000,000	1,500,000	1,000,000	500,000	0
Total Assets	2,500,000	3,300,000	4,100,000	4,900,000	5,700,000	6,500,000
Liabilities and Equity						
Current liabilities	0	0	0	0	0	0
Non-current liabilities	0	0	0	0	0	0
Total Liabilities	0	0	0	0	0	0
Book value of equity	2,500,000	3,300,000	4,100,000	4,900,000	5,700,000	6,500,000
Total Liabilities and Equity	2,500,000	3,300,000	4,100,000	4,900,000	5,700,000	6,500,000

At time 0, book value of equity will increase by \$2.5 million, the amount of the new stock issued.

Beginning in year 1, book value of equity will increase each year by \$800,000.

3. Your firm is considering purchasing the machine in problem 1 for \$2.5 million, which would be depreciable straight line over 5 years. To finance the purchase, you will issue \$2.5 in new shares. Working capital would not change. How would the purchase of the machine affect how much cash the firm has in years 1–5?

Step 1. Determine what financial statements would be affected and what statement(s) need to be forecasted to answer the question.

The statement of cash flows can be forecasted to determine the change in cash. [Note that you could also just use the information on the income statements and balance sheets to measure the same change.]

Step 2. Forecast the statement of cash flows.

Depreciation	500,000	500,000	500,000	500,000	500,000
Cash from operating activities	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000
Investment activities					
Capital expenditures	-2,500,000	0	0	0	0
Cash from investing activities	-2,500,000	0	0	0	0
Financing activities					
Dividends paid	0	0	0	0	0
Sale or purchase of stock	2500000	0	0	0	0
Increase in borrowing	0	0	0	0	0
Cash from financing activities	2500000	0	0	0	0
Change in Cash	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000

Thus, cash increases by \$1.8 million each year.

Questions and Problems

- On October 2nd of 2005, Starbucks had a book value of equity of \$2 billion, 768 million shares outstanding, and a market price of \$30 per share. Starbucks also had cash of \$207 million, and total debt of \$1.4 billion.
 - What was Starbucks' market capitalization? What was Starbucks' market-to-book ratio?
 - What was Starbucks' book debt-equity ratio? What was its market debt-equity ratio?
 - What was Starbucks' enterprise value?
- Suppose your firm receives a \$10 million order on the last day of the accounting period. You fill the order with \$5 million worth of inventory. The customer picks up the products the same day, pays \$1 million now, and will pay the remaining balance in 30 days. Ignoring tax consequences how does the transaction affect net working capital in that accounting period?
- Suppose a firm's tax rate is 40%.
 - What effect would a \$100 million operating expense have on this year's Net Income? What effect would it have on next year's Net Income?
 - What effect would a \$100 million capital expense have on Net Income in future years if the capital is depreciated straight line over 5 years?
- Your firm is considering purchasing a machine for \$3 million, which would be depreciable straight line over 3 years. The machine will allow you to sell products that increase sales by \$10 million per year and the cost of goods sold would increase by 50% of sales but not change any other costs. If the firm has 1 million shares outstanding and pays 35% in taxes, what affect would this project have on earnings per share in each of the next 3 years?
- Your firm is considering purchasing the machine in problem 4 for \$3 million, which would be depreciable straight line over 3 years. To finance the purchase, you will issue \$3 in new stock. Working capital would not change. If your firm pays no dividends, what affect will the project have on the book value of equity in each of the next 3 years?

Solutions to Questions and Problems

- Market Capitalization = 768 million \times \$30 = \$23 billion
 Market-to-book ratio = $\frac{\$23 \text{ billion}}{\$2 \text{ billion}} = 11.5$
 - Book debt-equity ratio = $\frac{1.4}{2} = 0.70$
 Market debt-equity ratio = $\frac{1.4}{23} = 0.06$
 - Enterprise value = Market Value of Equity + Debt – Cash = 23 + 1.4 – .207
 = \$24.193 billion
- Since inventory decreased by \$5 million and accounts receivable increased by \$9 million:
 $\Delta \text{ net working capital} = \Delta \text{ current assets} - \Delta \text{ current liabilities} = (-\$5 + \$9) - 0 = \$4 \text{ million}.$
- A \$100 million operating expense would be immediately expensed, increasing operating expenses by \$100 million. This would lead to a reduction in taxes of $40\% \times \$100 \text{ million} = \40 million . Thus, earnings would decline by $100 - 40 = \$60 \text{ million}$. There would be no effect on next year's earnings.

[B] Depreciation of \$20 million would appear each year as an operating expense. Thus, net income would change each of the next 5 years by $-\$20(0.40) = -\8 million

4. Earnings per share will increase by \$2.60 in each of the next three years.

	1	2	3
Sales revenue	10,000,000	10,000,000	10,000,000
- Cost of goods sold	5,000,000	5,000,000	5,000,000
= Gross profit	5,000,000	5,000,000	5,000,000
- Depreciation	1,000,000	1,000,000	1,000,000
= EBT	4,000,000	4,000,000	4,000,000
- Taxes	1,400,000	1,400,000	1,400,000
= Net income	2,600,000	2,600,000	2,600,000
Number of shares	1,000,000	1,000,000	1,000,000
Earnings per share	\$2.60	\$2.60	\$2.60

5. Book value of equity will increase from \$3 million at date 0, to \$3.9 million at the end of year 3.

	0	1	2	3
Assets				
Cash	0	1,300,000	2,600,000	3,900,000
Total current assets	0	1,300,000	2,600,000	3,900,000
Long-term assets	3,000,000	3,000,000	3,000,000	3,000,000
Less: Accumulated depr.	0	1,000,000	2,000,000	3,000,000
Net Long-term assets	3,000,000	2,000,000	1,000,000	0
Total Assets	3,000,000	3,300,000	3,600,000	3,900,000
Liabilities and Equity				
Current liabilities	0	0	0	0
Long-term liabilities	0	0	0	0
Total Liabilities	0	0	0	0
Book value of equity	3,000,000	3,300,000	3,600,000	3,900,000
Total Liabilities and Equity	3,000,000	3,300,000	3,600,000	3,900,000