

2025 CFA®  
Exam Prep

# SchweserNotes™

Financial Statement Analysis and  
Equity Investments

**Level I** Book 2

**KAPLAN SCHWESER**

# Book 2: Financial Statement Analysis and Equity Investments

SchweserNotes™ 2025

Level I CFA®



SCHWESERNOTES™ 2025 LEVEL I CFA® BOOK 2: FINANCIAL STATEMENT ANALYSIS AND EQUITY INVESTMENTS

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# **Learning Outcome Statements (LOS)**

## **27. Introduction to Financial Statement Analysis**

The candidate should be able to:

- a. describe the steps in the financial statement analysis framework.
- b. describe the roles of financial statement analysis.
- c. describe the importance of regulatory filings, financial statement notes and supplementary information, management's commentary, and audit reports.
- d. describe implications for financial analysis of alternative financial reporting systems and the importance of monitoring developments in financial reporting standards.
- e. describe information sources that analysts use in financial statement analysis besides annual and interim financial reports.

## **28. Analyzing Income Statements**

The candidate should be able to:

- a. describe general principles of revenue recognition, specific revenue recognition applications, and implications of revenue recognition choices for financial analysis.
- b. describe general principles of expense recognition, specific expense recognition applications, implications of expense recognition choices for financial analysis and contrast costs that are capitalized versus those that are expensed in the period in which they are incurred.
- c. describe the financial reporting treatment and analysis of non-recurring items (including discontinued operations, unusual or infrequent items) and changes in accounting policies.
- d. describe how earnings per share is calculated and calculate and interpret a company's basic and diluted earnings per share for companies with simple and complex capital structures including those with antidilutive securities.
- e. evaluate a company's financial performance using common-size income statements and financial ratios based on the income statement.

## **29. Analyzing Balance Sheets**

The candidate should be able to:

- a. explain the financial reporting and disclosures related to intangible assets.
- b. explain the financial reporting and disclosures related to goodwill.
- c. explain the financial reporting and disclosures related to financial instruments.
- d. explain the financial reporting and disclosures related to non-current liabilities.
- e. calculate and interpret common-size balance sheets and related financial ratios.

## **30. Analyzing Statements of Cash Flows I**

The candidate should be able to:

- a. describe how the cash flow statement is linked to the income statement and the balance sheet.
- b. describe the steps in the preparation of direct and indirect cash flow statements, including how cash flows can be computed using income statement and balance sheet data.
- c. demonstrate the conversion of cash flows from the indirect to direct method.
- d. contrast cash flow statements prepared under International Financial Reporting Standards (IFRS) and US generally accepted accounting principles (US GAAP).

## **31. Analyzing Statements of Cash Flows II**

The candidate should be able to:

- a. analyze and interpret both reported and common-size cash flow statements.
- b. calculate and interpret free cash flow to the firm, free cash flow to equity, and performance and coverage cash flow ratios.

## **32. Analysis of Inventories**

The candidate should be able to:

- a. describe the measurement of inventory at the lower of cost and net realisable value and its implications for financial statements and ratios.

- b. calculate and explain how inflation and deflation of inventory costs affect the financial statements and ratios of companies that use different inventory valuation methods.
- c. describe the presentation and disclosures relating to inventories and explain issues that analysts should consider when examining a company's inventory disclosures and other sources of information.

### **33. Analysis of Long-Term Assets**

The candidate should be able to:

- a. compare the financial reporting of the following types of intangible assets: purchased, internally developed, and acquired in a business combination.
- b. explain and evaluate how impairment and derecognition of property, plant, and equipment and intangible assets affect the financial statements and ratios.
- c. analyze and interpret financial statement disclosures regarding property, plant, and equipment and intangible assets.

### **34. Topics in Long-Term Liabilities and Equity**

The candidate should be able to:

- a. explain the financial reporting of leases from the perspectives of lessors and lessees.
- b. explain the financial reporting of defined contribution, defined benefit, and stock-based compensation plans.
- c. describe the financial statement presentation of and disclosures relating to long-term liabilities and share-based compensation.

### **35. Analysis of Income Taxes**

The candidate should be able to:

- a. contrast accounting profit, taxable income, taxes payable, and income tax expense and temporary versus permanent differences between accounting profit and taxable income.
- b. explain how deferred tax liabilities and assets are created and the factors that determine how a company's deferred tax liabilities and assets should be treated for the purposes of financial analysis.
- c. calculate, interpret, and contrast an issuer's effective tax rate, statutory tax rate, and cash tax rate.
- d. analyze disclosures relating to deferred tax items and the effective tax rate reconciliation and explain how information included in these disclosures affects a company's financial statements and financial ratios.

### **36. Financial Reporting Quality**

The candidate should be able to:

- a. compare financial reporting quality with the quality of reported results (including quality of earnings, cash flow, and balance sheet items).
- b. describe a spectrum for assessing financial reporting quality.
- c. explain the difference between conservative and aggressive accounting.
- d. describe motivations that might cause management to issue financial reports that are not high quality and conditions that are conducive to issuing low-quality, or even fraudulent, financial reports.
- e. describe mechanisms that discipline financial reporting quality and the potential limitations of those mechanisms.
- f. describe presentation choices, including non-GAAP measures, that could be used to influence an analyst's opinion.
- g. describe accounting methods (choices and estimates) that could be used to manage earnings, cash flow, and balance sheet items.
- h. describe accounting warning signs and methods for detecting manipulation of information in financial reports.

### **37. Financial Analysis Techniques**

The candidate should be able to:

- a. describe tools and techniques used in financial analysis, including their uses and limitations.
- b. calculate and interpret activity, liquidity, solvency, and profitability ratios.
- c. describe relationships among ratios and evaluate a company using ratio analysis.

- d. demonstrate the application of DuPont analysis of return on equity and calculate and interpret effects of changes in its components.
- e. describe the uses of industry-specific ratios used in financial analysis.
- f. describe how ratio analysis and other techniques can be used to model and forecast earnings.

### **38. Introduction to Financial Statement Modeling**

The candidate should be able to:

- a. demonstrate the development of a sales-based pro forma company model.
- b. explain how behavioral factors affect analyst forecasts and recommend remedial actions for analyst biases.
- c. explain how the competitive position of a company based on a Porter's five forces analysis affects prices and costs.
- d. explain how to forecast industry and company sales and costs when they are subject to price inflation or deflation.
- e. explain considerations in the choice of an explicit forecast horizon and an analyst's choices in developing projections beyond the short-term forecast horizon.

### **39. Market Organization and Structure**

The candidate should be able to:

- a. explain the main functions of the financial system.
- b. describe classifications of assets and markets.
- c. describe the major types of securities, currencies, contracts, commodities, and real assets that trade in organized markets, including their distinguishing characteristics and major subtypes.
- d. describe types of financial intermediaries and services that they provide.
- e. compare positions an investor can take in an asset.
- f. calculate and interpret the leverage ratio, the rate of return on a margin transaction, and the security price at which the investor would receive a margin call.
- g. compare execution, validity, and clearing instructions.
- h. compare market orders with limit orders.
- i. define primary and secondary markets and explain how secondary markets support primary markets.
- j. describe how securities, contracts, and currencies are traded in quote-driven, order-driven, and brokered markets.
- k. describe characteristics of a well-functioning financial system.
- l. describe objectives of market regulation.

### **40. Security Market Indexes**

**唯一微信: xuebjun888s**

The candidate should be able to:

- a. describe a security market index.
- b. calculate and interpret the value, price return, and total return of an index.
- c. describe the choices and issues in index construction and management.
- d. compare the different weighting methods used in index construction.
- e. calculate and analyze the value and return of an index given its weighting method.
- f. describe rebalancing and reconstitution of an index.
- g. describe uses of security market indexes.
- h. describe types of equity indexes.
- i. compare types of security market indexes.
- j. describe types of fixed-income indexes.
- k. describe indexes representing alternative investments.

### **41. Market Efficiency**

The candidate should be able to:

- a. describe market efficiency and related concepts, including their importance to investment practitioners.
- b. contrast market value and intrinsic value.
- c. explain factors that affect a market's efficiency.
- d. contrast weak-form, semi-strong-form, and strong-form market efficiency.
- e. explain the implications of each form of market efficiency for fundamental analysis, technical analysis, and the choice between active and passive portfolio management.

- f. describe market anomalies.
- g. describe behavioral finance and its potential relevance to understanding market anomalies.

## **42. Overview of Equity Securities**

The candidate should be able to:

- a. describe characteristics of types of equity securities.
- b. describe differences in voting rights and other ownership characteristics among different equity classes.
- c. compare and contrast public and private equity securities.
- d. describe methods for investing in non-domestic equity securities.
- e. compare the risk and return characteristics of different types of equity securities.
- f. explain the role of equity securities in the financing of a company's assets.
- g. contrast the market value and book value of equity securities.
- h. compare a company's cost of equity, its (accounting) return on equity, and investors' required rates of return.

## **43. Company Analysis: Past and Present**

The candidate should be able to:

- a. describe the elements that should be covered in a thorough company research report.
- b. determine a company's business model.
- c. evaluate a company's revenue and revenue drivers, including pricing power.
- d. evaluate a company's operating profitability and working capital using key measures.
- e. evaluate a company's capital investments and capital structure.

## **44. Industry and Competitive Analysis**

The candidate should be able to:

- a. describe the purposes of, and steps involved in, industry and competitive analysis.
- b. describe industry classification methods and compare methods by which companies can be grouped.
- c. determine an industry's size, growth characteristics, profitability, and market share trends.
- d. analyze an industry's structure and external influences using Porter's Five Forces and PESTLE frameworks.
- e. evaluate the competitive strategy and position of a company.

## **45. Company Analysis: Forecasting**

The candidate should be able to:

- a. explain principles and approaches to forecasting a company's financial results and position.
- b. explain approaches to forecasting a company's revenues.
- c. explain approaches to forecasting a company's operating expenses and working capital.
- d. explain approaches to forecasting a company's capital investments and capital structure.
- e. describe the use of scenario analysis in forecasting.

## **46. Equity Valuation: Concepts and Basic Tools**

The candidate should be able to:

- a. evaluate whether a security, given its current market price and a value estimate, is overvalued, fairly valued, or undervalued by the market.
- b. describe major categories of equity valuation models.
- c. describe regular cash dividends, extra dividends, stock dividends, stock splits, reverse stock splits, and share repurchases.
- d. describe dividend payment chronology.
- e. explain the rationale for using present value models to value equity and describe the dividend discount and free-cash-flow-to-equity models.
- f. explain advantages and disadvantages of each category of valuation model.
- g. calculate the intrinsic value of a non-callable, non-convertible preferred stock.
- h. calculate and interpret the intrinsic value of an equity security based on the Gordon (constant) growth dividend discount model or a two-stage dividend discount model, as appropriate.
- i. identify characteristics of companies for which the constant growth or a multistage dividend discount model is appropriate.

- j. explain the rationale for using price multiples to value equity, how the price to earnings multiple relates to fundamentals, and the use of multiples based on comparables.
- k. calculate and interpret the following multiples: price to earnings, price to an estimate of operating cash flow, price to sales, and price to book value.
- l. describe enterprise value multiples and their use in estimating equity value.
- m. describe asset-based valuation models and their use in estimating equity value.

## READING 27

# INTRODUCTION TO FINANCIAL STATEMENT ANALYSIS

## MODULE 27.1: FINANCIAL STATEMENT ROLES



Video covering this content is available online.

### LOS 27.a: Describe the steps in the financial statement analysis framework.

The **financial statement analysis framework**<sup>1</sup> sets out a generic set of steps for analysts to apply to a multitude of objectives when analyzing debt issues, equity securities, and corporate actions. The framework consists of six steps:

*Step 1: State the objective and context.* Determine what questions the analysis seeks to answer, the form in which this information needs to be presented, and what resources and how much time are available to perform the analysis.

*Step 2: Gather data.* Acquire the company's financial statements and other relevant data on its industry and the economy. Ask questions of the company's management, suppliers, and customers, and visit company sites.

*Step 3: Process the data.* Make any appropriate adjustments to the financial statements. Calculate ratios and perform statistical analysis. Prepare exhibits such as graphs and common-size balance sheets.

*Step 4: Analyze and interpret the data.* Use the data to answer the questions stated in the first step. Decide what conclusions or recommendations the information supports.

*Step 5: Report the conclusions or recommendations.* Prepare a report and communicate it to its intended audience. Be sure the report and its dissemination comply with the Code and Standards that relate to investment analysis and recommendations.

*Step 6: Update the analysis.* Repeat these steps periodically, and change the conclusions or recommendations when necessary.

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### LOS 27.b: Describe the roles of financial statement analysis.

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**Financial reporting** refers to the way companies show their financial performance to investors, creditors, and other interested parties by preparing and presenting financial

statements.

The role of **financial statement analysis** is to use the information in a company's financial statements, along with other relevant information, to make economic decisions. Examples of such decisions include whether to invest in the company's securities or recommend them to investors, whether to extend trade or bank credit to the company, and assigning credit ratings to a company's debt. Analysts use financial statement data to evaluate a company's past performance and current financial position to form opinions about the company's ability to earn profits and generate cash flow in the future. As part of this process, analysts will identify risk factors that affect the company's future profitability and position.



#### PROFESSOR'S NOTE

This reading deals with financial analysis for external users. Management also performs financial analysis in making everyday decisions. However, management may rely on internal financial information that is likely maintained in a different format and unavailable to external users.

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### LOS 27.c: Describe the importance of regulatory filings, financial statement notes and supplementary information, management's commentary, and audit reports.

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**Standard-setting bodies** are professional organizations of accountants and auditors that establish financial reporting standards. **Regulatory authorities** are government agencies that have the legal authority to enforce compliance with financial reporting standards.

The two primary standard-setting bodies are the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB). In the United States, the FASB sets forth the U.S. Generally Accepted Accounting Principles (U.S. GAAP). Outside the United States, the IASB establishes the International Financial Reporting Standards (IFRS). Other national standard-setting bodies exist as well. Some of the older IASB standards are referred to as the International Accounting Standards (IAS).

Regulatory authorities, such as the Securities and Exchange Commission (SEC) in the United States and the Financial Conduct Authority in the United Kingdom, are established by national governments.

Most national authorities belong to the **International Organization of Securities Commissions (IOSCO)**. Together, the members of IOSCO regulate more than 95% of the world's financial markets. IOSCO is not a regulatory body, but its members work together to improve cross-border cooperation and make national regulations and enforcement more uniform around the world. The IOSCO Objectives and Principles of Securities Regulation are based on three main objectives:

1. Protecting investors
2. Ensuring markets are fair, efficient, and transparent
3. Reducing systemic risk

IOSCO requires issuers to provide full, accurate, and timely disclosure of financial results, risk, and other information used in the decision-making process. It also requires accounting standards that are used to prepare financial statements to be of a high standard and internationally accepted.

The SEC's requirements for financial reporting by U.S. companies are shown in Figure 27.1 as an example of reporting requirements. The SEC has the responsibility of enforcing the Sarbanes-Oxley Act of 2002. The act prohibits a company's external auditor from providing certain additional paid services to the company, to avoid the conflict of interest involved, and to promote auditor independence. The act requires a company's executive management to certify that the financial statements are presented fairly and to include a statement about the effectiveness of the company's internal controls of financial reporting. Additionally, the external auditor must provide a statement confirming the effectiveness of the company's internal controls.

**Proxy statements** are issued to shareholders when there are matters that require a shareholder vote. These statements, which are also filed with the SEC, are a good source of information about the election of (and qualifications of) board members, compensation, management qualifications, and the issuance of stock options.

In the European Union (EU), each member state has its own securities regulations, but all countries in the EU are required to report using IFRS. The European Commission also has established the European Securities Commission, which advises the European Commission on securities regulation issues, and the European Securities and Market Authority (ESMA), which coordinates regulation within the EU.

**Financial statement notes** (footnotes) include disclosures that provide further details about the information summarized in the financial statements. Footnotes allow users to improve their assessments of the amount, timing, and uncertainty of the estimates reported in the financial statements. Footnotes do the following:

- They discuss the basis of presentation such as the fiscal period covered by the statements, whether IFRS or U.S. GAAP is adhered to, and the inclusion of consolidated entities.
- They provide information about accounting methods, assumptions, and estimates used by management.
- They provide additional information on information included in the primary financial statements and items such as business acquisitions or disposals, legal actions, employee benefit plans, contingencies and commitments, significant customers, related party transactions, position and performance of segments of the firm, and significant post balance sheet events.
- They are audited along with the primary financial statements.

## Figure 27.1: SEC Required Filings

**Form S-1.** This is the registration statement filed before the sale of new securities to the public. The statement includes disclosures about the securities offered, audited financial statements (plus interim accounts, if the statement is filed more than three months after year-end), risk assessment, underwriter identification, and the estimated amount and use of the offering proceeds.

**Form 10-K.** This is the required annual filing that includes information about the business, risks, and its management, audited financial statements and disclosures, and disclosures about legal matters involving the firm. Information required in Form 10-K is similar to that which a firm typically provides in its annual report to shareholders. However, a firm's annual report is not a substitute for the required 10-K filing. Equivalent SEC forms for foreign issuers in the U.S. markets are Form 40-F for Canadian companies and Form 20-F for other foreign issuers.

**Form 10-Q.** U.S. firms are required to file this form quarterly, with updated interim financial statements (unlike Form 10-K, these statements do not have to be audited) and disclosures about certain events such as significant legal proceedings or changes in accounting policy. Non-U.S. companies are typically required to file the equivalent Form 6-K semiannually.

**Form DEF-14A.** When a company prepares a proxy statement for its shareholders before the annual meeting or other shareholder vote, it also files the statement with the SEC as Form DEF-14A.

**Form 8-K.** Companies must file this form to disclose material events including significant asset acquisitions and disposals, changes in management or corporate governance, or matters related to its accountants, its financial statements, or the markets in which its securities trade.

**Form 144.** A company can issue securities to certain qualified buyers without registering the securities with the SEC, but it must notify the SEC that it intends to do so.

**Forms 3, 4, and 5** involve the beneficial ownership of securities by a company's officers and directors. Analysts can use these filings to learn about purchases and sales of company securities by corporate insiders.

Both U.S. GAAP and IFRS require companies to report segment data, but the required disclosure items are only a subset of the required disclosures for the company as a whole. Nonetheless, an analyst can prepare a more detailed analysis and forecast by examining the performance of business or geographic segments separately. Segment profit margins, asset utilization (turnover), and return on assets can be very useful in gaining a clear picture of a firm's overall operations. For forecasting, growth rates of segment revenues and profits can be used to estimate future sales and profits and to determine the changes in company characteristics over time.

A **business segment (operating segment)** is a portion of a larger company that accounts for more than 10% of the company's revenues, assets, or income. An operating segment should be distinguishable from the company's other lines of business in terms of the risk and return characteristics of the segment. Segments reported should account for a minimum of 75% of the firm's external sales.

The following must be disclosed for each segment within the financial statement notes:

- Revenue (external and between segments)
- A measure of profit or loss
- A measure of assets and liabilities

- Interest (revenue and expense)
- Acquisitions of PP&E and intangibles
- Depreciation and amortization
- Other noncash expenses
- Income tax expense
- Share of equity-accounted investments results

**Geographic segments** are also identified when they meet the size criterion given previously and the geographic unit has a business environment that is different from that of other segments or the remainder of the company's business.

For example, in its 2016 annual report, Boeing described its business segments as follows:<sup>2</sup>

- We are organized based on the products and services we offer. We operate in five principal segments:
  - Commercial Airplanes
  - Our Defense, Space & Security (BDS) business comprises three segments:
    - Boeing Military Aircraft (BMA)
    - Network & Space Systems (N&SS)
    - Global Services & Support (GS&S)
  - Boeing Capital (BCC)

**Management commentary** (also known as management report, operating and financial review, or **management discussion and analysis [MD&A]**) is one of the most useful sections of an annual report. IFRS guidance recommends that management commentary address the nature of the business, management's objectives, the company's past performance, the performance measures used, and the company's key relationships, resources, and risks. Analysts must be aware that some parts of management commentary may be unaudited.

For publicly held firms in the United States, the SEC requires management commentary to discuss trends and identify significant events and uncertainties that affect the firm's liquidity, capital resources, and results of operations. Management must also discuss the following:

- Effects of inflation and changing prices, if material
- Impact of off-balance-sheet obligations and contractual obligations, such as purchase commitments
- Accounting policies that require significant judgment by management
- Forward-looking expenditures and divestitures

An **audit** is an independent review of an entity's financial statements. Public accountants conduct audits and examine the financial reports and supporting records. The objective of an audit is to enable the auditor to provide an opinion on the fairness and reliability of the financial statements.

The independent certified public accounting firm employed by the board of directors is responsible for seeing that the financial statements conform to the applicable accounting standards. The auditor examines the company's accounting and internal control systems, confirms assets and liabilities, and generally tries to determine that there are no material errors in the financial statements. The auditor's report is an important source of information.

The **standard auditor's opinion** contains three parts and states the following:

1. Whereas the financial statements are prepared by management and are its responsibility, the auditor has performed an independent review.
2. Generally accepted auditing standards were followed, thus providing *reasonable assurance* that the financial statements contain no material errors.
3. The auditor is satisfied that the statements were prepared in accordance with accepted accounting principles and that the principles chosen and estimates made are reasonable. The auditor's report must also contain additional explanation when accounting methods have not been used consistently between periods.

An **unqualified opinion** (also known as an unmodified opinion or clean opinion) indicates that the auditor believes the statements are free from material omissions and errors. If the statements make any exceptions to the accounting principles, the auditor may issue a **qualified opinion** and explain these exceptions in the audit report. The auditor can issue an **adverse opinion** if the statements are not presented fairly or are materially nonconforming with accounting standards. If the auditor is unable to express an opinion (e.g., in the case of a scope limitation), a **disclaimer of opinion** is issued. Any opinion other than unqualified is sometimes referred to as a modified opinion.

The auditor's opinion will also contain an explanatory paragraph when a material loss is probable, but the amount cannot be reasonably estimated. These uncertainties may relate to the *going concern assumption* (the assumption that the firm will continue to operate for the foreseeable future), to the valuation or realization of asset values, or to litigation. This type of disclosure may be a signal of serious problems and may call for close examination by the analyst.

**Internal controls** are the processes by which the company ensures that it presents accurate financial statements. Internal controls are the responsibility of management. For publicly traded firms in the United States, the auditor must express an opinion on the firm's internal controls. The auditor can provide this opinion separately, or as the fourth element of the standard opinion.

An audit report must also contain a section communicating *key audit matters* (international reports) or *critical audit matters* (U.S.), which highlights accounting choices that are of greatest significance to users of financial statements. These would include accounting choices that require significant management judgments and estimates, how significant transactions during a period were accounted for, or choices that the auditor finds especially challenging or subjective—and which, therefore, have a significant likelihood of being misstated.

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**LOS 27.d: Describe implications for financial analysis of alternative financial reporting systems and the importance of monitoring developments in financial reporting standards.**

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While the IASB and FASB work together to harmonize changes to accounting standards, some significant differences between IFRS and U.S. GAAP still exist. Some major differences are outlined in Figure 27.2, but additional differences will be encountered in subsequent modules.

**Figure 27.2: Significant Differences Between IFRS and U.S. GAAP**

| Basis for Comparison              | U.S. GAAP                        | IFRS               |
|-----------------------------------|----------------------------------|--------------------|
| Developed by                      | FASB                             | IASB               |
| Based on                          | Rules                            | Principles         |
| Inventory valuation               | FIFO, LIFO, and weighted average | LIFO prohibited    |
| Product development costs         | Expensed                         | May be capitalized |
| Interest paid                     | CFO                              | CFO or CFF         |
| Reversal of inventory write-downs | Prohibited                       | Allowed            |

The existence of differences between the two sets of standards require the analyst to exercise caution when making comparisons between firms operating in different jurisdictions.

As financial reporting standards continue to evolve, analysts need to monitor how these developments will affect the financial statements they use. An analyst should be aware of new products and innovations in the financial markets that generate new types of transactions. These might not fall neatly into the existing financial reporting standards. Analysts can use the financial reporting framework as a guide for evaluating what effect new products or transactions might have on financial statements.

To keep up to date on the evolving standards, an analyst can monitor professional journals and other sources, such as the IASB ([www.ifrs.org](http://www.ifrs.org)) and FASB ([www.fasb.org](http://www.fasb.org)) websites. CFA Institute produces position papers on financial reporting issues through the CFA Institute Centre for Financial Market Integrity.

Finally, analysts must monitor company disclosures for significant accounting standards and estimates.

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**LOS 27.e: Describe information sources that analysts use in financial statement analysis besides annual and interim financial reports.**

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As well as regulated information provided by issuers in filings and financial statements, an analyst can also use additional information sources:

- Issuer sources:

- *Earnings calls.* Targeted at investors, analysts, and members of the media, earnings calls include presentations by the company's management and the opportunity for question-and-answer sessions. Firms often provide **earnings guidance** before they release their financial statements. After an earnings announcement, senior management may hold a conference call to answer questions and provide information to complement their regulatory filings.
- Ad hoc presentations and events that are similar in format to an earnings call
- Press releases focusing on major events relevant to the company
- Communications with management, investor relations, and company personnel

Analysts should note that these additional sources of information provided by issuers are unlikely to have been audited.

■ Public third-party sources:

- Free industry reports, whitepapers, and trade journals
- Government agency-produced economic and industry statistics
- Generalized and industry-specific media sources
- Social media

■ Proprietary third-party sources:

- Analyst reports
- Reports from data platforms such as Bloomberg, Wind, and FactSet
- Reports from industry-specific agencies and consultancies

■ Proprietary primary research:

- Studies commissioned by the analyst
- Hands-on experience with the company's products or services
- Data and advice of technical specialists employed by the analyst

An analyst should also review pertinent information on economic conditions and the company's industry and compare the company to its competitors. The necessary information can be acquired from trade journals, statistical reporting services, and government agencies.



### MODULE QUIZ 27.1

1. Which of the following statements *least accurately* describes a role of financial statement analysis?
  - A. Use the information in financial statements to make economic decisions.
  - B. Provide reasonable assurance that the financial statements are free of material errors.
  - C. Evaluate an entity's financial position and past performance to form opinions about its future ability to earn profits and generate cash flow.
2. Information about accounting estimates, assumptions, and methods chosen for reporting is *most likely* found in:
  - A. the auditor's opinion.
  - B. financial statement notes.
  - C. management discussion and analysis.
3. If an auditor finds that a company's financial statements have made a specific exception to applicable accounting principles, she is *most likely* to issue a:
  - A. dissenting opinion.

- B. cautionary note.
  - C. qualified opinion.
4. Information about elections of members to a company's board of directors is *most likely* found in:
    - A. a 10-Q filing.
    - B. a proxy statement.
    - C. footnotes to the financial statements.
  5. Which of these steps is *least likely* to be a part of the financial statement analysis framework?
    - A. State the purpose and context of the analysis.
    - B. Determine whether the company's securities are suitable for the client.
    - C. Adjust the financial statement data and compare the company to its industry peers.
  6. Which of the following is *least likely* to be a part of segment disclosure?
    - A. Segment sales.
    - B. Segment cost of goods sold.
    - C. Segment earnings.
  7. Which of the following sources of information is *most likely* to be classified as a proprietary third-party source?
    - A. Research reports prepared by analysts.
    - B. Trade journals.
    - C. Statistics produced by government agencies.

## KEY CONCEPTS

### LOS 27.a

The framework for financial analysis has six steps:

1. State the objective of the analysis.
2. Gather data.
3. Process the data.
4. Analyze and interpret the data.
5. Report the conclusions or recommendations.
6. Update the analysis.

### LOS 27.b

The role of financial reporting is to provide various users with useful information about a company's performance and financial position.

The role of financial statement analysis is to use the data from financial statements to support economic decisions.

### LOS 27.c

Standard-setting bodies are private sector organizations that establish financial reporting standards. The two primary standard-setting bodies are the International Accounting Standards Board (IASB) and, in the United States, the Financial Accounting Standards Board (FASB).

Regulatory authorities are government agencies that enforce compliance with financial reporting standards. Regulatory authorities include the Securities and Exchange Commission (SEC) in the United States and the Financial Conduct Authority in the United Kingdom. Many national regulatory authorities belong to the International Organization of Securities Commissions (IOSCO).

Important information about accounting methods, estimates, and assumptions is disclosed in the footnotes to the financial statements and supplementary schedules. These disclosures also contain information about segment results, commitments and contingencies, legal proceedings, acquisitions or divestitures, issuance of stock options, and details of employee benefit plans.

Management commentary (management discussion and analysis) contains an overview of the company and important information about business trends, future capital needs, liquidity, significant events, and significant choices of accounting methods requiring management judgment.

The objective of audits of financial statements is to provide an opinion on the statements' fairness and reliability.

The auditor's opinion gives evidence of an independent review of the financial statements that verifies that appropriate accounting principles were used, that standard auditing procedures were used to establish reasonable assurance that the statements contain no material errors, and that management's report on the company's internal controls has been reviewed.

An auditor can issue an unqualified (clean) opinion if the statements are free from material omissions and errors, a qualified opinion that notes any exceptions to accounting principles, an adverse opinion if the statements are not presented fairly in the auditor's opinion, or a disclaimer of opinion if the auditor is unable to express an opinion.

A company's management is responsible for maintaining an effective internal control system to ensure the accuracy of its financial statements.

#### **LOS 27.d**

Reporting standards are designed to ensure that different firms' statements are comparable to one another and to narrow the range of reasonable estimates on which financial statements are based. This aids users of the financial statements who rely on them for information about the company's activities, profitability, and creditworthiness. An analyst needs to be aware of differences between IFRS and U.S. GAAP when comparing companies in different jurisdictions.

An analyst should be aware of evolving financial reporting standards and new products and innovations that generate new types of transactions.

#### **LOS 27.e**

Along with the annual financial statements, important information sources for an analyst include a company's quarterly and semiannual reports, proxy statements, press

releases, and earnings guidance, as well as information on the industry and peer companies from external sources.

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 27.1

1. **B** This statement describes the role of an auditor, rather than the role of an analyst. The other responses describe the role of financial statement analysis. (LOS 27.b)
2. **B** Information about accounting methods and estimates is contained in the footnotes to the financial statements. (LOS 27.c)
3. **C** An auditor will issue a qualified opinion if the financial statements make any exceptions to applicable accounting standards and will explain the effect of these exceptions in the auditor's report. (LOS 27.c)
4. **B** Proxy statements contain information related to matters that come before shareholders for a vote, such as elections of board members. (LOS 27.c)
5. **B** Determining the suitability of an investment for a client is not one of the six steps in the financial statement analysis framework. The analyst would only perform this function if he also had an advisory relationship with the client. Stating the objective and processing the data are two of the six steps in the framework. The others are gathering the data, analyzing the data, updating the analysis, and reporting the conclusions. (LOS 27.a)
6. **B** Firms are not required to provide detailed financial statements for segments that would include line items such as cost of goods sold, but the following should be disclosed in the segment data:
  - Revenue (external and between segments)
  - A measure of profit or loss
  - A measure of assets and liabilities
  - Interest (revenue and expense)
  - Acquisitions of PP&E and intangibles
  - Depreciation and amortization
  - Other noncash expenses
  - Income tax expense
  - Share of equity-accounted investments results(LOS 27.c)
7. **A** Research reports provided by analysts are rarely in the public domain. Trade journals and government statistics are available publicly. (LOS 27.e)

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<sup>1</sup> Hennie van Greuning and Sonja Brajovic Bratanovic, *Analyzing and Managing Banking Risk: Framework for Assessing Corporate Governance and Financial Risk*, International Bank for Reconstruction and Development, April 2003, p. 300.

<sup>2</sup> Boeing, *The Boeing Company 2016 Annual Report* (USA: 2017),  
[https://s2.q4cdn.com/661678649/files/doc\\_financials/annual/2016/2016-Annual-Report.pdf](https://s2.q4cdn.com/661678649/files/doc_financials/annual/2016/2016-Annual-Report.pdf).

## READING 28

# ANALYZING INCOME STATEMENTS

### MODULE 28.1: REVENUE RECOGNITION



Video covering this content is available online.

**LOS 28.a: Describe general principles of revenue recognition, specific revenue recognition applications, and implications of revenue recognition choices for financial analysis.**

In a sale of goods where the goods or services are exchanged for cash and returns are not allowed, the recognition of revenue is straightforward: it is recognized at the time of the exchange. The recognition of revenue is not, however, dependent on receiving cash payment. If a sale of goods is made on credit, revenue can be recognized at the time of sale—and an asset, **accounts receivable**, is created on the balance sheet. As a general rule, revenue is recognized in the period in which it is earned, which may not necessarily be the same as the period in which cash is collected from the customer. Revenue is reported net of any returns and allowances in the income statement (e.g., estimated warranty provisions and customer discounts).

If payment for the goods is received before the transfer of the goods or services, a liability, **unearned revenue**, is created when the cash is received (offsetting the increase in the asset *cash*). Revenue is recognized as the goods are transferred to the buyer. As an example, consider a magazine subscription. When the subscription is purchased, an unearned revenue liability is created, and as magazine issues are delivered, revenue is recorded and the liability is decreased.

Converged standards under IFRS and U.S. GAAP take a principles-based approach to revenue recognition issues. The central principle is that a firm should recognize revenue when it has transferred a good or service to a customer. This is consistent with the familiar accrual accounting principle that revenue should be recognized when earned.

The converged standards identify a five-step process<sup>1</sup> for recognizing revenue:

1. Identify the contract(s) with a customer.
2. Identify the separate or distinct performance obligations in the contract.
3. Determine the transaction price.
4. Allocate the transaction price to the performance obligations in the contract.
5. Recognize revenue when (or as) the entity satisfies a performance obligation.

The standard defines a **contract** as an agreement between two or more parties that specifies their obligations and rights. Collectability must be probable for a contract to exist, but *probable* is defined differently under IFRS and U.S. GAAP, so an identical activity could still be accounted for differently by IFRS and U.S. GAAP reporting firms.

A **performance obligation** is a promise to deliver a distinct good or service. A *distinct* good or service is one that meets the following criteria:

- The customer can benefit from the good or service on its own or combined with other resources that are readily available.
- The promise to transfer the good or service can be identified separately from any other promises.

A **transaction price** is the amount a firm expects to receive from a customer in exchange for transferring a good or service to the customer. A transaction price is usually a fixed amount, but it can also be variable (e.g., if it includes a bonus for early delivery).

A firm should recognize revenue only when it is highly probable that it will not have to reverse it. For example, a firm may need to recognize a liability for a refund obligation (and an offsetting asset for the right to returned goods) if revenue from a sale cannot be estimated reliably.

A firm recognizes revenue when the performance obligation is satisfied by transferring the control of the good or service from seller to buyer. Indicators that the customer has obtained control include physical possession by the customer, acceptance of the good or service by the customer, the customer taking on risk and benefits of ownership, the customer holding legal title, and the seller having a right of payment.

For long-term contracts, revenue is recognized based on a firm's progress toward completing a performance obligation over a period of time. Progress toward completion can be measured from the input side (e.g., using the percentage of completion costs incurred as of the statement date). Progress can also be measured from the output side, using engineering milestones or the percentage of total output delivered to date.

A performance obligation is satisfied over a period of time if any of the following three criteria are met:

1. The customer receives and benefits from the good or service over time as the supplier meets the obligations of the contract (e.g., service and maintenance contracts).
2. The supplier enhances an existing asset or creates a new asset that the customer controls over the period in which the asset is created or enhanced.
3. The asset has no alternative use for the supplier, and the supplier has the right to enforce payment for work completed to date (e.g., constructing equipment specific to the needs of a single customer).

The costs to secure a long-term contract, such as sales commissions, must be capitalized; that is, the expense for these costs is spread over the life of the contract.

The following summarizes some examples from IFRS 15 of appropriate revenue recognition under various circumstances.

### **EXAMPLE: Revenue recognition**

#### **1. Performance obligation and progress toward completion (long-term contracts)**

A contractor agrees to build a warehouse for a price of \$10 million and estimates the total costs of construction at \$8 million. Although there are several *identifiable components* of the building (site preparation, foundation, electrical components, roof, etc.), these components are not *separate deliverables*, and the performance obligation is the completed building.

During the first year of construction, the builder incurs \$4 million of costs, 50% of the estimated total costs of completion. Based on this expenditure and a belief that the percentage of costs incurred represents an appropriate measure of progress toward completing the performance obligation, the builder recognizes \$5 million (50% of the transaction price of \$10 million) as revenue for the year.

During the second year of construction, the contractor incurred an additional \$2 million in costs.

The percentage of total costs incurred over the first two years is now  $(\$4 \text{ million} + \$2 \text{ million}) / \$8 \text{ million} = 75\%$ . The total revenue to be recognized to date is  $0.75 \times \$10 \text{ million} = \$7.5 \text{ million}$ . Because \$5 million of revenue had been recognized in Year 1, \$2.5 million ( $= \$7.5 \text{ million} - \$5 \text{ million}$ ) of revenue will be recognized in Year 2.

This treatment is consistent with the percentage of completion method previously in use, although the new standards do not call it that.

#### **2. Acting as an agent**

Consider a travel agent who arranges a first-class ticket for a customer flying to Singapore. The ticket price is \$10,000, made by nonrefundable payment at purchase, and the travel agent receives a \$1,000 commission on the sale. Because the travel agent is not responsible for providing the flight and bears no inventory or credit risk, they are *acting as an agent*. Because they are an agent, rather than a *principal*, they should report revenue equal to their commission of \$1,000, the net amount of the sale. If they were a principal in the transaction, they would report revenue of \$10,000, the gross amount of the sale, and an expense of \$9,000 for the ticket. Note that while gross profit is the same (\$1,000) regardless of selling as a principal or agent, the gross profit margin is very different. If treated as a principal, the margin would be  $\$1,000 / \$10,000 = 10\%$ , but as an agent, the margin would be  $\$1,000 / \$1,000 = 100\%$ .

#### **3. Franchising and licensing**

Consider a fast food company that both operates restaurants and grants franchisees rights to operate restaurants using its brand name under license, and supplies franchisees with some products used in daily operations. As well as charging a license fee, the company also receives a royalty fee of 2% of the franchisee's turnover. Accounting standards require revenue to be split into

categories that have similar characteristics (nature, amounts, timings, and risk factors).

The fast food company would disaggregate revenue into these categories:

- Revenue from company-owned restaurants
- Franchise royalties and fees
- Revenue from supplies to franchises (equipment and food materials)

Franchise fees often grant the franchisee the right to operate over numerous periods and would initially be treated as deferred revenue. Subsequently, it would be amortized to revenue in the income statement over the life of the franchise contract period.

Royalty fees would be included periodically in the franchisor's accounts when they become contractually payable by the franchisee under the terms of the contract.

#### 4. Service versus license

Consider a software supplier that allows customers to purchase a license and install the software on their own machines, or subscribe to a cloud-based solution with access over the internet.

If customers purchase a license and install the software on their own systems, IFRS allows for two treatments:

- a. The software supplier will report revenue over the life of the contract.

Criteria:

- The software supplier will continue to update and enhance the software over the term of the license.
- Customers will be exposed to potential benefits or negative impacts from updates and enhancements.
- Updates and enhancements do not result in a transfer of goods or services.

- b. The software supplier will report revenue at the outset of the contract.

Criteria:

- The license grants the customer the right to use the software as it exists at the start of the contract ("sold as is").
- A separate contract exists for enhancements and updates to the software. The revenue for support services will be recognized when provided (typically over the life of the contract).

If customers access the software without taking physical possession of the software (i.e., cloud-based access), the contract is for a service, and revenue should be recognized over the life of the contract.

#### 5. Bill-and-hold agreements

Bill-and-hold agreements are a type of sales agreement that involves the customer paying for goods ahead of shipping. Typically, when a customer pays ahead of delivery, the revenue is treated as deferred, but revenue may be recorded before shipping if the supplier can demonstrate that its performance obligations are complete and the customer has control over the good. IFRS criteria include the

following: the customer asked for the arrangement, the goods are identified as belonging to the customer, the goods are complete and ready for transfer to the customer, and the goods cannot be redirected to another customer.

Required disclosures under the converged standards include the following:

- Contracts with customers by category
- Assets and liabilities related to contracts, including balances and changes
- Outstanding performance obligations and the transaction prices allocated to them
- Management judgments used to determine the amount and timing of revenue recognition, including any changes to those judgments



### MODULE QUIZ 28.1

1. The first step in the revenue recognition process is to:
  - A. determine the price.
  - B. identify the contract.
  - C. identify the obligations.
2. A contractor agrees to build a bridge for a total price of \$10 million. The project is expected to take four years to complete, at a total cost of \$6.5 million. After Year 1, costs of \$2.5 million have been incurred, and a further \$1 million in costs are incurred in Year 2. The client pays \$2 million in each of the first two years. The amount of revenue the contractor should recognize in Year 2 is closest to:
  - A. \$1.54 million.
  - B. \$2.00 million.
  - C. \$5.38 million.
3. A realtor sells one of its client's houses for \$1.4 million, earning a commission of 3%. The costs to the realtor associated with the sale are \$15,000. What is the realtor's gross profit for this transaction?
  - A. \$27,000.
  - B. \$42,000.
  - C. \$1,385,000.

## MODULE 28.2: EXPENSE RECOGNITION



Video covering this content is available online.

**LOS 28.b: Describe general principles of expense recognition, specific expense recognition applications, implications of expense recognition choices for financial analysis and contrast costs that are capitalized versus those that are expensed in the period in which they are incurred.**

Expenses are subtracted from revenue to calculate net income. According to the IASB, expenses are decreases in economic benefits during the accounting period in the form of outflows or depletions of assets, or incurrence of liabilities that result in decreases in equity other than those relating to distributions to equity participants.<sup>2</sup>

If the financial statements were prepared on a cash basis, neither revenue recognition nor expense recognition would be an issue. The firm would simply recognize cash

received as revenue and cash payments as expense.

Under the accrual method of accounting, expense recognition is in the period in which the economic benefits of the expenditure are consumed. Three different methods are used to achieve this: the matching principle, expensing as incurred, and capitalization.

Using the **matching principle**, expenses to generate revenue are recognized in the same period as the revenue. Inventory provides a good example. Assume that inventory is purchased during the fourth quarter of one year and sold during the first quarter of the following year. Using the matching principle, both the revenue and the expense (cost of goods sold) are recognized in the first quarter of the second year, when the inventory is sold—not the period in which the inventory was purchased. Another example are goods that are sold with a warranty period. The estimated cost of repairing or replacing faulty goods under the warranty must be estimated and deducted from revenue at the time of sale, rather than when the actual costs are incurred.

**Capitalization** is an application of the matching principle whereby costs are initially capitalized as assets on the balance sheet and then expensed, using depreciation or amortization, to the income statement over the asset's life as its benefits are consumed. Property, plant, and equipment (PP&E) and intangible assets with finite lives are examples of this.

Not all expenses can be directly tied to revenue generation. These costs are known as **period costs**. Period costs, such as administrative costs, are expensed in the period incurred. For example, if a firm has occupied a leased premise, one year's worth of rent should be expensed to the income statement regardless of whether the rent has been paid.

An accounting policy that recognizes expenses later rather than sooner is seen as aggressive, while a policy that recognizes expenses earlier is conservative. Expensing is, therefore, more conservative than capitalization.

#### **EXAMPLE: Inventory and the matching principle**

Imagine a trading company that simply buys and resells goods. If the firm had 100 units of sales during the accounting period, we would expect to see cost of goods sold reflect 100 units of cost if we apply the matching principle. If the firm had 20 units of beginning inventory at the start of the year and purchased a further 90 units, the total number of units available for sale would be 110. The matching concept, therefore, requires the company to remove 10 units that are unsold from the income statement and store them in the balance sheet as a current asset (ending inventory). These 10 units will become the next period's beginning inventory.

#### **Matching Cost of Goods Sold to the Number of Units Sold**

|                     | Units       | Units           |
|---------------------|-------------|-----------------|
| Sales               | 100         |                 |
| Beginning inventory | 20          |                 |
| Purchases           | <u>90</u>   |                 |
| Available for sale  | 110         |                 |
| Ending inventory    | <u>(10)</u> | Transfer to B/S |
| Cost of goods sold  | 100         | Remains in I/S  |

Assume the firm had the following transactions in the period:

| <b>Purchase Made During the Period</b> |                      | <b>Total</b>   |
|--|----------------------|----------------|
| Purchase 1                             | 20 units @ \$22 each | \$440          |
| Purchase 2                             | 30 units @ \$25 each | \$750          |
| Purchase 3                             | 30 units @ \$28 each | \$840          |
| Purchase 4                             | 10 units @ \$30 each | <u>\$300</u>   |
| <b>Total</b>                           |                      | <b>\$2,330</b> |

| <b>Sales Made During the Period</b> |                         |                |
|-------------------------------------|-------------------------|----------------|
| <b>Sales</b>                        | <b>100 units @ \$35</b> | <b>\$3,500</b> |

In addition, assume the beginning inventory of 20 units had an associated cost of \$400.

The company has identified that of its 10 units of ending inventory, 8 units relate to Purchase 4, and 2 units relate to Purchase 3.

| <b>Ending inventory at cost</b> | <b>Total</b> |
|---------------------------------|--------------|
| 2 units @ \$28 each             | \$56         |
| 8 units @ \$30 each             | <u>\$240</u> |
| <b>Total</b>                    | <b>\$296</b> |
| <hr/>                           |              |
| <b>Income Statement</b>         | <b>\$</b>    |
| Revenue                         | 3,500        |
| Beginning inventory             | 400          |
| Purchases                       | 2,330        |
| Available for sale              | 2,730        |
| Ending inventory                | <u>(296)</u> |
| Cost of goods sold              | <u>2,434</u> |
| Gross profit                    | 1,066        |

This approach ensures that the company matches the 100 units of sales with 100 units of cost. The \$296 of ending inventory will be a current asset in the company's balance sheet.



#### PROFESSOR'S NOTE

This example used the specific identification method to compute the cost of ending inventory. This method is typically used if a firm can identify exactly which items were sold and which items remain in inventory (e.g.,

an auto dealer records each vehicle sold or in inventory by its identification number).

If the specific cost of each item remaining in ending inventory at period-end cannot be identified, the company will rely on one of three cost flow methodologies to assign cost. The three methods are first-in, first-out (FIFO); last-in, first-out (LIFO); and the weighted average cost method. We will discuss these methods in more detail in our reading on Analysis of Inventories.

## Capitalization vs. Expensing

When a firm makes an expenditure, it can either capitalize the cost as an asset on the balance sheet or expense the cost in the income statement in the period incurred. As a general rule, an expenditure that is expected to provide a future economic benefit over multiple accounting periods is capitalized; however, if the future economic benefit is unlikely or highly uncertain, the expenditure is expensed in the period incurred.

An expenditure that is capitalized is initially recorded as an asset on the balance sheet at cost, which is typically its fair value at acquisition plus any costs necessary to prepare the asset for use. Except for land and intangible assets with indefinite lives (such as acquisition goodwill), the cost is then allocated to the income statement over the life of the asset as **depreciation** expense (for tangible assets), **depletion** (for natural resources), or **amortization** expense (for intangible assets with finite lives). Depreciation, depletion, and amortization reduce the carrying value (net book value) of the asset in the balance sheet, and the expense reduces net income in the income statement. Alternatively, if an expenditure is immediately expensed, current-period pretax income is reduced by the amount of the expenditure.

Once an asset is capitalized, subsequent related expenditures that provide more future economic benefits (e.g., rebuilding the asset) are also capitalized. Subsequent expenditures that merely sustain the usefulness of the asset (e.g., regular maintenance) are expensed when incurred.

### EXAMPLE: Capitalizing vs. expensing

Northwood Corp. purchased new equipment to be used in its manufacturing plant. The cost of the equipment was \$250,000, including \$5,000 freight and \$12,000 of taxes. In addition to the equipment cost, Northwood paid \$10,000 to install the equipment and \$7,500 to train its employees to use the equipment. Over the asset's life, Northwood paid \$35,000 for repairs and maintenance. At the end of five years, Northwood extended the life of the asset by rebuilding the equipment's motors at a cost of \$85,000.

What amounts should be capitalized on Northwood's balance sheet, and what amounts should be expensed in the period incurred?

**Answer:**

Northwood should capitalize all costs that provide future economic benefits, including the costs that are necessary to get the asset ready for use. Rebuilding the equipment's motors extended its life; thus, it increased its future benefits.

**Capitalized Costs**

|                    |   |
|--------------------|---|
| Purchase price     | \$250,000 (including freight and taxes) |
| Installation costs | 10,000                                  |
| Rebuilt motors     | <u>85,000</u>                           |
|                    | <b>\$345,000</b>                        |

Costs that do not provide future economic benefits are expensed in the period incurred. The initial training costs are not necessary to get the asset ready for use. Rather, the training costs are necessary to get the employees ready to use the asset. Thus, the training costs are immediately expensed. Repair and maintenance costs are operating expenditures that do not extend the life of the equipment.

**Costs Expensed When Incurred**

|                         |                 |
|-------------------------|-----------------|
| Initial training costs  | \$7,500         |
| Repairs and maintenance | <u>35,000</u>   |
|                         | <b>\$42,500</b> |

**EXAMPLE: Impact of capitalization on financial statements**

Chair Ltd. was incorporated at the start of the year with the issuance of £40,000 of shares paid in full. The company immediately purchased new equipment to be used in the production process. The machinery cost £12,000 with an estimated useful economic life of four years and no salvage value. The equipment is depreciated using straight-line methodology in the accounts, and we will assume the accounting depreciation is tax deductible. Chair has no other assets and liabilities except cash and PP&E. Assume Chair has revenue of £30,000 per year and an operating profit margin of 40% before considering the impact of the equipment purchase. Chair is subject to a tax rate of 30% and pays no dividends.

Compare and contrast the impact on the financial statement if the cost of equipment is capitalized versus expensed.

**Answer:**

$$\text{straight-line depreciation of equipment} = \frac{\text{£12,000} - 0}{4 \text{ years}} = \text{£3,000 p.a.}$$

**Income Statement: Capitalization of Equipment Cost**

| Year                   | 1<br>£  | 2<br>£  | 3<br>£  | 4<br>£  |
|------------------------|---------|---------|---------|---------|
| Revenue                | 30,000  | 30,000  | 30,000  | 30,000  |
| Operating profit @ 40% | 12,000  | 12,000  | 12,000  | 12,000  |
| Depreciation           | (3,000) | (3,000) | (3,000) | (3,000) |
| Income before tax      | 9,000   | 9,000   | 9,000   | 9,000   |
| Tax @ 30%              | (2,700) | (2,700) | (2,700) | (2,700) |
| Net income             | 6,300   | 6,300   | 6,300   | 6,300   |

### Income Statement: Expensing of Equipment Cost

| Year                   | 1<br>£   | 2<br>£  | 3<br>£  | 4<br>£  |
|------------------------|----------|---------|---------|---------|
| Revenue                | 30,000   | 30,000  | 30,000  | 30,000  |
| Operating profit @ 40% | 12,000   | 12,000  | 12,000  | 12,000  |
| Equipment expense      | (12,000) | 0       | 0       | 0       |
| Income before tax      | 0        | 12,000  | 12,000  | 12,000  |
| Tax @ 30%              | 0        | (3,600) | (3,600) | (3,600) |
| Net income             | 0        | 8,400   | 8,400   | 8,400   |

Capitalization spreads the expense of the equipment in the income statement over the life of the asset. Expensing results in the full cost of the equipment passing through the income statement in the first year, but none in subsequent years; in turn, this causes net income to be lower in the first year, but higher in the subsequent years. Capitalization results in less volatility of earnings when compared to expensing.

### Balance Sheet: Capitalization of Equipment Cost

| End of year                                       | 1<br>£ | 2<br>£ | 3<br>£ | 4<br>£ |
|---|--------|--------|--------|--------|
| Cash  | 37,300 | 46,600 | 55,900 | 65,200 |
| PP&E (net)  | 9,000  | 6,000  | 3,000  | 0      |
| Total assets                                      | 46,300 | 52,600 | 58,900 | 65,200 |
| Share capital & additional paid-in capital (APIC) | 40,000 | 40,000 | 40,000 | 40,000 |
| Retained earnings                                 | 6,300  | 12,600 | 18,900 | 25,200 |
| Total equity                                      | 46,300 | 52,600 | 58,900 | 65,200 |

### Balance Sheet: Expensing of Equipment Cost

| End of year          | 1<br>£        | 2<br>£        | 3<br>£        | 4<br>£        |
|----------------------|---------------|---------------|---------------|---------------|
| Cash                 | 40,000        | 48,400        | 56,800        | 65,200        |
| PP&E (net)           | 0             | 0             | 0             | 0             |
| Total assets         | <u>40,000</u> | <u>48,400</u> | <u>56,800</u> | <u>65,200</u> |
| Share capital & APIC | 40,000        | 40,000        | 40,000        | 40,000        |
| Retained earnings    | 0             | 8,400         | 16,800        | 25,200        |
| Total equity         | <u>40,000</u> | <u>48,400</u> | <u>56,800</u> | <u>65,200</u> |

In the earlier years, total assets and equity are higher if the firm capitalizes costs. This results from including the carrying value of the asset (its cost less accumulated depreciation) in the balance sheet. Equity is higher in Year 1 under capitalization due to higher net income, and therefore, higher retained earnings.

These differences narrow over the asset's life until they are identical at the end. This convergence is caused by two factors:

1. The carrying value of the asset decreases as it is depreciated under the capitalization approach.
2. Although net income is lower in Year 1 if the cost is expensed, it is higher in all the subsequent years.

### Cash Flow Statement: Capitalization of Equipment Cost

| Year                | 1<br>£        | 2<br>£       | 3<br>£       | 4<br>£       |
|---------------------|---------------|--------------|--------------|--------------|
| Operating cash flow | 9,300         | 9,300        | 9,300        | 9,300        |
| Investing cash flow | (12,000)      | 0            | 0            | 0            |
| Financing cash flow | <u>40,000</u> | 0            | 0            | 0            |
| Change in cash      | <u>37,300</u> | <u>9,300</u> | <u>9,300</u> | <u>9,300</u> |

We can state operating cash flow as net income plus noncash charges less working capital investment. The only noncash charge in this example is depreciation.

Working capital investment is assumed to be zero in this example.

|                |               |               |               |               |
|----------------|---------------|---------------|---------------|---------------|
| Opening cash   | 0             | 37,300        | 46,600        | 55,900        |
| Change in cash | <u>37,300</u> | <u>9,300</u>  | <u>9,300</u>  | <u>9,300</u>  |
| Closing cash   | <u>37,300</u> | <u>46,600</u> | <u>55,900</u> | <u>65,200</u> |

### Cash Flow Statement: Expensing of Equipment Cost

| Year                | 1<br>£        | 2<br>£        | 3<br>£        | 4<br>£        |
|---------------------|---------------|---------------|---------------|---------------|
| Operating cash flow | 0             | 8,400         | 8,400         | 8,400         |
| Investing cash flow | 0             | 0             | 0             | 0             |
| Financing cash flow | <u>40,000</u> | <u>0</u>      | <u>0</u>      | <u>0</u>      |
| Change in cash      | 40,000        | 8,400         | 8,400         | 8,400         |
| Opening cash        | 0             | 40,000        | 48,400        | 56,800        |
| Change in cash      | <u>40,000</u> | <u>8,400</u>  | <u>8,400</u>  | <u>8,400</u>  |
| Closing cash        | <u>40,000</u> | <u>48,400</u> | <u>56,800</u> | <u>65,200</u> |

Capitalization requires the investment in equipment to be treated as a cash outflow from investing activities, while expensing treats the cost of equipment as a cash outflow from operating activities. The reason total cash flow differs under the two approaches is that the full tax benefit of the cost is recognized in Year 1 with expensing, while it is spread over the life of the asset under capitalization. At the end of the asset's life, total cash is identical for both approaches.

### Financial statement ratios: Capitalization vs. expensing

| Ratio                                | Year 1 | Year 2 | Year 3 | Year 4 |
|--------------------------------------|--------|--------|--------|--------|
| Total asset turnover: capitalization | 0.7    | 0.6    | 0.5    | 0.5    |
| Total asset turnover: expensing      | 0.8    | 0.7    | 0.6    | 0.5    |
| Net profit margin: capitalization    | 21%    | 21%    | 21%    | 21%    |
| Net profit margin: expensing         | 0%     | 28%    | 28%    | 28%    |
| Return on equity: capitalization     | 14%    | 13%    | 11%    | 10%    |
| Return on equity: expensing          | 0%     | 19%    | 16%    | 14%    |

Total asset turnover (sales / average total assets) is lower if costs are capitalized due to higher balance sheet assets. As the asset's carrying value declines over time and retained earnings converge under the two approaches, the difference in total asset turnover between the two approaches declines.

Net profit margin (net income / sales) is higher in Year 1 if the costs are capitalized because the income statement contains depreciation of £3,000 compared to the full cost of £12,000 if costs are expensed. In subsequent years, expensing will give higher margins as depreciation continues to pass through the income statement when using capitalization, while no cost passes through the income statement after Year 1 if the cost was expensed.

Return on equity (net income / average stockholders' equity) is higher in Year 1 if the cost is capitalized, but lower in subsequent years when compared to expensing. Again, this is due to the impact on net income of depreciation under capitalization versus the one-off charge to the income statement when expensing.

The preceding example demonstrates how the decision to capitalize or expense a cost reduces comparability among companies. Capitalization increases net income, ROE, and CFO in Year 1 at the expense of decreased values in subsequent years. Analysts

should take care to identify different accounting treatments of significant expenditures when comparing companies or industries. Figure 28.1 summarizes the impacts of capitalizing versus expensing.

**Figure 28.1: Financial Statement Effects**

|                             | Capitalizing | Expensing |
|-----------------------------|--------------|-----------|
| Assets & equity             | Higher       | Lower     |
| Net income (first year)     | Higher       | Lower     |
| Net income (other years)    | Lower        | Higher    |
| Income variability          | Lower        | Higher    |
| ROA & ROE (first year)      | Higher       | Lower     |
| ROA & ROE (other years)     | Lower        | Higher    |
| Debt ratio & debt-to-equity | Lower        | Higher    |
| CFO                         | Higher       | Lower     |
| CFI                         | Lower        | Higher    |

The example considered a one-off decision to capitalize or expense. If a company continues to capitalize rather than expense cost in future periods, the profit-enhancing effects of capitalization will continue, provided the capitalized costs in each period exceed depreciation expense.

## Capitalized Interest

When a firm constructs an asset for its own use or, in limited circumstances, for resale, the interest that accrues during the construction period is capitalized as a part of the asset's cost. The reasons for capitalizing interest are to accurately measure the cost of the asset and to better match the cost with the revenues generated by the constructed asset. The treatment of construction interest is similar under U.S. GAAP and IFRS.

Capitalized interest is not reported in the income statement as interest expense. Once construction interest is capitalized, the interest cost is allocated to the income statement through depreciation expense (if the asset is held for use) or COGS (if the asset is held for sale).

Capitalizing interest results in it being reported in the cash flow statement as an outflow from investing activities. This contrasts with the usual treatment of interest paid, which is reported as an outflow from operating activities under U.S. GAAP and can be an operating or financing outflow under IFRS.

For an analyst, both capitalized and expensed interest should be used when calculating interest coverage ratios to get a clearer picture of the company's solvency. Analysts should also adjust income by adding back any depreciation of capitalized interest.

### EXAMPLE: Capitalization of interest

Willock AG is a German company specializing in large infrastructure projects. Due to the highly specialized nature of some equipment, Willock constructs equipment that it will use in projects. In the current period, Willock reports EBIT of €160 million

and an interest expense of €80 million. Footnote disclosures reveal €20 million of interest has been capitalized in assets in the course of construction in the year, and that depreciation resulting from interest capitalized on assets constructed in prior years that are now in use was €10 million.

Calculate the interest coverage ratio before and after adjusting for capitalized interest.

**Answer:**

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

$$\text{before adjustment} = \frac{\text{€160 million}}{\text{€80 million}} = 2.0$$

$$\text{after adjustment} = \frac{\text{€160 million} + \text{€10 million}}{\text{€80 million} + \text{€20 million}} = 1.7$$

Additional depreciation in the income statement due to the capitalization of financing costs during the construction phase is reversed for assets that are now in use, increasing EBIT. Interest capitalized in the current period for equipment in the course of construction is added to interest expense.

**EXAMPLE: Cash flow treatment of capitalized interest**

Continuing the previous example, Willock reported CFO of €70 million and CFI of –€50 million. Willock includes interest paid within its computation of CFO, with the exception of capitalized interest on the construction of equipment. Assuming all interest has been paid by year-end and ignoring any tax implications, what was the impact of interest capitalization on CFO and CFI?

**Answer:**

€20 million interest was capitalized. Had this been expensed instead, CFI would have been €20 million higher, or –€30 million, and CFO would have been €20 million lower, or €50 million. No adjustment for depreciation is required as it is a noncash charge.

## Research and Development Costs

With some exceptions, costs to create intangible assets are expensed as incurred. Important exceptions are research and development costs (under IFRS) and software development costs.

Under IFRS, **research costs**, which are costs aimed at the discovery of new scientific or technical knowledge and understanding, are expensed as incurred. However, **development costs** may be capitalized. Development costs are incurred to translate research findings into a plan or design of a new product or process. To recognize an intangible asset in development, a firm must show that it can complete the asset and intends to use or sell the completed asset, among other criteria.

Under U.S. GAAP, both research and development costs are generally expensed as incurred. However, the costs of creating software for sale to others are treated in a manner similar to the treatment of research and development costs under IFRS. Costs incurred to develop software for sale to others are expensed as incurred until the product's technological feasibility has been established, after which the costs of developing a salable product are capitalized.

To make the financial statements comparable for a company that capitalizes development costs with one that expenses such costs, the income statement should be adjusted to include development costs as an expense, and any current amortization of development cost capitalized in the past should be removed. In the balance sheet, capitalized development costs should be removed, resulting in lower assets and equity. Adjusting the cash flow statement will require capitalized costs to be removed from CFI and included in CFO, which will decrease CFO.

## **Bad Debt Expense and Warranty Expense Recognition**

If a firm sells goods or services on credit or provides a warranty to the customer, the matching principle requires the firm to estimate bad debt expense or warranty expense. To do so, the firm recognizes the expense in the period of the sale, rather than a later period.

## **Implications for Financial Analysis**

Like revenue recognition, expense recognition requires numerous estimates. Because estimates are involved, it is possible for firms to delay or accelerate the recognition of expenses. Delayed expense recognition increases current net income and is, therefore, more aggressive.

Analysts must consider the underlying reasons for a change in an expense estimate. If a firm decreases its bad debt expense, was it because its collection experience improved, or was it to manipulate net income?

Analysts should also compare a firm's estimates to those of other firms in its industry. If a firm's warranty expense is significantly less than that of a peer firm, is that a result of higher quality products, or is the firm's expense recognition more aggressive than that of the peer firm?

Firms disclose their accounting policies and significant estimates in the financial statement footnotes and in the management discussion and analysis (MD&A) section of the annual report.



### **MODULE QUIZ 28.2**

1. If a company purchases an asset with future economic benefits that are highly uncertain, the company should:
  - A. expense the purchase.
  - B. use straight-line depreciation.
  - C. use an accelerated depreciation method.
2. Red Company immediately expenses its development costs, while Black Company capitalizes its development costs. All else equal, Red Company will:

- A. show smoother reported earnings than Black Company.
- B. report higher operating cash flow than Black Company.
- C. report higher asset turnover than Black Company.

## MODULE 28.3: NONRECURRING ITEMS



Video covering  
this content is  
available online.

### LOS 28.c: Describe the financial reporting treatment and analysis of non-recurring items (including discontinued operations, unusual or infrequent items) and changes in accounting policies.

The definition of **unusual or infrequent items** is obvious—these events are either unusual in nature or infrequent in occurrence and are material (significant enough to affect the opinions of financial statement users). Examples of items that could be considered unusual or infrequent include the following:

- Gains or losses from the sale of assets or part of a business, if these activities are not a firm's ordinary operations
- Impairments, write-offs, and write-downs
- Restructuring costs

唯一微信: xuebajun888s

Unusual or infrequent items are included in income from continuing operations and are reported before tax.

Analysts should review unusual or infrequent items to determine whether they truly should be excluded when forecasting a firm's earnings. Some companies appear to be accident-prone and have “unusual or infrequent” losses every year or every few years.

A **discontinued operation** is one that management has decided to dispose of, but either has not yet done so, or has disposed of in the current year after the operation had generated income or losses. To be accounted for as a discontinued operation, the business must be physically and operationally distinct from the rest of the firm, in terms of assets, operations, and investing and financing activities.

The date when the company develops a formal plan for disposing of an operation is referred to as the *measurement date*, and the time between the measurement period and the actual disposal date is referred to as the *phaseout period*. Any income or loss from discontinued operations is reported separately in the income statement, net of tax, after income from continuing operations. Any past income statements presented must be restated, separating the income or loss from the discontinued operations. On the measurement date, the company will accrue any estimated loss during the phaseout period, and any estimated loss on the sale of the business. Any expected gain on the disposal cannot be reported until after the sale is completed.

Analysis of discontinued operations is straightforward: They do not affect net income from continuing operations. For this reason, analysts should exclude discontinued operations when forecasting future earnings. However, the actual event of discontinuing a business segment or selling assets may provide information about the future cash flows of the firm.

## Changes in Accounting Policies and Estimates

Accounting changes include changes in accounting policies, changes in accounting estimates, and prior-period adjustments. Such changes may require either **retrospective application or prospective application**. With retrospective application, any prior-period financial statements presented in a firm's current financial statements must be restated, applying the new policy to those statements as well as future statements. Retrospective application enhances the comparability of the financial statements over time. With prospective application, prior statements are not restated, and the new policies are applied only to future financial statements.

Standard-setting bodies, at times, issue a **change in accounting policy**. Sometimes, a firm may change which accounting policy it applies, for example, by changing its inventory costing method or capitalizing rather than expensing specific purchases. Unless it is impractical, changes in accounting policies require retrospective application.

In the recent change to revenue recognition standards, firms were given the option of *modified retrospective application*. This application does not require restatement of prior-period statements; however, beginning values of affected accounts are adjusted for the cumulative effects of the change.

Generally, a **change in accounting estimate** is the result of a change in management's judgment, usually due to new information. For example, management may change the estimated useful life of an asset because new information indicates that the asset has a longer or shorter life than originally expected. Changes in accounting estimates are applied prospectively and do not require the restatement of prior financial statements.

Accounting estimate changes typically do not affect cash flow. An analyst should review changes in accounting estimates to determine their impact on future operating results.

Sometimes, a change from an incorrect accounting method to one that is acceptable under GAAP or IFRS is required. A correction of an accounting error made in previous financial statements is reported as a **prior-period adjustment** and requires retrospective application. Prior-period results are restated. Disclosure of the nature of any significant prior-period adjustment and its effect on net income is also required.

Prior-period adjustments usually involve errors or new accounting standards and do not typically affect cash flow. Analysts should review adjustments carefully because errors may indicate weaknesses in the firm's internal controls.

## Changes in Scope and Exchange Rates

Accounting standards do not require firms to disclose the impact on their financial statements of changes in scope or exchange rates, but analysts must be alert to their effects. In this context, "changes in scope" refer to how acquiring another company affects the size of the combined entity. Mergers and acquisitions can dramatically reduce comparability of company financial statements before and after the acquisition date. If a company conducts overseas trade or owns overseas subsidiaries, fluctuating

exchange rates can affect its financial statements because overseas sales and purchases and the income statements of overseas subsidiaries need to be converted to the company's reporting currency.



#### PROFESSOR'S NOTE

The Level II CFA curriculum addresses accounting and analysis of business combinations and foreign currency translation.



#### MODULE QUIZ 28.3

1. Changing an accounting estimate:
  - A. is reported prospectively.
  - B. requires restatement of all prior-period statements presented in the current financial statements.
  - C. is reported by adjusting the beginning balance of retained earnings for the cumulative effect of the change.
2. Which of the following transactions would *most likely* be reported below income from continuing operations, net of tax?
  - A. Gain or loss from the sale of equipment used in a firm's manufacturing operation.
  - B. A change from the accelerated method of depreciation to the straight-line method.
  - C. The operating income of a physically and operationally distinct division that is currently for sale, but not yet sold.
3. Which of the following statements about nonrecurring items is *least accurate*?
  - A. Discontinued operations are reported net of taxes, at the bottom of the income statement before net income.
  - B. Unusual or infrequent items are reported before taxes, above net income from continuing operations.
  - C. A change in accounting principle is reported in the income statement net of taxes, before net income.

## MODULE 28.4: EARNINGS PER SHARE



Video covering this content is available online.

**LOS 28.d: Describe how earnings per share is calculated and calculate and interpret a company's basic and diluted earnings per share for companies with simple and complex capital structures including those with antidilutive securities.**

**Earnings per share (EPS)** is one of the most commonly used corporate profitability performance measures for publicly traded firms (nonpublic companies are not required to report EPS data). EPS is reported only for shares of common stock (also known as ordinary stock).

A company may have either a simple or complex capital structure:

- A **simple capital structure** is one that contains *no* potentially dilutive securities. A simple capital structure contains only common stock, nonconvertible debt, and nonconvertible preferred stock.
- A **complex capital structure** contains *potentially dilutive securities* such as employee stock options, warrants, or convertible securities.

All firms with complex capital structures must report both *basic* and *diluted* EPS. Firms with simple capital structures report only basic EPS.

## Basic EPS

The basic EPS calculation does not consider the effects of any dilutive securities in the computation of EPS:

$$\text{basic EPS} = \frac{\text{net income} - \text{preferred dividends}}{\text{weighted average number of common shares outstanding}}$$

The current year's preferred dividends are subtracted from net income because EPS refers to the per-share earnings *available to common shareholders*. Net income minus preferred dividends is the income available to common stockholders. Common stock dividends are *not* subtracted from net income because they are a part of the net income available to common shareholders.

The **weighted average number of common shares** is the number of shares outstanding during the year, weighted by the portion of the year they were outstanding.

### ***Effect of Stock Dividends and Stock Splits***

A **stock dividend** is the distribution of additional shares to each shareholder in an amount proportional to their current number of shares. If a 10% stock dividend is paid, the holder of 100 shares of stock would receive 10 additional shares.

A **stock split** refers to the division of each "old" share into a specific number of "new" (post-split) shares. The holder of 100 shares will have 200 shares after a 2-for-1 split, or 150 shares after a 3-for-2 split.

The important thing to remember is that each shareholder's proportional ownership in the company is unchanged by either of these events. Each shareholder has more shares but the same percentage of the total shares outstanding. For calculating EPS, we apply stock dividends and splits retroactively to the beginning of the year, to all shares before the date of the corporate event. Prior years' weighted average number of common shares is also adjusted as if the stock split or stock dividend had occurred in the prior period, to prevent EPS from appearing to decline when these actions are largely cosmetic.



#### **PROFESSOR'S NOTE**

For our purposes here, a stock dividend and a stock split are two ways of doing the same thing. For example, a 50% stock dividend and a 3-for-2 stock split both result in three "new" shares for every two "old" shares.

The following are key things to know about calculating weighted average shares outstanding:

- The weighting system is days outstanding divided by the number of days in a year, but on the exam, the monthly approximation method will probably be used.
- Shares issued enter into the computation from the date of issuance.
- Reacquired shares are excluded from the computation from the date of reacquisition.

- Shares sold or issued in a purchase of assets are included from the date of issuance.
- A stock split or stock dividend is applied to all shares outstanding before the split or dividend and to the beginning-of-period weighted average shares. A stock split or stock dividend adjustment is not applied to any shares issued or repurchased after the split or dividend date.

### EXAMPLE: Weighted average shares outstanding

Johnson Company has 10,000 shares outstanding at the beginning of the year. On April 1, Johnson issues 4,000 new shares. On July 1, Johnson distributes a 10% stock dividend. On September 1, Johnson repurchases 3,000 shares. Calculate Johnson's weighted average number of shares outstanding for the year, for its reporting of basic earnings per share.

#### Answer:

Shares outstanding are weighted by the portion of the year that the shares were outstanding. Any shares that were outstanding before the 10% stock dividend must be adjusted for it. Transactions that occur after the stock dividend do not need to be adjusted.



#### PROFESSOR'S NOTE

Think of the shares before the stock dividend as "old" shares and shares after the stock dividend as "new" shares that each represent ownership of a smaller portion of the company (in this example, 10/11ths of that of an old [pre-stock dividend] share). The weighted average number of shares for the year will be in new shares.

Shares outstanding on January 1:  $10,000 \times 1.10 \times 12/12$  of the year = 11,000

Shares issued April 1:  $4,000 \times 1.10 \times 9/12$  of the year = 3,300

Shares repurchased September 1:  $-3,000 \times 4/12$  of the year = -1,000

Weighted average shares outstanding = 13,300

### EXAMPLE: Basic earnings per share

Johnson Company has net income of \$10,000, paid \$1,000 cash dividends to its preferred shareholders, and paid \$1,750 cash dividends to its common shareholders. Calculate Johnson's basic EPS using the weighted average number of shares from the previous example.

#### Answer:

$$\begin{aligned}\text{basic EPS} &= \frac{\text{net income} - \text{preferred dividends}}{\text{weighted average shares of common}} \\ &= \frac{\$10,000 - \$1,000}{13,300} = \$0.68\end{aligned}$$



#### PROFESSOR'S NOTE

Remember, the payment of a cash dividend on common shares is not considered in the calculation of EPS.

## Diluted EPS

Before calculating diluted EPS, it is necessary to understand the following terms:

- **Dilutive securities** are stock options, warrants, convertible debt, or convertible preferred stock that would *decrease* EPS if exercised or converted to common stock.
- **Antidilutive securities** are stock options, warrants, convertible debt, or convertible preferred stock that would *increase* EPS if exercised or converted to common stock.

We apply the “if converted” method to examine the impact of potentially dilutive securities. This looks at what EPS would have been if the securities were converted at the start of the accounting period, regardless of whether they can actually be converted during the period.

The numerator of the basic EPS equation contains income available to common shareholders (net income less preferred dividends). In the case of diluted EPS, if there are dilutive securities, the numerator must be adjusted as follows:

- If convertible preferred stock is dilutive (meaning EPS will decrease if it is converted to common stock), the convertible preferred dividends must be added to earnings available to common shareholders.
- If convertible bonds are dilutive, then the bonds’ after-tax interest expense is not considered an interest expense for diluted EPS. Hence, interest expense multiplied by (1 – the tax rate) must be added back to the numerator.



### PROFESSOR'S NOTE

Interest paid on bonds is typically tax deductible for the firm. If convertible bonds are converted to stock, the firm saves the interest cost but loses the tax deduction. Thus, only the after-tax interest savings are added back to income available to common shareholders.

The basic EPS denominator is the weighted average number of shares. When the firm has dilutive securities outstanding, the denominator is adjusted for the equivalent number of common shares that would be created by the conversion of all dilutive securities outstanding (convertible bonds, convertible preferred shares, warrants, and options), with each one considered separately to determine if it is dilutive.

If a dilutive security was issued during the year, the increase in the weighted average number of shares for diluted EPS is based on only the portion of the year the dilutive security was outstanding.

Dilutive stock options or warrants increase the number of common shares outstanding in the denominator for diluted EPS. There is no adjustment to the numerator.

The **diluted EPS equation** is:

$$\text{diluted EPS} = \frac{\text{adjusted income available for common shares}}{\text{weighted-average common and potential common shares outstanding}}$$

where:

$$\begin{aligned}\text{adjusted income available for common shares} &= \text{net income} - \text{preferred dividends} \\ &\quad + \text{dividends on convertible preferred stock} \\ &\quad + \text{after-tax interest on convertible debt}\end{aligned}$$

Therefore, diluted EPS is:

$$\text{diluted EPS} = \frac{\left[ \text{net income} - \frac{\text{preferred dividends}}{\text{shares from conversion of conv. pfd. shares}} \right] + \left[ \frac{\text{convertible preferred dividends}}{\text{shares from conversion of conv. debt}} \right] + \left( \frac{\text{convertible debt interest}}{\text{shares issuable from stock options}} \right) (1 - t)}{\left( \frac{\text{weighted average shares}}{\text{shares from conversion of conv. pfd. shares}} \right) + \left( \frac{\text{shares from conversion of conv. debt}}{\text{shares issuable from stock options}} \right)}$$

The effect of conversion to common shares is included in the calculation of diluted EPS for a given security only if it is, in fact, dilutive. If a firm has more than one potentially dilutive security outstanding, each potentially dilutive security must be examined separately to determine if it is actually dilutive (i.e., would reduce EPS if converted to common stock).

### EXAMPLE: EPS with convertible preferred stock

During 20X6, ZZZ Corp. reported net income of \$4.35 million and had 2 million shares of common stock outstanding for the entire year. ZZZ's 7%, \$5 million par value preferred stock is convertible into common stock at a conversion rate of 1.1 shares for every \$10 of par value. Calculate basic and diluted EPS.

#### Answer:

*Step 1: Calculate 20X6 basic EPS:*

$$\text{basic EPS} = \frac{\$4,350,000 - (0.07) (\$5,000,000)}{2,000,000} = \$2.00$$

*Step 2: Calculate diluted EPS:*

- Compute the increase in common stock outstanding if the preferred stock is converted to common stock at the beginning of 20X6:  $(\$5,000,000 / \$10) \times 1.1 = 550,000$  shares.
- If the convertible preferred shares were converted to common stock, there would be no preferred dividends paid. Therefore, you should add back the convertible preferred dividends that had previously been subtracted from net income in the numerator.
- Compute diluted EPS as if the convertible preferred stock were converted into common stock:

$$\text{diluted EPS} = \frac{\text{net. inc.} - \text{pref. div.} + \text{convert. pref. dividends}}{\text{wt. avg. shares} + \text{convert. pref. common shares}}$$

$$\text{diluted EPS} = \frac{\$4,350,000}{2,000,000 + 550,000} = \$1.71$$

- Check to see if diluted EPS is less than basic EPS ( $\$1.71 < \$2.00$ ). If the answer is yes, the preferred stock is dilutive and must be included in diluted EPS as computed previously. If the answer is no, the preferred stock is antidilutive, and conversion effects are not included in diluted EPS.

A quick way to check whether convertible preferred stock is dilutive is to divide the preferred dividend by the number of shares that will be created if the preferred stock is converted. For ZZZ:

$$\frac{\$5,000,000 \times 0.07}{550,000} = \$0.64$$

Because this is less than basic EPS, the convertible preferred is dilutive.

### EXAMPLE: EPS with convertible debt

During 20X6, YYY Corp. had earnings available to common shareholders of \$2.5 million and had 1 million shares of common stock outstanding for the entire year, for basic EPS of \$2.50. During 20X5, YYY issued 2,000, \$1,000 par, 5% bonds for \$2 million (issued at par). Each of these bonds is convertible to 120 shares of common stock. The tax rate is 30%. Calculate the 20X6 diluted EPS.

#### Answer:

Compute the increase in common stock outstanding if the convertible debt is converted to common stock at the beginning of 20X6:

$$\text{shares issuable for debt conversion} = (2,000)(120) = 240,000 \text{ shares}$$

If the convertible debt is considered converted to common stock at the beginning of 20X6, then there would be no interest expense related to the convertible debt. Therefore, it is necessary to increase YYY's after-tax net income for the after-tax effect of the decrease in interest expense:

$$\text{increase in income} = [(2,000)(\$1,000)(0.05)] (1 - 0.30) = \$70,000$$

Compute diluted EPS as if the convertible debt were common stock:

$$\text{diluted EPS} = \frac{\text{net. inc.} - \text{pref. div.} + \text{convert. int.} (1 - t)}{\text{wt. avg. shares} + \text{convertible debt shares}}$$

$$\text{diluted EPS} = \frac{\$2,500,000 + \$70,000}{1,000,000 + 240,000} = \$2.07$$

Check to make sure that *diluted EPS is less than basic EPS* ( $\$2.07 < \$2.50$ ). If diluted EPS is more than the basic EPS, the convertible bonds are *antidilutive* and should not be treated as common stock in computing diluted EPS.

A quick way to determine whether the convertible debt is dilutive is to calculate its per share impact:

$$\frac{\text{convertible debt interest} (1 - t)}{\text{convertible debt shares}}$$

If this per share amount is greater than basic EPS, the convertible debt is antidilutive, and the effects of conversion should not be included when calculating diluted EPS.

If this per share amount is less than basic EPS, the convertible debt is dilutive, and the effects of conversion should be included in the calculation of diluted EPS.

For YYY:

$$\frac{\$70,000}{240,000} = \$0.29$$

The company's basic EPS is \$2.50, so the convertible debt is dilutive, and the effects of conversion should be included in the calculation of diluted EPS.

Stock options and warrants are dilutive only when their exercise prices are less than the average market price of the stock over the year. If the options or warrants are dilutive, use the **treasury stock method** to calculate the number of shares used in the denominator:

- The treasury stock method assumes that the funds received by the company from the exercise of the options would be used to hypothetically purchase shares of the company's common stock in the market at the average market price.
- The net increase in the number of shares outstanding (the adjustment to the denominator) is the number of shares created by exercising the options less the number of shares hypothetically repurchased with the proceeds of exercise.

### EXAMPLE: EPS with stock options

During 20X6, XXX Corp. reported earnings available to common shareholders of \$1.2 million and had 500,000 shares of common stock outstanding for the entire year, for basic EPS of \$2.40. XXX has 100,000 stock options (or warrants) outstanding the entire year. Each option allows its holder to purchase one share of common stock at \$15 per share. The average market price of XXX's common stock during 20X6 is \$20 per share. Calculate diluted EPS.

#### Answer:

Number of common shares created if the options are exercised = 100,000

Cash inflow if the options are exercised = \$15 per share × 100,000 shares = \$1,500,000

Number of shares that can be purchased with these funds = \$1,500,000 / \$20 = 75,000 shares

Net increase in common shares outstanding from the exercise of the stock options = 100,000 – 75,000 = 25,000 shares

$$\text{diluted EPS} = \frac{\$1,200,000}{500,000 + 25,000} = \$2.29$$

A quick way to calculate the net increase in common shares from the potential exercise of stock options or warrants when the exercise price is less than the average market price is:

$$\left[ \frac{\text{AMP} - \text{EP}}{\text{AMP}} \right] \times N$$

where:

AMP = average market price over the year

EP = exercise price of the options or warrants

N = number of common shares that the options and warrants can be converted into

For XXX:

$$\frac{\$20 - \$15}{\$20} \times 100,000 \text{ shares} = 25,000 \text{ shares}$$



#### MODULE QUIZ 28.4

- Hall Corp. had 100,000 shares of common stock outstanding at the beginning of the year. Hall issued 30,000 shares of common stock on May 1. On July 1, the company issued a 10% stock dividend. On September 1, Hall issued 1,000, 10% bonds, each convertible into 21 shares of common stock. What is the weighted average number of shares to be used in computing diluted EPS, assuming the convertible bonds are dilutive?

- A. 132,000.
- B. 139,000.
- C. 146,000.

- An analyst has gathered the following information about a company:

- 300,000 shares outstanding
- 100,000 warrants exercisable at \$50 per share
- Average share price: \$55
- Year-end share price: \$60

How many shares should be used in computing diluted EPS?

- A. 9,091.
- B. 90,909.
- C. 309,091.

- An analyst has gathered the following information about a company:

- 100,000 common shares outstanding from the beginning of the year
- Earnings: \$125,000
- 1,000, 7%, \$1,000 par bonds convertible into 25 shares each, outstanding as of the beginning of the year
- Tax rate: 40%

The company's diluted EPS is *closest* to:

- A. \$1.22.
- B. \$1.25.
- C. \$1.34.

- An analyst has gathered the following information about a company:

- 50,000 common shares outstanding from the beginning of the year
- Warrants outstanding all year on 50,000 shares, exercisable at \$20 per share
- Stock is selling at year-end for \$25
- Average price of the company's stock for the year was \$15

How many shares should be used in calculating the company's diluted EPS?

- 16,667.
- 50,000.
- 66,667.

## MODULE 28.5: RATIOS AND COMMON-SIZE INCOME STATEMENTS



Video covering this content is available online.

### LOS 28.e: Evaluate a company's financial performance using common-size income statements and financial ratios based on the income statement.

## Common-Size Income Statements

A vertical **common-size income statement** expresses each category of the income statement as a percentage of revenue. The common-size format standardizes the income statement by eliminating the effects of size. This allows for comparison of income statement items over time (time-series analysis) and across firms (cross-sectional analysis). For example, the following are year-end income statements of industry competitors North Company and South Company:

|                        | North Co.         | South Co.      |
|------------------------|-------------------|----------------|
| Revenue                | \$75,000,000      | \$3,500,000    |
| Cost of goods sold     | <u>52,500,000</u> | <u>700,000</u> |
| Gross profit           | \$22,500,000      | \$2,800,000    |
| Administrative expense | 11,250,000        | 525,000        |
| Research expense       | <u>3,750,000</u>  | <u>700,000</u> |
| Operating profit       | \$7,500,000       | \$1,575,000    |

Notice that North is significantly larger and more profitable than South when measured in absolute dollars. North's gross profit is \$22,500,000, as compared to South's gross profit of \$2,800,000. Similarly, North's operating profit of \$7,500,000 is significantly greater than South's operating profit of \$1,575,000.

Once we convert the income statements to common-size format, we can see that South is the more profitable firm on a relative basis. South's gross profit of 80% and operating profit of 45% are significantly greater than North's gross profit of 30% and operating profit of 10%.

|                        | <b>North Co.</b> | <b>South Co.</b> |
|------------------------|------------------|------------------|
| Revenue                | 100%             | 100%             |
| Cost of goods sold     | <u>70%</u>       | <u>20%</u>       |
| Gross profit           | 30%              | 80%              |
| Administrative expense | 15%              | 15%              |
| Research expense       | <u>5%</u>        | <u>20%</u>       |
| Operating profit       | 10%              | 45%              |

Common-size analysis can also be used to examine a firm's strategy. South's higher gross profit margin may be the result of technologically superior products. Notice that South spends more on research than North on a relative basis. This may allow South to charge a higher price for its products.

In most cases, expressing expenses as a percentage of revenue is appropriate. One exception is income tax expense. Tax expense is more meaningful when expressed as a percentage of pretax income. The result is known as the **effective tax rate**.

## Income Statement Ratios

Margin ratios can be used to measure a firm's profitability quickly. **Gross profit margin** is the ratio of gross profit (revenue minus cost of goods sold) to revenue (sales):

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

Gross profit margin can be increased by raising prices or reducing production costs. A firm might be able to increase prices if its products can be differentiated from other firms' products as a result of factors such as brand names, quality, technology, or patent protection. This was illustrated in the previous example whereby South's gross profit margin was higher than North's.

Another popular margin ratio is **net profit margin**. Net profit margin is the ratio of net income to revenue:

$$\text{net profit margin} = \frac{\text{net income}}{\text{revenue}}$$

Net profit margin measures the profit generated after considering all expenses. Like gross profit margin, net profit margin should be compared over time and with the firm's industry peers.

Any subtotal found in the income statement can be expressed as a percentage of revenue. For example, operating profit divided by revenue is known as **operating profit margin**. Pretax accounting profit divided by revenue is known as **pretax margin**.



### MODULE QUIZ 28.5

1. A vertical common-size income statement expresses each category of the income statement as a percentage of:
  - assets.
  - gross profit.

- C. revenue.
2. Which of the following would *most likely* result in higher gross profit margin, assuming no fixed costs?
- A 10% increase in the number of units sold.
  - A 5% decrease in production cost per unit.
  - A 7% decrease in administrative expenses.

## KEY CONCEPTS

### LOS 28.a

Revenue is recognized when earned, and expenses are recognized when incurred.

Accounting standards identify a five-step process for recognizing revenue:

1. Identify the contract(s) with a customer.
2. Identify the performance obligations in the contract.
3. Determine the transaction price.
4. Allocate the transaction price to the performance obligations in the contract.
5. Recognize revenue when (or as) the entity satisfies a performance obligation.

Information that can influence the choice of revenue recognition method includes progress toward completion of a performance obligation, variable considerations and their likelihood of being earned, revisions to contracts, and whether the firm is acting as a principal or an agent in a transaction.

### LOS 28.b

The matching principle requires that firms match revenues recognized in a period with the expenses required to generate them. One application of the matching principle is seen in accounting for inventory, with cost of goods sold as the cost of units sold from inventory that are included in current-period revenue. Other costs, such as depreciation of fixed assets or administrative overhead, are period costs, and they are taken without regard to revenues generated during the period.

With capitalization, the asset value is put on the balance sheet, and the cost is expensed through the income statement over the asset's useful life through either depreciation or amortization. Compared to expensing, capitalization results in the following:

- Lower expense and higher net income in period of acquisition, and higher expense (depreciation or amortization) and lower net income in each of the remaining years of the asset's life
- Higher assets and equity
- Lower CFI and higher CFO because the cost of a capitalized asset is classified as an investing cash outflow
- Higher ROE and ROA in the initial period, and lower ROE and ROA in subsequent periods because net income is lower and both assets and equity are higher
- Lower debt-to-assets and debt-to-equity ratios because assets and equity are higher

Users of financial data should analyze the reasons for any changes in estimates of expenses and compare these estimates with those of peer companies.

#### LOS 28.c

Results of discontinued operations are reported below income from continuing operations, net of tax, from the date the decision to dispose of the operations is made. These results are segregated because they likely are nonrecurring and do not affect future net income.

Unusual or infrequent items are reported before tax and above income from continuing operations. An analyst should determine how “unusual” or “infrequent” these items really are for the company when estimating future earnings or firm value.

Changes in accounting standards, changes in accounting methods applied, and corrections of accounting errors require retrospective restatement of all prior-period financial statements included in the current statement. A change in an accounting estimate, however, is applied prospectively (to subsequent periods) with no restatement of prior-period results.

#### LOS 28.d

$$\text{basic EPS} = \frac{\text{net income} - \text{preferred dividends}}{\text{weighted average number of common shares outstanding}}$$

When a company has potentially dilutive securities, it must report diluted EPS. For any convertible preferred stock, convertible debt, warrants, or stock options that are dilutive, the calculation of diluted EPS is as follows:

$$\text{diluted EPS} = \frac{\left[ \text{net income} - \text{preferred dividends} \right] + \left[ \begin{array}{c} \text{convertible} \\ \text{preferred} \\ \text{dividends} \end{array} \right] + \left( \begin{array}{c} \text{convertible} \\ \text{debt} \\ \text{interest} \end{array} \right)(1 - t)}{\left( \begin{array}{c} \text{weighted} \\ \text{average} \end{array} \right) + \left( \begin{array}{c} \text{shares from} \\ \text{conversion of} \\ \text{conv. pfd. shares} \end{array} \right) + \left( \begin{array}{c} \text{shares from} \\ \text{conversion of} \\ \text{conv. debt} \end{array} \right) + \left( \begin{array}{c} \text{shares} \\ \text{issuable from} \\ \text{stock options} \end{array} \right)}$$

A dilutive security is one that, if converted to its common stock equivalent, would decrease EPS. An antidilutive security is one that would not reduce EPS if converted to its common stock equivalent.

#### LOS 28.e

A vertical common-size income statement expresses each item as a percentage of revenue. The common-size format standardizes the income statement by eliminating the effects of size. Common-size income statements are useful for trend analysis and for comparisons with peer firms.

Two popular profitability ratios are gross profit margin (gross profit / revenue) and net profit margin (net income / revenue). A firm can often achieve higher profit margins by differentiating its products from the competition.

**ANSWER KEY FOR MODULE QUIZZES**

## Module Quiz 28.1

1. **B** The five steps in revenue recognition are as follows:

*Step 1:* Identify the contract or contracts with the customer.

*Step 2:* Identify the performance obligations in the contract(s).

*Step 3:* Determine a transaction price.

*Step 4:* Allocate the transaction price to the performance obligations.

*Step 5:* Recognize revenue when (or as) the performance obligations have been satisfied.

(LOS 28.a)

2. **A** In Year 1, the contractor has incurred 38.5% ( $\$2.5 \text{ million} / \$6.5 \text{ million}$ ) of expected total costs and should recognize 38.5% of total revenue ( $\$10 \text{ million} \times 38.5\% = \$3.85 \text{ million}$ ). By the end of Year 2, a total of \$3.5 million costs have been incurred, 53.8% of expected total costs. Cumulatively, by the end of Year 2, total revenue of  $53.8\% \times \$10 \text{ million} = \$5.38 \text{ million}$  should have been recognized, leaving  $\$1.53 \text{ million} (\$5.38 \text{ million} - \$3.85 \text{ million})$  to be recognized in Year 2. The amount paid by the client does not affect revenue. (LOS 28.a)
3. **A** The realtor is acting as an agent, and so should recognize only the commission as revenue. Revenue should therefore be:  $(\$1.4 \text{ million} \times 3\%) = \$42,000$ . Gross profit will be  $\$42,000 - \$15,000 = \$27,000$ . (LOS 28.a)

## Module Quiz 28.2

1. **A** If the future economic benefits of a purchase are highly uncertain, a company should expense the purchase in the period it is incurred. (LOS 28.b)
2. **C** As compared to a firm that capitalizes its expenditures, a firm that immediately expenses expenditures will report lower assets. Thus, asset turnover (revenue / average assets) will be higher for the expensing firm (lower denominator). (LOS 28.b)

## Module Quiz 28.3

1. **A** A change in an accounting estimate is reported prospectively. No restatement of prior-period statements is necessary. (LOS 28.c)
2. **C** A physically and operationally distinct division that is currently for sale is treated as a discontinued operation. The income from the division is reported net of tax below income from continuing operations. Gains and losses on sales of operating assets, as well as depreciation expense, are reported pretax, above income from continuing operations. (LOS 28.c)
3. **C** A change in accounting principle requires retrospective application; that is, all prior-period financial statements currently presented are restated to reflect the change. (LOS 28.c)

## Module Quiz 28.4

1. **B** The new stock is weighted by 8 / 12. The bonds are weighted by 4 / 12 and are not affected by the stock dividend.

$$\text{basic shares} = \{[100,000 \times (12 / 12)] + [30,000 \times (8 / 12)]\} \times 1.10 = 132,000$$

$$\text{diluted shares} = 132,000 + [21,000 \times (4 / 12)] = 139,000$$

(LOS 28.d)

2. **C** Because the exercise price of the warrants is less than the average share price, the warrants are dilutive. Use the Treasury stock method to determine the denominator impact:

$$\frac{\$55 - \$50}{\$55} \times 100,000 \text{ shares} = 9,091 \text{ shares}$$

Thus, the denominator will increase by 9,091 shares to 309,091 shares. The question asks for the total, not just the impact of the warrants. (LOS 28.d)

3. **B** First, calculate basic EPS:

$$\frac{\$125,000}{100,000} = \$1.25$$

Next, check if the convertible bonds are dilutive:

$$\text{numerator impact} = (1,000 \times 1,000 \times 0.07) \times (1 - 0.4) = \$42,000$$

$$\text{denominator impact} = (1,000 \times 25) = 25,000 \text{ shares}$$

$$\text{per share impact} = \frac{\$42,000}{25,000 \text{ shares}} = \$1.68$$

Because \$1.68 is greater than the basic EPS of \$1.25, the bonds are antidilutive. Thus, diluted EPS = basic EPS = \$1.25. (LOS 28.d)

4. **B** The warrants, in this case, are antidilutive. The average price per share of \$15 is less than the exercise price of \$20. The year-end price per share is not relevant. The denominator consists of only the common stock for basic EPS. (LOS 28.d)

## Module Quiz 28.5

1. **C** Each category of the income statement is expressed as a percentage of revenue (sales). (LOS 28.e)
2. **B** A 5% decrease in per unit production cost will increase gross profit by reducing the cost of goods sold. Assuming no fixed costs, gross profit margin will remain the same if sale quantities increase. Administrative expenses are not included in gross profit margin. (LOS 28.e)

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<sup>1</sup> IFRS 15, *Revenue From Contracts With Customers*.

<sup>2</sup> IASB Framework for the Preparation and Presentation of Financial Statements, paragraph 4.25(b).

# READING 29

## ANALYZING BALANCE SHEETS

### MODULE 29.1: INTANGIBLE ASSETS AND MARKETABLE SECURITIES

**LOS 29.a: Explain the financial reporting and disclosures related to intangible assets.**



Video covering this content is available online.

Intangible assets are nonmonetary assets that lack physical substance. Securities are not considered intangible assets. Intangible assets are either identifiable or unidentifiable. **Identifiable intangible assets** can be acquired separately or are the result of rights or privileges conveyed to their owner. Examples of identifiable intangibles are patents, trademarks, and copyrights. **Unidentifiable intangible assets** cannot be acquired separately and may have an unlimited life. The best example of an unidentifiable intangible asset is goodwill.

Under International Financial Reporting Standards (IFRS), identifiable intangibles that are *purchased* can be reported on the balance sheet using the cost model or the revaluation model, although the revaluation model can only be used if an active market for the intangible asset exists. Both models are basically the same as the measurement models used for property, plant, and equipment. Under U.S. GAAP, only the cost model is allowed.

Except for certain legal costs, intangible assets that are *created internally*, such as research and development costs, are expensed as incurred under U.S. GAAP. Under IFRS, a firm must identify the research stage (discovery of new scientific or technical knowledge) and the development stage (using research results to plan or design products). The firm must expense costs incurred during the research stage but can capitalize costs incurred during the development stage. Criteria a project must meet for the firm to capitalize development costs include the following: the project is technically feasible, the resources exist to complete the project, a market exists for the product, and the company has the intention and resources to complete the project and sell the product.

Finite-lived intangible assets are amortized over their useful lives and tested for impairment in the same way as PP&E. The firm must review its amortization method and useful life estimates at least annually. Intangible assets with indefinite lives are not amortized, but they are tested for impairment at least annually.

Under IFRS and U.S. GAAP, all of the following should be expensed as incurred:

- Start-up and training costs
- Administrative overhead
- Advertising and promotion costs
- Relocation and reorganization costs
- Termination costs

Some analysts choose to eliminate intangible assets when they evaluate balance sheets. However, analysts should consider the value to the firm of each intangible asset before making any adjustments.

### **EXAMPLE: Measuring intangible assets**

The R&D department of Lowe S.A. worked on two projects during the year:

- Project 1 aims to develop hydrogen fuel cells for motor vehicles. The company has not yet developed a working prototype propulsion unit, but it believes if successful, in the long run it could revolutionize the motor industry by producing environmentally clean vehicles.
- Project 2 is to develop a new type of catalytic converter, which would remove more particulates from exhaust fumes than those currently available. The company has developed a working prototype and is now working on a commercial version of the product. Lowe believes the demand from auto manufacturers would be high and has the resources to develop and launch the product.

### **R&D Department Period Costs**

|                         | <b>Project 1</b> | <b>Project 2</b> |
|-------------------------|------------------|------------------|
|                         | <b>€m</b>        | <b>€m</b>        |
| Materials               | 150              | 120              |
| Direct labor            | 80               | 60               |
| Production overhead     | 40               | 30               |
| Administrative overhead | 30               | 30               |

What costs will be capitalized, and what costs should be expensed, if Lowe reports under IFRS?

#### **Answer:**

Project 1: This project is not yet technically feasible, so is still in the research phase. Under IFRS and U.S. GAAP, Lowe should expense all costs.

Project 2: The existence of a working prototype suggests the project is technically feasible and that the project is in the development phase. The company has the resources and intention to complete the project and believes there would be high customer demand when launched. Under IFRS, the development costs should be capitalized while U.S. GAAP would require expensing.

Costs to be capitalized = materials + direct labor + production overhead (120 + 60 + 30) = €210 million.

Administrative costs are expensed as incurred.

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### LOS 29.b: Explain the financial reporting and disclosures related to goodwill.

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Balance sheet **goodwill** results from acquiring another business. Goodwill is the amount by which the purchase price is greater than the fair value of the acquired company's identifiable net assets (assets minus liabilities).

Acquirers are often willing to pay more than the fair value of a target's identifiable net assets because the target may have assets that are not reported on its balance sheet. For example, the target's reputation and customer loyalty certainly have value, but that value is not quantifiable. Also, the target may have research and development assets that remain off the balance sheet because of accounting standards. Finally, part of the acquisition price may reflect perceived synergies from the business combination. For example, the acquirer may be able to eliminate duplicate facilities and reduce payroll after the acquisition.



#### PROFESSOR'S NOTE

Occasionally, the purchase price of an acquisition is less than fair value of the identifiable net assets. In this case, the difference is immediately recognized as a gain in the acquirer's income statement.

Goodwill is only created in a purchase acquisition. Internally generated goodwill is expensed as incurred.

Because it is an intangible asset with indefinite life, goodwill is not amortized but must be tested for impairment at least annually. If goodwill is impaired, the company decreases its value and recognizes a loss in the income statement. The impairment loss does not affect cash flow. Goodwill impairment suggests an acquired business is now worth less than the price the company paid to acquire it, because the company has reduced its estimate of the future excess returns the acquired business is expected to generate.

Acquiring firms might try to take advantage of the fact that goodwill is not amortized, manipulating net income upward by allocating more of an acquisition price to goodwill and less to the identifiable assets, especially when fair value is subjective. Lower-valued identifiable assets result in less future depreciation and amortization expense, and therefore higher net income.

Accounting goodwill should not be confused with **economic goodwill**. Economic goodwill derives from the expected future performance of the firm, while accounting goodwill is the result of past acquisitions.

Some analysts believe goodwill represents the present value of excess returns that the acquired company is expected to contribute, and so it is a legitimate asset. Other analysts believe goodwill is not a genuine asset because it cannot be sold separately

and might result from simply overpaying for an acquired company. Examining impairments of goodwill can be a way to judge how successful companies' past acquisitions have been.

To improve comparability when computing ratios, analysts should eliminate goodwill from balance sheets and goodwill impairment charges from income statements. Also, analysts should evaluate future acquisitions in terms of the price paid relative to the earning power of the acquired assets.

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### **LOS 29.c: Explain the financial reporting and disclosures related to financial instruments.**

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**Financial instruments** are contracts that give rise to both a financial asset of one entity and a financial liability or equity instrument of another entity.<sup>1</sup> Financial instruments can be found on the asset side and the liability side of the balance sheet. Financial instruments held as assets include investment securities (stocks and bonds), derivatives, loans, and receivables.

Accounting standards require some financial instruments to be measured at historical cost, some at amortized cost, and some at fair value. Financial assets measured at cost include unquoted equity investments (for which fair value cannot be reliably measured) and loans to and notes receivable from other entities.

Under U.S. GAAP, debt securities acquired with the intent to hold them until they mature are classified as **held-to-maturity securities** and measured at amortized cost. Amortized cost is equal to the original issue price minus any principal payments, plus any amortized discount or minus any amortized premium, minus any impairment losses. Subsequent changes in market value are ignored.

Financial assets measured at fair value, also known as **mark-to-market accounting**, include trading securities, available-for-sale securities, and derivatives.

**Trading securities** (also known as held-for-trading securities) are debt securities acquired with the intent to sell them in the near term. Trading securities are reported on the balance sheet at fair value, with unrealized gains and losses (changes in market value before the securities are sold) recognized in the income statement. All equity securities holdings with quoted market prices (except those that give a company significant influence over a firm) are treated this way. Unrealized gains and losses are also known as holding period gains and losses. **Derivative instruments** are treated the same as trading securities.



#### **PROFESSOR'S NOTE**

Accounting for equity investments when the share owner has significant influence or control over a firm is addressed at Level II.

**Available-for-sale securities** are debt securities that are not expected to be held to maturity or traded in the near term. Like trading securities, available-for-sale securities are reported on the balance sheet at fair value. However, any unrealized gains and

losses are not recognized in the income statement, but are reported in other comprehensive income as a part of shareholders' equity.

For all financial securities, dividend and interest income and realized gains and losses (actual gains or losses when the securities are sold) are recognized in the income statement.

Figure 29.1 summarizes the different classifications and measurement bases of financial assets under U.S. GAAP.

**Figure 29.1: Financial Asset Measurement Bases—U.S. GAAP**

| <b>Historical Cost</b>      | <b>Amortized Cost</b>       | <b>Fair Value</b>             |
|-----------------------------|-----------------------------|-------------------------------|
| Unlisted equity investments | Held-to-maturity securities | Trading securities            |
| Loans and notes receivable  |                             | Available-for-sale securities |
|                             |                             | Derivatives                   |

#### **EXAMPLE: Classification of investment securities**

Triple D Corporation, a U.S. GAAP reporting firm, purchased a 6% bond, at par, for \$1 million at the beginning of the year. Interest rates have recently increased, and the market value of the bond declined \$20,000. Determine the bond's effect on Triple D's financial statements under each classification of securities.

#### **Answer:**

If the bond is classified as a *held-to-maturity* security, the bond is reported on the balance sheet at \$1,000,000. Interest income of \$60,000 [ $\$1,000,000 \times 6\%$ ] is reported in the income statement.

If the bond is classified as a *trading* security, the bond is reported on the balance sheet at \$980,000. The \$20,000 unrealized loss and \$60,000 of interest income are both recognized in the income statement.

If the bond is classified as an *available-for-sale* security, the bond is reported on the balance sheet at \$980,000. Interest income of \$60,000 is recognized in the income statement. The \$20,000 unrealized loss is reported as part of other comprehensive income.

## **IFRS Treatment of Marketable Securities**

Under IFRS, the three classifications of investment securities are as follows:

1. *Securities measured at amortized cost* (corresponds to the treatment of held-to-maturity securities under U.S. GAAP): IFRS requires that cash flows are solely interest and principal and that the business model is to hold the security to maturity.
2. *Securities measured at fair value through other comprehensive income* (corresponds to the treatment of available-for-sale securities under U.S. GAAP)

**3. Securities measured at fair value through profit and loss** (corresponds to the treatment of trading securities under U.S. GAAP)

While the three different treatments are essentially the same as those used under U.S. GAAP, there are significant differences in how securities are classified under IFRS and U.S. GAAP. Similarities and differences are as follows:

- Under both IFRS and U.S. GAAP, loans, notes receivable, debt securities that a firm intends to hold until maturity, and unlisted securities for which fair value cannot be reliably determined, are all *measured at (amortized) historical cost*.
- Under IFRS, debt securities for which a firm intends to collect interest payments but also to sell the securities are *measured at fair value through other comprehensive income*. This is similar to the treatment of available-for-sale securities under U.S. GAAP.
- Under IFRS, firms may make an irrevocable choice at the time of purchase to account for equity securities as *measured at fair value through other comprehensive income*. Equity securities cannot be classified as available-for-sale under U.S. GAAP.
- Under IFRS, financial assets that do not fit either of the other two classifications are *measured at fair value through profit and loss* (unrealized gains and losses reported on the income statement).
- Under IFRS, firms can make an irrevocable choice to carry any financial asset at *fair value through profit and loss*. This choice is not available under U.S. GAAP.

Figure 29.2 summarizes the different classifications of financial assets under IFRS.

**Figure 29.2: Financial Asset Classifications—IFRS**

| Measured at Amortized Cost  | Measured at Fair Value Through Other Comprehensive Income  | Measured at Fair Value Through Profit and Loss  |
|---|--|---|
| <ul style="list-style-type: none"> <li>■ Debt securities acquired with the intent to hold them to maturity</li> <li>■ Loans receivable</li> <li>■ Notes receivable</li> <li>■ Unlisted equity securities if fair value cannot be determined reliably</li> </ul> | <ul style="list-style-type: none"> <li>■ Debt securities acquired with intent to collect interest payments but sell before maturity</li> <li>■ Equity securities only if this treatment is chosen at time of purchase</li> </ul> | <ul style="list-style-type: none"> <li>■ Debt securities acquired with intent to sell in near term</li> <li>■ Equity securities (unless fair value through OCI is chosen at time of purchase)</li> <li>■ Derivatives</li> <li>■ Any security not assigned to the other two categories</li> <li>■ Any security for which this treatment is chosen at time of purchase</li> </ul> |

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## **LOS 29.d: Explain the financial reporting and disclosures related to non-current liabilities.**

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**Long-term financial liabilities** include bank loans, notes payable, bonds payable, and some derivatives. If the financial liabilities are not issued at face value, the liabilities are usually reported on the balance sheet at amortized cost. If the issuance value differs from face value, any premium or discount is amortized through interest expense over the life of the liability. Amortized cost at any point in the liability's life is equal to the issue price minus any principal payments, plus any amortized discount or minus any amortized premium. Amortizing premiums and discounts causes the balance sheet liability to move toward face value at maturity of the liability.

In some cases, financial liabilities are reported at fair value. Examples include held-for-trading liabilities such as a short position in a stock (which may be classified as a short-term liability), derivative liabilities, and nonderivative liabilities with exposures hedged by derivatives.

**Deferred tax liabilities** are income taxes payable in future periods as a result of timing differences between financial accounting and tax accounting. Deferred tax liabilities are created when the amount of income tax expense recognized in the income statement is greater than taxes payable using tax accounting. This can occur when expenses or losses are tax deductible before they are recognized in the income statement. A common example is when a firm uses an accelerated depreciation method for tax purposes and the straight-line method for financial reporting. Deferred tax liabilities are also created when revenues or gains are recognized in the income statement before they are taxable. For example, a firm often recognizes the earnings of a subsidiary before any distributions (dividends) are made. Eventually, deferred tax liabilities will reverse when the taxes are paid.



### **PROFESSOR'S NOTE**

We explain deferred tax items in more detail in our reading on Analysis of Income Taxes.



### **MODULE QUIZ 29.1**

1. For a company reporting under IFRS, product development costs:
  - A. must always be capitalized.
  - B. may be capitalized.
  - C. must be expensed.
2. The SF Corporation has created employee goodwill by reorganizing its retirement benefit package. An independent management consultant estimated the value of the goodwill at \$2 million. In addition, SF recently purchased a patent that was developed by a competitor. The patent has an estimated useful life of five years. Should SF report the goodwill and patent on its balance sheet?

| <u>Goodwill</u> | <u>Patent</u> |
|-----------------|---------------|
| A. Yes          | No            |
| B. No           | Yes           |
| C. No           | No            |

3. At the beginning of the year, the Parent Company purchased all 500,000 shares of Sub, Inc. for \$15 per share. Just before the acquisition date, Sub's balance sheet reported net assets of \$6 million. Parent determined the fair value of Sub's property and equipment was \$1 million higher than reported by Sub. What amount of goodwill should Parent report as a result of its acquisition of Sub?
- A. \$0.
  - B. \$500,000.
  - C. \$1,500,000.
4. At the beginning of the year, Company P purchased \$80,000 face value of Company S corporate bonds for \$77,000. Company P intends to hold these bonds for several years but sell them before they mature. At the end of the year, the market value of the bonds was \$75,000. What amount should Company P report on its balance sheet at year-end for the investment in Company S bonds?
- A. \$75,000.
  - B. \$77,000.
  - C. \$80,000.
5. Which of the following comments is *most accurate* for a company that has issued bonds at a discount?
- A. The liability value will increase with the passage of time.
  - B. The bond will be recorded at fair value in the balance sheet.
  - C. Amortized cost may not be used if the company intends to repurchase the bond before maturity.

## MODULE 29.2: COMMON-SIZE BALANCE SHEETS



Video covering this content is available online.

### LOS 29.e: Calculate and interpret common-size balance sheets and related financial ratios.

A vertical **common-size balance sheet** expresses each item of the balance sheet as a percentage of total assets. The common-size format standardizes the balance sheet by eliminating the effects of size. This allows for comparison over time (time-series analysis) and across firms (cross-sectional analysis).

#### EXAMPLE: Common-size balance sheets

The following are the balance sheets of industry competitors East Company (East) and West Company (West).

|                                     | East            | West            |
|-------------------------------------|-----------------|-----------------|
| Cash                                | \$2,300         | \$1,500         |
| Accounts receivable                 | 3,700           | 1,100           |
| Inventory                           | <u>5,500</u>    | <u>900</u>      |
| Current assets                      | 11,500          | 3,500           |
| Plant and equipment                 | 32,500          | 11,750          |
| Goodwill                            | <u>1,750</u>    | <u>0</u>        |
| Total assets                        | \$45,750        | \$15,250        |
|                                     |                 |                 |
| Current liabilities                 | \$10,100        | \$1,000         |
| Long-term debt                      | <u>26,500</u>   | <u>5,100</u>    |
| Total liabilities                   | 36,600          | 6,100           |
| Equity                              | <u>9,150</u>    | <u>9,150</u>    |
| <b>Total liabilities and equity</b> | <b>\$45,750</b> | <b>\$15,250</b> |

Convert each balance sheet to a vertical common-size balance sheet and interpret the results.

**Answer:**

East is obviously the larger company. By converting the balance sheets to common-size format, we can eliminate the size effect.

|                                     | East        | West        |
|-------------------------------------|-------------|-------------|
| Cash                                | 5%          | 10%         |
| Accounts receivable                 | 8%          | 7%          |
| Inventory                           | <u>12%</u>  | <u>6%</u>   |
| Current assets                      | 25%         | 23%         |
| Plant and equipment                 | 71%         | 77%         |
| Goodwill                            | <u>4%</u>   | <u>0%</u>   |
| Total assets                        | 100%        | 100%        |
|                                     |             |             |
| Current liabilities                 | 22%         | 7%          |
| Long-term debt                      | <u>58%</u>  | <u>33%</u>  |
| Total liabilities                   | 80%         | 40%         |
| Equity                              | <u>20%</u>  | <u>60%</u>  |
| <b>Total liabilities and equity</b> | <b>100%</b> | <b>100%</b> |

East's investment in current assets of 25% of total assets is slightly higher than West's current assets of 23%. However, East's current liabilities of 22% of total assets are significantly higher than West's current liabilities of 7%. Thus, East is less liquid and may have more difficulty paying its current obligations when due. However, West's superior working capital position may not be an efficient use of resources. The investment returns on working capital are usually lower than the returns on long-term assets.

A closer look at current assets reveals that East reports less cash as a percentage of assets than West. In fact, East does not have enough cash to satisfy its current liabilities without selling more inventory and collecting receivables. East's inventories of 12% of total assets are higher than West's inventories of 6%. Carrying higher inventories may be an indication of inventory obsolescence. Further analysis of inventory is necessary.

Not only are East's current liabilities higher than West's, but East's long-term debt of 58% of total assets is much greater than West's long-term debt of 33%. Thus, East may have trouble satisfying its long-term obligations because its capital structure consists of more debt.

Common-size analysis can also be used to examine a firm's strategies. East appears to be growing through acquisitions because it is reporting goodwill. West is growing internally because no goodwill is reported. It could be that East is financing the acquisitions with debt.

The percentages on a common-size balance sheet are examples of **balance sheet ratios**, which compare one balance sheet item to another balance sheet item (total assets in this case). Balance sheet ratios, along with common-size analysis, can be used to evaluate a firm's liquidity and solvency. The results can be compared over time and across firms.

**Liquidity ratios** measure the firm's ability to satisfy its short-term obligations as they come due. Liquidity ratios include the current ratio, the quick ratio, and the cash ratio:

$$\text{current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

$$\text{quick ratio} = \frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{current liabilities}}$$

$$\text{cash ratio} = \frac{\text{cash} + \text{marketable securities}}{\text{current liabilities}}$$

Although all three ratios measure a firm's ability to pay current liabilities, they should be considered collectively. For example, assume Firm A has a higher current ratio but a lower quick ratio than Firm B. This must result from Firm A having higher inventory than Firm B, because the quick ratio (also known as the acid-test ratio) excludes inventory from current assets. Similar analysis can be performed by comparing the quick ratio to the cash ratio, which excludes inventory and receivables.

**Solvency ratios** measure a firm's ability to satisfy its long-term obligations. Solvency ratios include the long-term debt-to-equity ratio, the total debt-to-equity ratio, the debt ratio, and the financial leverage ratio:

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

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

$$\text{debt ratio} = \frac{\text{total debt}}{\text{total assets}}$$

$$\text{financial leverage ratio} = \frac{\text{total assets}}{\text{total equity}}$$

All four ratios measure solvency, but they should be considered collectively. For example, Firm A might have a higher long-term debt-to-equity ratio but a lower total debt-to-equity ratio as compared to Firm B. This would indicate that Firm B is using more short-term debt to finance itself.

When calculating solvency ratios, debt is typically considered to be any interest-bearing obligation. The financial leverage ratio captures the impact of all interest-bearing and non-interest-bearing obligations.

Analysts must understand the limitations of balance sheet ratio analysis:

- Comparisons with peer firms are limited by differences in accounting standards and estimates.
- Ratios might not be comparable for firms that operate in different industries.
- Interpretation of ratios requires significant judgment.
- Balance sheet data are only measured at a single point in time.



### MODULE QUIZ 29.2

1. A vertical common-size balance sheet expresses each category of the balance sheet as a percentage of:
  - A. assets.
  - B. equity.
  - C. revenue.
2. Which of the following ratios are used to measure a firm's liquidity and solvency?

| <u>Liquidity</u>        | <u>Solvency</u>          |
|-------------------------|--------------------------|
| A. Current ratio        | Quick ratio              |
| B. Debt-to-equity ratio | Financial leverage ratio |
| C. Cash ratio           | Total debt ratio         |

## KEY CONCEPTS

### LOS 29.a

Intangible assets created internally are expensed as incurred. Purchased intangibles with finite lives are treated in a way similar to tangible assets. Purchased intangibles with indefinite lives are not amortized but must be tested for impairment periodically.

Under IFRS, research costs are expensed as incurred and development costs are capitalized if certain criteria are satisfied. Both research and development costs are expensed under U.S. GAAP.

### LOS 29.b

Goodwill is the excess of purchase price over the fair value of identifiable net assets in a business acquisition. Goodwill is not amortized, but must be tested for impairment at least annually.

### LOS 29.c

Under IFRS, debt securities acquired with the intent to hold them to maturity are measured at amortized cost. Debt securities acquired with the intent to collect interest

payments but sell before maturity are measured at fair value through other comprehensive income. Debt securities acquired with the intent to sell them in the near term, as well as equity securities and derivatives, are measured at fair value through profit and loss.

IFRS permits firms to elect, irrevocably at the time of purchase, to measure equity securities at fair value through other comprehensive income, or any security at fair value through profit and loss.

Under U.S. GAAP, held-to-maturity securities are reported at amortized cost. Trading securities, available-for-sale securities, and derivatives are reported at fair value. For trading securities and derivatives, unrealized gains and losses are recognized in the income statement. Unrealized gains and losses for available-for-sale securities are reported in equity (other comprehensive income). Equity securities cannot be classified as available-for-sale.

#### **LOS 29.d**

Financial liabilities that are not issued at face value are reported at amortized cost. The liability will move toward par value at maturity as the premium or discount (relative to par) is amortized. Held-for-trading liabilities and derivative liabilities are reported at fair value.

Deferred tax liabilities result from temporary timing differences between a firm's tax reporting and its financial reporting.

#### **LOS 29.e**

A vertical common-size balance sheet expresses each item of the balance sheet as a percentage of total assets. The common-size format standardizes the balance sheet by eliminating the effects of size. This allows for comparison over time (time-series analysis) and across firms (cross-sectional analysis).

Balance sheet ratios, along with common-size analysis, can be used to evaluate a firm's liquidity and solvency. Liquidity ratios measure the firm's ability to satisfy its short-term obligations as they come due. Liquidity ratios include the current ratio, the quick ratio, and the cash ratio.

Solvency ratios measure the firm's ability to satisfy its long-term obligations. Solvency ratios include the long-term debt-to-equity ratio, the total debt-to-equity ratio, the debt ratio, and the financial leverage ratio.

## **ANSWER KEY FOR MODULE QUIZZES**

### **Module Quiz 29.1**

1. **B** Product development costs may be capitalized under IFRS if certain criteria are met (e.g., the company has identified a customer base, has sufficient resources to complete the product, and intends to sell the product). U.S. GAAP requires all product development expenditure to be expensed. (LOS 29.a)

2. **B** Goodwill developed internally is expensed as incurred. The purchased patent is reported on the balance sheet. (LOS 29.a)
3. **B** The purchase price of \$7,500,000 ( $\$15 \text{ per share} \times 500,000 \text{ shares}$ ) – fair value of net assets of \$7,000,000 ( $\$6,000,000 \text{ book value} + \$1,000,000 \text{ increase in property and equipment}$ ) = goodwill of \$500,000. (LOS 29.a)
4. **A** Debt securities acquired with the intent to sell before maturity are reported on the balance sheet at their fair values. (LOS 29.b)
5. **A** Financial liabilities are typically recognized at amortized cost. Amortization of a discount will increase the liability over time so that it equals par at the bond's maturity (the opposite is true of bonds issued at a premium). (LOS 29.c)

## Module Quiz 29.2

1. **A** Each category of the balance sheet is expressed as a percentage of total assets. (LOS 29.e)
2. **C** The current ratio, quick ratio, and cash ratio measure liquidity. The debt-to-equity, the total debt ratio, and the financial leverage ratio measure solvency. (LOS 29.e)

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<sup>1</sup> IAS 32, *Financial Instruments: Presentation*, 32.11.

## READING 30

# ANALYZING STATEMENTS OF CASH FLOWS I

### MODULE 30.1: CASH FLOW INTRODUCTION AND DIRECT METHOD CFO



Video covering this content is available online.

#### LOS 30.a: Describe how the cash flow statement is linked to the income statement and the balance sheet.

The **cash flow statement** provides information for a reporting period beyond that available from the income statement, which is based on accrual, rather than cash, accounting. Analysts use cash flow statements to understand:

- A company's cash receipts and cash payments during an accounting period
- A company's operating, investing, and financing activities
- The impact of accrual accounting events on cash flows
- A company's quality of earnings

An analyst can use the statement of cash flows to assess a firm's liquidity, solvency, and financial flexibility, including:

- Whether regular operations generate enough cash to sustain the business
- Whether the firm generates enough cash to pay off existing debts as they mature
- Whether the firm is likely to need additional financing
- Whether the firm can meet unexpected obligations
- Whether the firm can take advantage of new business opportunities as they arise

The cash flow statement reconciles the beginning and ending balances of cash in the balance sheet over an accounting period. The change in cash is a result of the firm's operating, investing, and financing activities, as follows:

|     |                               |
|-----|-------------------------------|
|     | <b>Operating cash flow</b>    |
| +/- | <b>Investing cash flow</b>    |
| +/- | <b>Financing cash flow</b>    |
| =   | <b>Change in cash balance</b> |
| +   | <b>Beginning cash balance</b> |
| =   | <b>Ending cash balance</b>    |

Earnings are considered to be of high quality when operating cash flows, which can also be called cash flow from operations (CFO), are close to or higher than reported earnings. If earnings are consistently higher than CFO, their quality is lower because the accruals-based earnings are not backed by cash creation from operating activities.

Like the statement of cash flows, the income statement is a “flow” statement (sometimes referred to as a dynamic statement), as it shows the company’s performance between two balance sheet dates. However, due to the accruals concept, net income is not the same as cash generated by the company. In addition, many financing and investing cash flows do not affect the income statement at the time of the transactions.

With respect to the balance sheet, operating activities relate (with a few exceptions) to the firm’s current assets and current liabilities. Investing activities typically relate to the firm’s noncurrent assets, and financing activities typically relate to the firm’s noncurrent liabilities and equity.

Transactions for which the timing of revenue or expense recognition differs from the receipt or payment of cash are reflected in changes in balance sheet accounts. For example, when revenues (sales) exceed cash collections, the firm has sold items on credit, and accounts receivable (an asset) increase. The opposite occurs if customers repay more on their outstanding accounts than the firm extends in new credit: cash collections exceed revenues, and accounts receivable decrease. Similarly, when purchases from suppliers exceed cash payments, accounts payable (a liability) increase. When cash payments exceed purchases, accounts payable decrease.

It is helpful to understand how transactions affect each balance sheet account. For example, accounts receivable are increased by sales on credit and decreased by cash collections. We can summarize this relationship as follows:

|                                      |                              |
|--------------------------------------|------------------------------|
| <b>Beginning accounts receivable</b> | <b>Opening balance sheet</b> |
| + Sales                              | Income statement             |
| - <u>Cash collections</u>            | Cash flow statement          |
| = Ending accounts receivable         | Closing balance sheet        |

Knowing three of the four variables, we can solve for the fourth. For example, if beginning accounts receivable are €10,000, ending accounts receivable are €15,000, and sales are €68,000, then cash collections must equal €63,000.

By rearranging this relationship, we can say that cash = sales – ending accounts receivable + beginning accounts receivable, or cash = sales – change in accounts receivable. Cash = €68,000 – (€15,000 – €10,000) = €63,000.

Revenue recognition standards affect when a sale is recorded in the income statement, but not the timing of cash flows from the customer. If a firm receives cash from a customer in advance of the sale being recorded in the income statement (unearned revenue), the cash received will appear in the cash flow statement at the time of payment, not when the sale is recorded. For example, if a company provided a service agreement to a customer, the cash received is reflected in the cash flow statement when the customer pays for the contract (normally in advance), but revenue recognized in the income statement is spread over the life of the contract.

### **EXAMPLE: Balance sheet and income statement impacts on cash flow**

Loftus Communications Limited provides equipment sales and installation of telecommunication equipment. Loftus also provides maintenance for systems installed under service contracts. Revenue from maintenance contracts is deferred and recognized over the life of the contract.

### **Selected Financial Statement Data: Loftus Communications Limited**

| Financial year                  | 20X2      | 20X1      |
|---------------------------------|-----------|-----------|
|                                 | £m        | £m        |
| <b>Income statement extract</b> |           |           |
| Revenues                        | 2,000,000 | 1,800,000 |
| <b>Balance sheet extract</b>    |           |           |
| Accounts receivable             | 900,000   | 500,000   |
| Unearned revenue (deferred)     | 1,000,000 | 300,000   |

Calculate the cash received from customers in 20X2.

#### **Answer:**

|                                 | <b>20X2</b>      |
|---------------------------------|------------------|
|                                 | £m               |
| Revenue                         | 2,000,000        |
| Increase in accounts receivable | (400,000)        |
| Increase in unearned revenue    | <u>700,000</u>   |
| Cash received from customers    | <u>2,300,000</u> |

The increase in accounts receivable represents credit extended to customers, which is a use of cash from the firm's perspective. The increase in unearned revenue represents services that customers have paid for in advance, a source of cash.

Understanding these interrelationships is not only useful in preparing the cash flow statement, but is also helpful in uncovering accounting shenanigans, as we will see in our reading on Financial Reporting Quality.

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**LOS 30.b: Describe the steps in the preparation of direct and indirect cash flow statements, including how cash flows can be computed using income statement**

## and balance sheet data.

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### PROFESSOR'S NOTE

Throughout the discussion of the direct and indirect methods, remember the following points:

- The terms *cash flow from operations (CFO)*, *cash flow from operating activities*, and *operating cash flows (OCF)* are used interchangeably in the Level I CFA curriculum.
- Two methods can be used in the accounts to present CFO. CFO is presented differently under the direct and indirect methods, but the result is the same under both methods.
- Cash flow from investing (CFI) and cash flow from financing (CFF) are each presented the same way regardless of which method a firm chooses to present CFO.
- An increase in an asset account is a use of cash, and a decrease in an asset account is a source of cash.
- An increase in a liability account is a source of cash, and a decrease in a liability is a use of cash.
- Sources of cash are positive numbers (cash inflows), and uses of cash are negative numbers (cash outflows).

## The Direct Method for Cash Flow From Operating Activities

The direct method of presenting a firm's statement of cash flows shows only cash payments and cash receipts over the period. The sum of these inflows and outflows is CFO. The direct method gives an analyst more information than the indirect method (which we will explain later in this reading). The analyst can see the actual amounts that went to each use of cash and that were received from each source of cash. This information can help the analyst to better understand the firm's performance over time and to forecast future cash flows.

The following are common components that appear on a statement of cash flows presented using the direct method:

- Cash collected from customers (typically the main component of CFO)
- Cash used in the production of goods and services (cash inputs)
- Cash operating expenses, such as salaries
- Cash paid for interest
- Cash paid for taxes

These are steps for the direct method:

*Step 1:* Start at the top of the income statement with revenue.

*Step 2:* Examine the balance sheet for any assets or liabilities (typically current) relating to the income statement item.

**Step 3:** Compute the change in the balance sheet asset or liability.

**Step 4:** Adjust the income statement for the change in the balance sheet amount using the following rules:

- Subtract an increase in an asset (a use of cash), or add a decrease in an asset (a source of cash).
- Add an increase in a liability (a source of cash), or subtract a decrease in a liability (a use of cash).

For these rules to work consistently, we must *treat expense items as negative numbers* (e.g., cost of goods sold, wages and salaries) before we adjust them.

**Step 5:** After adjusting the income statement item for the change in the balance sheet asset or liability, move to the next item in the income statement.

**Step 6:** Ignore any noncash charges (e.g., depreciation, gains and losses on asset disposal). A noncash charge is any amount in the income statement that is due to accounting treatment rather than actual cash flows.

**Step 7:** Once all income statement items have been adjusted for accruals, total the amount to get CFO.

### **EXAMPLE: CFO using the direct method**

Use the following balance sheet and income statement to prepare operating cash flows using the direct method. The company produces its financial statements under U.S. GAAP.

#### **Income Statement for 20X7**

|                                   | \$            |
|-----------------------------------|---------------|
| Sales                             | 104,000       |
| Expenses                          |               |
| Cost of goods sold                | 40,000        |
| Wages                             | 5,000         |
| Depreciation                      | 7,000         |
| Interest                          | <u>1,000</u>  |
| Total expenses                    | <u>53,000</u> |
| Income from continuing operations | 51,000        |
| Gain from sale of land            | 10,000        |
| Loss on disposals of PP&E         | <u>2,000</u>  |
| Pretax income                     | 59,000        |
| Provision for income taxes        | <u>20,000</u> |
| Net income                        | 39,000        |
| Common dividends declared         | <u>8,500</u>  |

#### **Balance Sheets for 20X7 and 20X6**

|   | 20X7            | 20X6           |
|---|-----------------|----------------|
| Assets  | \$              | \$             |
| <b>Current assets</b>                             |                 |                |
| Cash  | 53,000          | 11,500         |
| Accounts receivable                               | 10,000          | 9,000          |
| Inventory   | <u>5,000</u>    | <u>7,000</u>   |
| Total current assets                              | 68,000          | 27,500         |
| <b>Noncurrent assets</b>                          |                 |                |
| Land  | 35,000          | 40,000         |
| Gross plant and equipment                         | 69,000          | 60,000         |
| Less: accumulated depreciation                    | <u>(12,000)</u> | <u>(9,000)</u> |
| Net plant and equipment                           | 57,000          | 51,000         |
| Goodwill  | <u>10,000</u>   | <u>10,000</u>  |
| Total assets                                      | 170,000         | 128,500        |
| <b>Liabilities</b>                                |                 |                |
| <b>Current liabilities</b>                        |                 |                |
| Accounts payable                                  | 9,000           | 5,000          |
| Wages payable                                     | 4,500           | 8,000          |
| Interest payable                                  | 3,500           | 3,000          |
| Unearned revenue                                  | 6,000           | 2,000          |
| Taxes payable                                     | 5,000           | 4,000          |
| Dividends payable                                 | <u>6,000</u>    | <u>1,000</u>   |
| Total current liabilities                         | 34,000          | 23,000         |
| <b>Noncurrent liabilities</b>                     |                 |                |
| Bonds payable                                     | 15,000          | 10,000         |
| Deferred tax liability                            | <u>20,000</u>   | <u>15,000</u>  |
| Total liabilities                                 | 69,000          | 48,000         |
| <b>Stockholders' equity</b>                       |                 |                |
| Common stock                                      | 15,000          | 20,000         |
| Additional paid in capital                        | <u>25,000</u>   | <u>30,000</u>  |
| Contributed capital                               | 40,000          | 50,000         |
| Retained earnings                                 | <u>61,000</u>   | <u>30,500</u>  |
| Total equity                                      | <u>101,000</u>  | <u>80,500</u>  |
| <b>Total liabilities and stockholders' equity</b> | <b>170,000</b>  | <b>128,500</b> |

### Answer:

Start at the top of the income statement and adjust each line for the change in balance sheet asset and liabilities that arise due to the accruals process.

| Cash collected from customers          | \$           |
|--|--------------|
| Sales                                  | 104,000      |
| Increase in accounts receivable        | (1,000)      |
| Increase in unearned revenue liability | <u>4,000</u> |
| Cash collected                         | 107,000      |

To calculate cash paid to suppliers, adjust cost of goods sold for the change in inventory (the result is purchases for the period) and for the change in accounts payable.

| Cash paid to suppliers       | \$           |
|------------------------------|--------------|
| Cost of goods sold           | (40,000)     |
| Decrease in inventory        | <u>2,000</u> |
| Purchases                    | (38,000)     |
| Increase in accounts payable | <u>4,000</u> |
| Cash paid to suppliers       | (34,000)     |

All expenses, including cost of goods sold, must be treated as negative values if we wish to apply the rules for sources and uses of cash. Expenses in the income statement may be shown as either negative or positive values in the financial statements at the company's discretion. Users of the accounts are expected to know that revenue and gains increase net income, and that expenses and losses decrease it.

| Wages paid                | \$             |
|---------------------------|----------------|
| Wage expense              | (5,000)        |
| Decrease in wages payable | <u>(3,500)</u> |
| Cash paid to employees    | (8,500)        |

The next line in the income statement is depreciation. When using the direct method we ignore depreciation because it is not a cash flow.

| Interest paid                | \$         |
|------------------------------|------------|
| Interest expense             | (1,000)    |
| Increase in interest payable | <u>500</u> |
| Cash interest paid           | (500)      |

We also ignore the gain from sale of land and the loss on disposal of PP&E because these items relate to investing activities (CFI) and not operating activities (CFO). Later in this reading we will explain how to determine the related cash flows when we calculate CFI.

The last item in the income statement before net income is the tax expense. Here we must adjust not only for changes in the current liability for taxes payable, but also for any changes in deferred tax assets and deferred tax liabilities, which are typically noncurrent items. We will explain these further in our reading on Analysis of Income Taxes.

| Cash paid to tax authorities             | \$           |
|--|--------------|
| Tax expense (provision for income taxes) | (20,000)     |
| Increase in taxes payable liability      | 1,000        |
| Increase in deferred tax liability       | <u>5,000</u> |
| Cash paid for taxes                      | (14,000)     |

Having arrived at the bottom of the income statement, we can sum the cash flows to compute CFO:

## 20X7 CFO

|                               | \$              | \$ |
|-------------------------------|-----------------|----|
| Cash collected from customers | 107,000         |    |
| Cash paid to suppliers        | 34,000          |    |
| Wages paid to employees       | 8,500           |    |
| Cash interest paid            | 500             |    |
| Cash paid to tax authorities  | <u>14,000</u>   |    |
| Total cash operating expenses | <u>(57,000)</u> |    |
| Operating cash flows          | 50,000          |    |

## MODULE 30.2: INDIRECT METHOD CFO

Using the indirect method of presenting CFO, we begin with net income and adjust it for differences between accounting items and actual cash inflows and outflows.



Video covering this content is available online.

Non-cash-based items in the income statement can be described as either noncash charges or working capital investment. For example, depreciation is a noncash charge as it is deducted in calculating net income, but it requires no cash outlay. Therefore, we must add depreciation (and amortization) back to net income for the period.

Another adjustment to net income on an indirect statement of cash flows is to subtract gains and add back losses on the disposal of assets. Proceeds from the sale of fixed assets are an investing cash flow. Because gains and losses relate to CFI activities, we need to remove them from net income to calculate CFO under the indirect method.



### PROFESSOR'S NOTE

Candidates are often confused by why noncash charges and gains and losses are ignored when using the direct method, but adjusted for under the indirect method. The key to understanding this is to realize that these items have been included in arriving at net income, which is the starting point of our computation when we use the indirect method. That is, net income includes some non-cash and non-operating items that we have to unwind to arrive at CFO.

Under the indirect method, we also need to adjust net income for any change in balance sheet accounts, just as we do with the direct method. If, for example, accounts receivable went up during the period, we know that sales during the period were greater than the cash collected from customers. We need to reduce net income to reflect the fact that sales, rather than cash collected, were used in calculating net income.

The net change in a company's total operating assets and liabilities is known as its **investment in working capital**. We can think of CFO as net income adjusted for noncash charges and the investment in working capital:

$$\text{CFO} = \text{NI} + \text{NCC} - \text{WC}_{\text{INV}}$$

Noncash charges are gains and losses that have passed through the income statement but are not cash flows. While we call them “charges,” in practice they can either increase or decrease net income. Gains and losses on asset disposals are classic examples. Figure 30.1 lists some of the typical noncash charges in company income statements.

**Figure 30.1: Typical Noncash Charges, Gains, and Losses**

---

|                 |   |
|-----------------|---|
| <b>Add Back</b> | Depreciation, depletion, and amortization                               |
|                 | Loss on asset disposal  |
|                 | Asset impairments and write-downs                                       |
|                 | Losses on early retirement of debt                                      |
|                 | Amortization of bond discounts (under the amortized cost method)        |
|                 | Increases in deferred tax liabilities, decreases of deferred tax assets |
|                 | Losses of equity accounted associates                                   |
| <b>Subtract</b> | Gains on asset disposals  |
|                 | Gains on early retirement of debt                                       |
|                 | Reversals of impairment and write-downs                                 |
|                 | Amortization of bond premiums (under the amortized cost method)         |
|                 | Decreases in deferred tax liabilities, increases in deferred tax assets |

---

Working capital investment represents the investment in noncash working capital. This means we need to look at the change in current assets and liabilities that relate to the operating revenues and expenses and ignore any assets or liabilities that do not relate to operating items.



#### PROFESSOR'S NOTE

The definition of *working capital* is not the same in all parts of the Level I CFA curriculum. In our module covering ratios, we will see it defined as total current assets minus total current liabilities. Here and in Corporate Issuers, it is defined as operating assets minus operating liabilities; this is often referred to as noncash working capital.

In practice, when looking at the current assets, we ignore cash and any short-term investments (except trading securities, for which cash flows are treated as CFO). Dividends payable and any short-term interest-bearing debt instruments are also excluded, as they affect cash flow from financing (CFF), not CFO.

Adjust for changes in working capital accounts as follows:

---

|                 |  |
|-----------------|--|
| <b>Add back</b> | Decreases in current operating assets      |
|                 | Increases in current operating liabilities |
| <b>Subtract</b> | Increases in current operating assets      |
|                 | Decreases in current operating liabilities |

---

The steps in calculating CFO under the indirect method can be summarized as follows:

*Step 1:* Begin with net income.

*Step 2:* Add back all noncash charges to income (such as depreciation and amortization) and subtract all noncash components of revenue. Subtract gains or add losses that resulted from financing or investing cash flows (such as gains from sale of land).

*Step 3:* Adjust for working capital by adding or subtracting changes to balance sheet operating accounts as follows:

- Subtract increases in operating asset accounts (uses of cash), and add decreases (sources of cash).
- Add increases in operating liability accounts (sources of cash), and subtract decreases (uses of cash).

### **EXAMPLE: Statement of cash flows using the indirect method**

Use the balance sheet and income statement presented in the previous direct method example to prepare operating cash flows under the indirect method.

#### **Answer:**

*Step 1:* Start with net income of \$39,000.

*Step 2:* Add back noncash charges:

Depreciation = \$7,000

Change in deferred tax liability = \$5,000

Loss on disposal of PP&E = \$2,000

Deduct noncash gains:

Gain from sale of land = \$10,000

*Step 3:* Subtract increases in receivables and inventories and add increases in payables.

|  | \$              |
|--|-----------------|
| Net income                             | 39,000          |
| <b>Noncash charges</b>                 |                 |
| Depreciation                           | 7,000           |
| Increase in deferred tax liability     | 5,000           |
| Loss on disposal of PP&E               | 2,000           |
| Gain from sale of land                 | <u>(10,000)</u> |
| Subtotal                               | 43,000          |
| <b>Investment in working capital</b>   |                 |
| Increase in receivables                | (1,000)         |
| Decrease in inventories                | 2,000           |
| Increase in accounts payable           | 4,000           |
| Decrease in wages payable              | (3,500)         |
| Increase in interest payable           | 500             |
| Increase in unearned revenue liability | 4,000           |
| Increase in taxes payable              | <u>1,000</u>    |
| <b>Operating cash flows</b>            | <b>50,000</b>   |

Alternatively, we can look at noncash working capital in aggregate rather than line by line.

|                                      | 20X7                    | 20X6            |
|--------------------------------------|-------------------------|-----------------|
|                                      | \$                      | \$              |
| Total current assets                 | 68,000                  | 27,500          |
| Less cash                            | <u>(53,000)</u>         | <u>(11,500)</u> |
| Operating assets                     | 15,000                  | 16,000          |
|                                      |                         |                 |
| Total current liabilities            | 34,000                  | 23,000          |
| Less dividends payable               | <u>(6,000)</u>          | <u>(1,000)</u>  |
| Operating liabilities                | 28,000                  | 22,000          |
|                                      |                         |                 |
| Non-cash working capital             | (13,000)                | (6,000)         |
| <b>Investment in working capital</b> | <b><u>(\$7,000)</u></b> |                 |

We can then calculate CFO as NI + NCC - WC<sub>INV</sub>:

$$\text{CFO} = 39,000 + 4,000 - (-7,000) = \$50,000$$

Our examples demonstrate that whether CFO is calculated using the direct or indirect method, we arrive at the same figure.

Both IFRS and U.S. GAAP encourage the use of a statement of cash flows in the direct format. Under U.S. GAAP, a statement of cash flows under the direct method must include footnote disclosure of the indirect method. Most companies, however, report cash flows using the indirect method, which requires no additional disclosure. Later in this reading we will illustrate the method an analyst can use to create a statement of

cash flows in the direct method format when the company reports using the indirect method.



### MODULE QUIZ 30.1, 30.2

1. The Continental Corporation reported sales revenue of \$150,000 for the current year. If accounts receivable decreased \$10,000 during the year and accounts payable increased \$4,000 during the year, cash collections were:
  - A. \$154,000.
  - B. \$160,000.
  - C. \$164,000.

**Use the following data, prepared under U.S. GAAP, to answer Questions 2 through 4.**

**Income statement selected data:**

|                    | <b>20X7</b> |
|--------------------|-------------|
|                    | \$          |
| Revenues           | 2,000,000   |
| Cost of goods sold | 1,400,000   |
| Tax expense        | 200,000     |

**Balance sheet selected data:**

|                              | <b>20X7</b> | <b>20X6</b> |
|------------------------------|-------------|-------------|
|                              | \$          | \$          |
| <b>Long-lived assets</b>     |             |             |
| Deferred tax                 | 30,000      | 20,000      |
| <b>Current assets</b>        |             |             |
| Accounts receivable          | 200,000     | 150,000     |
| Inventory                    | 260,000     | 280,000     |
| <b>Current liabilities</b>   |             |             |
| Accounts payable             | 120,000     | 150,000     |
| Unearned revenue             | 220,000     | 150,000     |
| Tax payable                  | 150,000     | 240,000     |
| <b>Long-term liabilities</b> |             |             |
| Deferred tax                 | 150,000     | 100,000     |

2. What was cash collected from customers in 20X7?
  - A. \$1,950,000.
  - B. \$1,980,000.
  - C. \$2,020,000.
3. What was cash tax paid in 20X7?
  - A. \$160,000.
  - B. \$250,000.
  - C. \$290,000.
4. What was cash paid to suppliers in 20X7?
  - A. \$1,350,000.
  - B. \$1,410,000.
  - C. \$1,450,000.
5. Using the following information, what is the firm's cash flow from operations?

|                                      |       |
|--------------------------------------|-------|
| Net income                           | \$120 |
| Decrease in accounts receivable      | 20    |
| Depreciation                         | 25    |
| Increase in inventory                | 10    |
| Increase in accounts payable         | 7     |
| Decrease in wages payable            | 5     |
| Increase in deferred tax liabilities | 15    |
| Profit from the sale of land         | 2     |

- A. \$158.  
 B. \$170.  
 C. \$174.
6. Net income for Monique, Inc., for the year ended December 31, 20X7 was \$78,000. Its accounts receivable balance at December 31, 20X7, was \$121,000, and this balance was \$69,000 at December 31, 20X6. The accounts payable balance at December 31, 20X7, was \$72,000, and it was \$43,000 at December 31, 20X6. Depreciation for 20X7 was \$12,000, and there was an unrealized gain of \$15,000 included in 20X7 income from the change in value of trading securities. Which of the following amounts represents Monique's cash flow from operations for 20X7?
- A. \$52,000.  
 B. \$67,000.  
 C. \$82,000.
7. From an analyst's perspective, an advantage of the indirect method for presenting operating cash flow is that the indirect method:
- A. shows operating cash received and paid.  
 B. provides more information than the direct method.  
 C. shows the difference between net income and operating cash flow.

## MODULE 30.3: INVESTING AND FINANCING CASH FLOWS AND IFRS/U.S. GAAP DIFFERENCES



Video covering this content is available online.

**Cash flow from investing activities (CFI)** consists of the cash inflows and outflows that result from acquiring or disposing of long-term assets and certain investments.

**Cash flow from financing activities (CFF)** consists of the cash inflows and outflows that result from transactions affecting a firm's capital structure, such as borrowing, repaying debt, and issuing or redeeming equity securities.

Examples of each cash flow classification, in accordance with U.S. GAAP, are presented in Figure 30.2.

**Figure 30.2: U.S. GAAP Cash Flow Classifications**

| Operating Activities                           |  |
|--|--|
| Inflows  | Outflows                                   |
| Cash collected from customers                  | Cash paid to employees and suppliers       |
| Interest and dividends received                | Cash paid for other expenses               |
| Sale proceeds from trading securities          | Acquisition of trading securities          |
|  | Interest paid on debt or leases            |
|  | Taxes paid                                 |
| Investing Activities                           |  |
| Inflows  | Outflows                                   |
| Sale proceeds from PP&E and intangibles        | Acquisition of PP&E and intangibles        |
| Sale proceeds from debt and equity investments | Acquisition of debt and equity investments |
| Principal received from loans made to others   | Loans made to others                       |
| Financing Activities                           |  |
| Inflows  | Outflows                                   |
| Principal amounts of debt issued               | Principal paid on debt or leases           |
| Proceeds from issuing stock                    | Payments to reacquire stock                |
|  | Dividends paid to shareholders             |

Debt and equity investments (other than trading securities) and loans made to others are reported as investing cash outflows. However, under U.S. GAAP the income from these investments (interest and dividends received) is reported as operating cash inflows. Principal amounts borrowed are reported as financing cash inflows, but interest paid is reported as an operating cash outflow. Finally, dividends paid to the firm's shareholders are financing cash outflows. Later in this reading we will see that IFRS offers companies more discretion than U.S. GAAP with regard to how they may classify these cash flows.



#### PROFESSOR'S NOTE

Don't confuse dividends received and dividends paid. Under U.S. GAAP, dividends received are operating cash flows, and dividends paid are financing cash flows.

#### EXAMPLE: Computing CFI

Returning to the financial statements we used in our CFO examples, we will use the following information to compute CFI:

|                              | 20X7            | 20X6           |
|------------------------------|-----------------|----------------|
| <b>Balance sheet extract</b> | \$              | \$             |
| Land                         | 35,000          | 40,000         |
| Gross PP&E                   | 69,000          | 60,000         |
| Accumulated depreciation     | <u>(12,000)</u> | <u>(9,000)</u> |
| Net PP&E                     | 57,000          | 51,000         |

**Income statement extract**

|                          |        |
|--------------------------|--------|
| Depreciation             | 7,000  |
| Gain on sale of land     | 10,000 |
| Loss on disposal of PP&E | 2,000  |

A footnote disclosure reveals that the company purchased PP&E for \$25,000 during 20X7.

**Answer:**

CFI will comprise additions to PP&E and the disposal proceeds from the sale of PP&E and land.

The footnote disclosure shows acquisitions of PP&E were \$25,000; however, gross PP&E has only increased by \$9,000. This, coupled with the disposal loss in the income statement, indicates that the company must have disposed of PP&E during 20X7.

| <i>Step 1: Compute cost of disposed PP&amp;E</i> | \$            |
|--|---------------|
| Beginning gross PP&E                             | 60,000        |
| Acquisitions gross cost                          | 25,000        |
| Disposals gross cost                             | <u>(X)</u>    |
| Ending gross PP&E                                | <u>69,000</u> |

The value (X) we need to calculate is the cost of the assets that have been disposed of; that is, the gross book value the company recorded when it first acquired these assets. By rearranging the reconciliation, the gross cost of the disposed asset is computed as follows:

$$\text{beginning PP&E} + \text{acquisitions} - \text{ending gross PP&E} = \text{disposals gross cost}$$

$$\text{disposals gross cost} = \$60,000 + \$25,000 - \$69,000 = \$16,000$$

Next, we can see that accumulated depreciation has increased by \$3,000 when the 20X7 depreciation expense is \$7,000. The difference is also due to the asset disposal, because when a company disposes of an asset, it removes the accumulated depreciation on that asset from the total.

| <i>Step 2: Compute accumulated depreciation on disposed PP&amp;E</i> | \$     |
|--|--------|
| Beginning accumulated depreciation                                   | 9,000  |
| Depreciation expense   | 7,000  |
| Accumulated depreciation on disposed PP&E                            | (X)    |
| Ending accumulated depreciation                                      | 12,000 |

Accumulated depreciation on disposed PP&E = beginning accumulated depreciation + depreciation expense – ending accumulated depreciation

$$= \$9,000 + \$7,000 - \$12,000 = \$4,000.$$

| <i>Step 3: Compute carrying value of PP&amp;E disposal</i> | \$      |
|--|---------|
| Gross cost   | 16,000  |
| Accumulated depreciation                                   | (4,000) |
| Carrying value before disposal                             | 12,000  |



### PROFESSOR'S NOTE

Steps 1–3 can be combined for a quicker result:

| <i>Shortcut approach</i>          | \$      |
|-----------------------------------|---------|
| Beginning carrying value          | 51,000  |
| Depreciation expense              | (7,000) |
| Additions to PP&E                 | 25,000  |
| Carrying value of assets disposed | (X)     |
| Ending carrying value             | 57,000  |

Carrying value of assets disposed = beginning carrying value – depreciation expense + additions to PP&E – ending carrying value

$$= \$51,000 - \$7,000 + \$25,000 - \$57,000 = \$12,000$$

When an asset is disposed of, the carrying value is removed from the balance sheet and netted against proceeds received from the sale, and any difference is reported as an accounting gain or loss in the income statement. A gain results if the proceeds from the sale exceed the carrying value, and a loss results if the proceeds are less than the carrying value. The only elements of the disposal that are cash flows are the disposal proceeds.

| <i>Step 4: Compute disposal proceeds</i>  | \$       |
|---|----------|
| Disposal proceeds                         | X        |
| Carrying value removed from balance sheet | (12,000) |
| Disposal gain/(loss) in income statement  | (2,000)  |

The disposal proceeds on the sale of PP&E must have been \$10,000.

We carry out similar calculations for the disposal of land. This will be simpler because land is not depreciated, so the carrying value is its gross cost. Because the

footnotes do not mention any acquisitions of land, the carrying value of the land disposed of is the change in carrying value reported on the balance sheet.

Carrying value of disposed land = \$40,000 – \$35,000 = \$5,000.

| <b>Compute disposal proceeds</b>          | <b>\$</b>      |
|---|----------------|
| Disposal proceeds                         | X              |
| Carrying value removed from balance sheet | <u>(5,000)</u> |
| Disposal gain/(loss) in income statement  | 10,000         |

The disposal proceeds on the sale of land must have been \$15,000.

Finally we can combine these results to determine cash flow from investing:

$$CFI = -\text{cash paid for PP&E acquisitions} + \text{disposal proceeds}$$

$$CFI = -\$25,000 + \$10,000 + \$15,000 = \$0$$

The cost of new assets acquired was, by coincidence, perfectly matched by the proceeds from asset disposals.

### EXAMPLE: Computing cash flow from financing (CFF)

Returning to the financial statements from our CFO examples, we will need the following information to compute CFF:

|                                       | 20X7          | 20X6          |
|---------------------------------------|---------------|---------------|
| <b>Balance sheet extract</b>          | <b>\$</b>     | <b>\$</b>     |
| Current liabilities                   |               |               |
| Dividends payable                     | 6,000         | 1,000         |
| Noncurrent liabilities                |               |               |
| Bonds payable                         | 15,000        | 10,000        |
| Stockholders' equity                  |               |               |
| Common stock                          | 15,000        | 20,000        |
| Additional paid-in capital            | <u>25,000</u> | <u>30,000</u> |
| Contributed capital                   | 40,000        | 50,000        |
| Retained earnings                     | 61,000        | 30,500        |
| <b>Other financial statement data</b> |               |               |
| Net income                            | 39,000        |               |
| Dividend declared                     | 8,500         |               |

A footnote disclosure reveals that the bonds outstanding had been issued at face value (par).

### Answer:

We can begin by determining cash flows from issuing or repaying bonds:

|                         | \$           |
|-------------------------|--------------|
| Beginning bonds payable | 10,000       |
| Net principal flows     | <u>X/(X)</u> |
| Ending bonds payable    | 15,000       |

$$\text{net principal flow} = \text{ending bonds payable} - \text{beginning bonds payable} = \\ \$15,000 - \$10,000 = \$5,000 \text{ (inflow)}$$

Next we can determine cash flows from issuing or redeeming equity shares.

**Contributed capital** is the sum of common stock at par and additional paid-in capital, and reflects the price at which the company issued shares.

| Reconciliation of equity<br>contributed capital | \$           |
|---|--------------|
| Beginning contributed capital                   | 50,000       |
| Net proceeds from repurchases and issuance      | <u>X/(X)</u> |
| Ending contributed capital                      | 40,000       |

$$\text{net proceeds from buyback and issuance} = \text{ending contributed capital} - \text{beginning contributed capital} = \$50,000 - \$40,000 = -\$10,000 \text{ (use of cash, or a net share repurchase of \$10,000)}$$

Next we determine cash dividends paid, which can be a two-step process:

**Step 1:** Calculate dividend declared if it is not given.

In this example, the dividend declared of \$8,500 was given. If it had not been, we could compute it based on the change in retained earnings:

| Reconciliation of retained earnings | \$         |
|-------------------------------------|------------|
| Beginning retained earnings         | 30,500     |
| Net income                          | 39,000     |
| Dividend declared                   | <u>(X)</u> |
| Ending retained earnings            | 61,000     |

$$\text{dividends declared} = \text{beginning retained earnings} + \text{net income} - \text{ending retained earnings} \\ = \$30,500 + \$39,000 - \$61,000 = \$8,500$$

**Step 2:** Adjust the dividend declared for changes in the dividends payable liability. Simply because it is declared does not mean it has been paid. While the dividend declared does not pass through the income statement, it does reduce retained earnings; therefore, we treat it as a negative value. We then apply the increase/decrease rules for balance sheet liabilities:

| Dividends paid                         | \$      |
|--|---------|
| Dividend declared                      | (8,500) |
| Increase in dividend payable liability | 5,000   |
| Cash dividend paid                     | (3,500) |

## Computation of CFF

|   | \$                    |
|---|-----------------------|
| Net principal on bonds                          | 5,000                 |
| Net proceeds from share repurchase and issuance | (10,000)              |
| Cash dividends                                  | <u>(3,500)</u>        |
| <b>Cash flow from financing</b>                 | <b><u>(8,500)</u></b> |

Having computed CFO, CFI, and CFF, we can complete the cash flow statement.

## Total cash flow

|                                | \$             |
|--------------------------------|----------------|
| Cash flow from operations      | 50,000         |
| Cash flow from investing       | 0              |
| Cash flow from financing       | <u>(8,500)</u> |
| Total cash flow                | 41,500         |
| 20X6 balance sheet cash        | <u>11,500</u>  |
| <b>20X7 balance sheet cash</b> | <b>53,000</b>  |

The total cash flow of \$41,500 is equal to the increase in cash. The difference between beginning cash and ending cash should be used as a check figure to ensure that the total cash flow calculation is correct.



### PROFESSOR'S NOTE

The Level I CFA curriculum makes a few simplifications in the calculation of CFF.

For bonds issued at a premiums or discounts, the difference relative to par is amortized over the life of the bond. Amortization of premiums and discounts are not cash flows:

$$\text{coupon} + \text{amortized discount} - \text{amortized premium} = \text{interest expense}$$

With *amortization of a discount bond*, amortization will increase the interest expense and carrying value.

With *amortization of a premium bond*, amortization will decrease the interest expense and carrying value.

The curriculum mentions the noncash element affecting interest expense (see Figure 30.1), but does not mention the impact on the balance sheet carrying value.

The Level I curriculum sidesteps such complications by assuming that bonds are issued at par value in computations of CFF, which means there are no premiums or discounts to amortize.

A second simplification in the Level I curriculum is to assume that stock buybacks are transacted at the same price that the shares were initially

issued for. In practice, this is unlikely, and if the buyback price differs from issue price, adjustments to retained earnings are made.

---

### LOS 30.c: Demonstrate the conversion of cash flows from the indirect to direct method.

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The only difference between the indirect and direct methods of presentation is in the cash flow from operations (CFO) section. CFO under the direct method can be computed using a combination of the income statement and a statement of cash flows prepared under the indirect method.



#### PROFESSOR'S NOTE

The Level I CFA curriculum describes a three-step method for converting from indirect cash flow statements to direct cash flow statements. Provided that you understood the direct and indirect methods presented earlier, you will find little that you do not already know (although it is presented slightly differently).

Here is the three-step process:

*Step 1:* Aggregate all revenues and gains and all expenses and losses.

*Step 2:* Remove all noncash charges and disaggregate the remaining items.

*Step 3:* Convert from accruals to cash flows by adjusting for the change in working capital.

#### EXAMPLE: Conversion from indirect to direct CFO

Using the same data as the direct and indirect examples, the three stages are as follows:

|   | \$            |
|---|---------------|
| <i>Step 1:</i> Total revenues and gains | 114,000       |
| Total expenses and losses               | <u>75,000</u> |
| Net income                              | 39,000        |

|  |                 |
|--|-----------------|
| <i>Step 2:</i> Revenues less noncash charges | 104,000         |
| (\$114,000 – \$10,000)                       |                 |
| \$10,000 = gain on asset disposal            |                 |
| Expenses less noncash charges                | 61,000          |
| (\$75,000 – \$7,000 – \$2,000 – \$5,000)     |                 |
| \$7,000 = depreciation                       |                 |
| \$2,000 = loss on disposal of PP&E           |                 |
| \$5,000 = change in deferred tax liability   |                 |
| Cost of goods sold                           | 40,000          |
| Wages  | 5,000           |
| Interest                                     | 1,000           |
| Tax payable                                  | <u>15,000</u>   |
| (Tax provision – increase in DTL)            |                 |
| Total  | 61,000          |
| <i>Step 3:</i> Cash collected from customers | 107,000         |
| \$104,000 – \$1,000 + \$4,000                |                 |
| Cash paid to suppliers                       | (34,000)        |
| – \$40,000 + \$2,000 + \$4,000               |                 |
| Cash paid to employees                       | (8,500)         |
| – \$5,000 – \$3,500                          |                 |
| Cash interest paid                           | (500)           |
| – \$1,000 + \$500                            |                 |
| Cash paid to tax authorities*                | <u>(14,000)</u> |
| – \$15,000 + \$1,000                         |                 |
| Net cash flow from operating activities      | 50,000          |

\* Note that the computation of cash paid looks slightly different from the direct method example. This is because the change in deferred tax is treated as a noncash charge and adjusted for in Step 2.

#### LOS 30.d: Contrast cash flow statements prepared under International Financial Reporting Standards (IFRS) and US generally accepted accounting principles (US GAAP).

Recall that under U.S. GAAP, dividends paid to the firm's shareholders are reported as financing activities, while interest paid is reported in operating activities. Interest received and dividends received from investments are also reported as operating activities.

International Financial Reporting Standards (IFRS) allow more flexibility in the classification of cash flows. Under IFRS, interest and dividends received may be classified as either operating *or* investing cash inflows. Dividends paid to the company's

shareholders and interest paid on the company's debt may be classified as either operating *or* financing cash outflows.

Another important difference relates to income taxes paid. Under U.S. GAAP, all taxes paid are reported as operating cash outflows—even taxes related to investing and financing transactions. Under IFRS, income taxes are reported as operating cash outflows unless they are associated with an investing or financing transaction.

For example, consider a company that sells land that was held for investment for \$1 million. Income taxes on the sale total \$160,000. Under U.S. GAAP, the firm reports an inflow of cash from investing activities of \$1 million and an outflow of cash from operating activities of \$160,000. Under IFRS, the firm can report a net inflow of \$840,000 from investing activities.

The differences between U.S. GAAP and IFRS are summarized in Figure 30.3.

**Figure 30.3: Differences Between U.S. GAAP and IFRS**

|                     | <b>U.S. GAAP</b>   | <b>IFRS</b>   |
|---------------------|--|---|
| Interest received   | CFO  | CFO or CFI  |
| Interest paid       | CFO  | CFO or CFF  |
| Dividends received  | CFO  | CFO or CFI  |
| Dividends paid      | CFF  | CFO or CFF  |
| Bank overdraft      | Treated as balance sheet debt  | Treated as balance sheet cash   |
| Taxes               | CFO  | May be split between CFO, CFI, and CFF according to the nature of the transaction that caused tax to become payable |
| Presentation of CFO | Direct preferred, but indirect allowed; a reconciliation of net income to CFO must be disclosed if using direct method | Direct preferred, but indirect allowed  |



### MODULE QUIZ 30.3

Assuming U.S. GAAP, use the following data to answer Questions 1 and 2.

|   |      |
|---|------|
| Net income                                    | \$45 |
| Depreciation                                  | 75   |
| Taxes paid                                    | 25   |
| Interest paid                                 | 5    |
| Dividends paid                                | 10   |
| Cash received from sale of company building   | 40   |
| Issuance of preferred stock                   | 35   |
| Repurchase of common stock                    | 30   |
| Purchase of machinery                         | 20   |
| Issuance of bonds                             | 50   |
| Debt retired through issuance of common stock | 45   |
| Paid off long-term bank borrowings            | 15   |
| Profit on sale of building                    | 20   |

1. Cash flow from investing activities is:
  - A. -\$30.
  - B. \$20.
  - C. \$50.
2. Cash flow from financing activities is:
  - A. \$30.
  - B. \$55.
  - C. \$75.
3. Which of the following items is *least likely* considered a cash flow from financing activity under U.S. GAAP?
  - A. Receipt of cash from the sale of bonds.
  - B. Payment of cash for dividends.
  - C. Payment of interest on debt.
4. Which of the following would be *least likely* to cause a change in investing cash flow?
  - A. The sale of a division of the company.
  - B. The purchase of new machinery.
  - C. An increase in depreciation expense.
5. Issuing bonds is classified as:
  - A. an investing activity.
  - B. a financing activity.
  - C. having no cash flow impact.
6. The sale of land is classified as a(n):
  - A. operating activity.
  - B. investing activity.
  - C. financing activity.
7. Which balance sheet items are *most likely* to be linked to cash flows from financing?
  - A. Long-lived assets.
  - B. Current assets and liabilities.
  - C. Long-term liabilities and equity.
8. Under IFRS, interest expense may be classified as:

- A. either operating cash flow or financing cash flow.
  - B. operating cash flow only.
  - C. financing cash flow only.
9. Under U.S. GAAP, dividends received from investments are classified as:
- A. operating cash flow.
  - B. investing cash flow.
  - C. financing cash flow.

## KEY CONCEPTS

### LOS 30.a

Cash flow from operations is not the same as earnings because of the accruals process. To calculate CFO, balance sheet operating assets and liabilities are used to adjust income statement revenues and expenses to cash flows.

Cash flows can be computed as the income statement figure – increase in related operating assets + decreases in related operating assets + increases in related operating liabilities – decrease in related operating liabilities.

Operating activities typically relate to the firm's current assets and current liabilities. Investing activities typically relate to noncurrent assets. Financing activities typically relate to noncurrent liabilities and equity.

### LOS 30.b

Under the direct method of presenting CFO, each line item of the accruals-based income statement is adjusted to get cash receipts or cash payments. The main advantage of the direct method is that it presents clearly the firm's operating cash receipts and payments.

Under the indirect method of presenting CFO, net income is adjusted for transactions that affect net income but do not affect operating cash flow, such as depreciation and gains or losses on asset sales, and for changes in balance sheet items. The main advantage of the indirect method is that it focuses on the differences between net income and operating cash flow and gives the user of the accounts an indication of earnings quality.

CFI is calculated by determining the changes in asset accounts that result from investing activities. The cash flow from selling an asset is its book value plus any gain on the sale (or minus any loss on the sale).

CFF is the sum of net cash flows from creditors (new borrowings minus principal repaid) and net cash flows from shareholders (new equity issued minus share repurchases minus cash dividends paid).

### LOS 30.c

An indirect cash flow statement can be converted to a direct cash flow statement by adjusting each income statement account for changes in associated balance sheet accounts and by eliminating noncash and nonoperating items (i.e., applying the direct method).

#### LOS 30.d

Differences in cash flow classifications between U.S. GAAP and IFRS:

|                     | U.S. GAAP                             | IFRS  |
|---------------------|---------------------------------------|---|
| Interest received   | CFO                                   | CFO or CFI  |
| Interest paid       | CFO                                   | CFO or CFF  |
| Dividends received  | CFO                                   | CFO or CFI  |
| Dividends paid      | CFF                                   | CFO or CFF  |
| Bank overdraft      | Treated as balance sheet debt         | Treated as balance sheet cash   |
| Taxes               | CFO                                   | May be split between CFO, CFI, and CFF according to the nature of the transaction that caused tax to become payable       |
| Presentation of CFO | Direct preferred but indirect allowed | Direct preferred but indirect allowed; a reconciliation of net income to CFO must be disclosed if using the direct method |

#### ANSWER KEY FOR MODULE QUIZZES

#### Module Quiz 30.1, 30.2

1. **B** \$150,000 sales + \$10,000 decrease in accounts receivable = \$160,000 cash collections. The change in accounts payable does not affect cash collections. Accounts payable result from a firm's purchases from its suppliers. (Module 30.1, LOS 30.a, LOS 30.b)
2. **C** Revenue must be adjusted for the change in accounts receivable asset and unearned revenue liability:

|                                 | \$               |
|---------------------------------|------------------|
| Revenue                         | 2,000,000        |
| Increase in accounts receivable | (50,000)         |
| Increase in unearned revenue    | <u>70,000</u>    |
| <b>Cash from customers</b>      | <b>2,020,000</b> |

(Module 30.1, LOS 30.a, LOS 30.b)

3. **B** The income statement tax expense must first be adjusted to remove the impact of any changes to deferred tax assets and liabilities to arrive at tax payable. Tax payable represents the tax owed to the tax authorities on this period's earnings. The tax-payable figure then must be adjusted for changes in tax-payable liabilities to arrive at the cash tax paid.

|                                    | \$               |
|------------------------------------|------------------|
| Tax expense                        | (200,000)        |
| Increase in deferred tax liability | 50,000           |
| Increase in deferred tax asset     | <u>(10,000)</u>  |
| Tax payable                        | <u>(160,000)</u> |
| Decrease in tax payable liability  | <u>(90,000)</u>  |
| Cash taxes paid                    | <u>(250,000)</u> |

(Module 30.1, LOS 30.a, LOS 30.b)

4. **B** The cost of goods sold needs to be adjusted for both change in inventory and change in accounts payable.

|                              | \$                 |
|------------------------------|--------------------|
| Cost of goods sold           | (1,400,000)        |
| Decrease in inventory        | <u>20,000</u>      |
| Purchases                    | <u>(1,380,000)</u> |
| Decrease in accounts payable | <u>(30,000)</u>    |
| Cash paid to suppliers       | <u>(1,410,000)</u> |

(Module 30.1, LOS 30.a, LOS 30.b)

5. **B** Net income – profits from sale of land + depreciation + decrease in receivables – increase in inventories + increase in accounts payable – decrease in wages payable + increase in deferred tax liabilities =  $120 - 2 + 25 + 20 - 10 + 7 - 5 + 15 = \$170$ . Note that the profit on the sale of land should be subtracted from net income because this transaction is classified as investing, not operating. (Module 30.2, LOS 30.b)

#### 6. A

|                                 |                 |
|---------------------------------|-----------------|
| Net income                      | \$78,000        |
| Depreciation                    | 12,000          |
| Unrealized gain                 | (15,000)        |
| Increase in accounts receivable | (52,000)        |
| Increase in accounts payable    | <u>29,000</u>   |
| Cash flow from operations       | <u>\$52,000</u> |

(Module 30.2, LOS 30.b)

7. **C** The indirect method reconciles the difference between net income and CFO. The direct method shows operating cash received and paid—and, therefore, provides more information on its face than the indirect method. (Module 30.2, LOS 30.b)

### Module Quiz 30.3

1. **B** Cash from sale of building – purchase of machinery =  $40 - 20 = \$20$ . (Module 30.3, LOS 30.b)
2. **A** Sale of preferred stock + issuance of bonds – principal payments on bank borrowings – repurchase of common stock – dividends paid =  $35 + 50 - 15 - 30 - 10 = \$30$ . Note that we did not include \$45 of debt retired through issuance of

common stock because this was a noncash transaction. Knowing how to handle noncash transactions is important. (Module 30.1, LOS 30.b)

3. **C** The payment of interest on debt is an *operating* cash flow under U.S. GAAP. (Module 30.3, LOS 30.d)
4. **C** Depreciation does not represent a cash flow. To the extent that it affects the firm's taxes, an increase in depreciation changes operating cash flows, but not investing cash flows. (Module 30.3, LOS 30.b)
5. **B** Issuing bonds is classified as a financing activity. (Module 30.3, LOS 30.b)
6. **B** The sale of land is classified as an investing activity. (Module 30.3, LOS 30.b)
7. **C** Financing cash flows are linked primarily to changes in long-term liabilities and equity. Changes in current assets and liabilities tend to be linked to operating cash flows. Changes in long-lived assets are typically linked to investing cash flows. (Module 30.3, LOS 30.b)
8. **A** Under IFRS, interest expense can be classified as either an operating cash flow or financing cash flow. (Module 30.3, LOS 30.d)
9. **A** Dividends received from investments are classified as operating cash flow under U.S. GAAP. (Module 30.3, LOS 30.d)

唯一微信: xuebjun888s

## READING 31

# ANALYZING STATEMENTS OF CASH FLOWS II

## MODULE 31.1: ANALYZING STATEMENTS OF CASH FLOWS II



Video covering this content is available online.

### LOS 31.a: Analyze and interpret both reported and common-size cash flow statements.

The cash flow statement provides information to assess the firm's liquidity, solvency, and financial flexibility. An analyst can use the statement of cash flows to determine the following:

- Whether regular operations generate enough cash to sustain the business
- Whether enough cash is generated to pay off existing debts as they mature
- Whether the firm is likely to need additional financing
- Whether unexpected obligations can be met
- Whether the firm can take advantage of new business opportunities as they arise

Cash flow analysis begins with evaluating the firm's sources and uses of cash from operating, investing, and financing activities. Sources and uses of cash change as the firm moves through its life cycle. For example, when a firm is in the early stages of growth, it may experience negative operating cash flow as it uses cash to increase inventory and receivables. Early-stage firms usually finance this negative operating cash flow externally by issuing debt or equity securities. These sources of financing are not sustainable. Eventually, the firm must begin generating positive operating cash flow or external investors will stop providing capital. Over the long term, successful firms must generate operating cash flows that exceed capital expenditures and provide a return to debt and equity holders.

An analyst should identify how a firm is generating its operating cash flow. The firm's earnings-related activities should provide its operating cash flow. However, a firm can also generate positive operating cash flow in the near term by decreasing noncash working capital, such as by liquidating inventory and receivables or increasing payables. Decreasing noncash working capital is not sustainable because inventories and receivables cannot fall below zero and creditors will not extend credit indefinitely unless payments are made when due.

Operating cash flow provides a check on the quality of a firm's earnings. A stable relationship of operating cash flow and net income is an indication of quality earnings. Earnings that significantly exceed operating cash flow may be an indication of aggressive (or even improper) accounting choices such as recognizing revenues too soon or delaying the recognition of expenses. An analyst should also evaluate the variability of net income and operating cash flow as an indicator of a firm's risk.

An analyst should also examine a firm's sources and uses of cash from investing activities. Increasing capital expenditures, a use of cash, is usually an indication of growth. Conversely, a firm may reduce capital expenditures or even sell capital assets to save or generate cash. An analyst should inquire into the reasons for this because it may result in higher cash outflows in the future when the firm needs to replace older fixed assets. Investing cash flows may also result from acquisitions or investments in securities.

The financing activities section of the cash flow statement reveals information about whether the firm is generating cash flow by issuing debt or equity. It also indicates whether the firm is using cash to repay debt, reacquire stock, or pay dividends. For example, an analyst would certainly want to know if a firm issued debt and used the proceeds to reacquire stock or pay dividends to shareholders.

## Common-Size Cash Flow Statements

As with the income statement and balance sheet, an analyst can use common-size analysis to interpret a cash flow statement.

The cash flow statement can be converted to common-size format by expressing each line item as a percentage of revenue. Alternatively, each inflow of cash can be expressed as a percentage of total cash inflows, and each outflow of cash can be expressed as a percentage of total cash outflows.

A revenue-based common-size cash flow statement is useful for identifying trends and forecasting future cash flow. Because each line item of the cash flow statement is stated in terms of revenue, once future revenue is forecast, cash flows can be estimated for those items that are tied to revenue.

### EXAMPLE: Common-size cash flow statement analysis

Triple Y Corporation's common-size cash flow statement is shown in the following table. Each item has been stated as a percentage of revenue. Explain the decrease in Triple Y's total cash flow as a percentage of revenues.

#### Triple Y Corporation

**Cash Flow Statement  
(Percentage of Revenues)**

| Year                            | 20X9          | 20X8          | 20X7          |
|---------------------------------|---------------|---------------|---------------|
| Net income                      | 13.4%         | 13.4%         | 13.5%         |
| Depreciation                    | 4.0%          | 3.9%          | 3.9%          |
| Accounts receivable             | -0.6%         | -0.6%         | -0.5%         |
| Inventory                       | -10.3%        | -9.2%         | -8.8%         |
| Prepaid expenses                | 0.2%          | -0.2%         | 0.1%          |
| Accrued liabilities             | 5.5%          | 5.5%          | 5.6%          |
| <b>Operating cash flow</b>      | <b>12.2%</b>  | <b>12.8%</b>  | <b>13.8%</b>  |
| Cash from sale of fixed assets  | 0.7%          | 0.7%          | 0.7%          |
| Purchase of plant and equipment | -12.3%        | -12.0%        | -11.7%        |
| <b>Investing cash flow</b>      | <b>-11.6%</b> | <b>-11.3%</b> | <b>-11.0%</b> |
| Sale of bonds                   | 2.6%          | 2.5%          | 2.6%          |
| Cash dividends                  | -2.1%         | -2.1%         | -2.1%         |
| <b>Financing cash flow</b>      | <b>0.5%</b>   | <b>0.4%</b>   | <b>0.5%</b>   |
| <b>Total cash flow</b>          | <b>1.1%</b>   | <b>1.9%</b>   | <b>3.3%</b>   |

**Answer:**

Operating cash flow has decreased as a percentage of revenues. This appears to be due largely to accumulating inventories. Investing activities, specifically purchases of plant and equipment, have also required an increasing percentage of the firm's cash flow. These observations are consistent with a growing firm, but an analyst should inquire whether the increase in inventories was intended or unintended.

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**LOS 31.b: Calculate and interpret free cash flow to the firm, free cash flow to equity, and performance and coverage cash flow ratios.**

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**Free cash flow** is a measure of cash available for discretionary use, after a firm has covered its capital expenditures. This fundamental cash flow measure is often used for valuation. Analysts have several ways to measure free cash flow. Two of the more common measures are free cash flow to the firm and free cash flow to equity.

## Free Cash Flow to the Firm

**Free cash flow to the firm (FCFF)** is cash available to all investors, both equity owners and debtholders. FCFF can be calculated by starting with either net income or operating cash flow. FCFF is calculated from net income as follows:

$$FCFF = NI + NCC + [Int \times (1 - \text{tax rate})] - FC_{INV} - WC_{INV}$$

where:

NI = net income

NCC = noncash charges (depreciation and amortization)

Int = cash interest paid

FC<sub>INV</sub> = fixed capital investment (net capital expenditures)

WC<sub>INV</sub> = working capital investment



### PROFESSOR'S NOTE

Fixed capital investment is cash spent on fixed assets minus cash received from selling fixed assets. We cannot assume it is the same as CFI, which may also include cash flows from investments in securities and repaid principal from loans made.

Cash interest paid, net of tax, is added back to net income. This is because FCFF is the cash flow available to stockholders and debtholders. Because interest is paid to (and therefore "available to") the debtholders, it must be included in FCFF.

Notice that three components of the equation are just computing operating cash flows under the indirect method:

$$CFO = NI + NCC - WC_{INV}$$

For this reason, FCFF can also be calculated from operating cash flow as follows:

$$FCFF = CFO + [Int \times (1 - \text{tax rate})] - FC_{INV}$$

where:

CFO = cash flow from operations

Int = cash interest paid

FC<sub>INV</sub> = fixed capital investment (net capital expenditures)

For firms that follow IFRS, it is not necessary to adjust for interest that is included as a part of financing activities. Additionally, firms that follow IFRS can report dividends paid as operating activities. In this case, the dividends paid would be added back to CFO. Again, the goal is to calculate the cash flow that is available to the shareholders and debtholders. It is not necessary to adjust dividends for taxes because dividends paid are not tax deductible.

## Free Cash Flow to Equity

**Free cash flow to equity (FCFE)** is the cash flow available for distribution to common shareholders. FCFE can be calculated as follows:

$$FCFE = CFO - FC_{INV} + \text{net borrowing}$$

where:

CFO = cash flow from operations

FC<sub>INV</sub> = fixed capital investment (net capital expenditures)

net borrowing = debt issued - debt repaid



### PROFESSOR'S NOTE

If net borrowing is negative (debt repaid exceeds debt issued), we would subtract net borrowing in calculating FCFE.

If a firm that follows IFRS has subtracted dividends paid in calculating CFO, dividends must be added back when calculating FCFE.

### **EXAMPLE: Free cash flow**

Using the financial statement extracts presented next, calculate the company's FCFF and FCFE. Assume a tax rate of 40%.

|  | \$              |
|--|-----------------|
| Net income                             | 39,000          |
| <b>Noncash charges</b>                 |                 |
| Depreciation                           | 7,000           |
| Increase in deferred tax liability     | 5,000           |
| Loss on disposal of PP&E               | 2,000           |
| Gain from sale of land                 | <u>(10,000)</u> |
| Subtotal                               | 43,000          |
| <b>Investment in working capital</b>   |                 |
| Increase in receivables                | (1,000)         |
| Decrease in inventories                | 2,000           |
| Increase in accounts payable           | 4,000           |
| Decrease in wages payable              | (3,500)         |
| Increase in interest payable           | 500             |
| Increase in unearned revenue liability | 4,000           |
| Increase in taxes payable              | <u>1,000</u>    |
| <b>Operating cash flows</b>            | 50,000          |

| Interest paid                | \$         |
|------------------------------|------------|
| Interest expense             | (1,000)    |
| Increase in interest payable | <u>500</u> |
| Cash interest paid           | (500)      |

| Cash flow from investing (CFI) | \$       |
|--------------------------------|----------|
| Cash paid for PP&E             | (25,000) |
| Disposal proceeds              | 25,000   |
| Cash flow from investing       | 0        |

| Cash flow from financing (CFF)                  | \$             |
|---|----------------|
| Net principal on bonds                          | 5,000          |
| Net proceeds from share repurchase and issuance | (10,000)       |
| Cash dividends                                  | <u>(3,500)</u> |
| Cash flow from financing                        | (8,500)        |

### **Answer:**

In this example, CFI is equal to  $FC_{INV}$  due to the absence of cash flows related to financial investments.

$\text{FCFF} = \text{CFO} + [\text{cash interest paid} \times (1 - \text{tax rate})] - \text{fixed capital investment}$

$$= \$50,000 + \$500(1 - 0.4) - \$0 = \$50,300$$

$\text{FCFE} = \text{CFO} - \text{fixed capital investment} + \text{net borrowing}$

$$= \$50,000 - \$0 + \$5,000 = \$55,000$$

Alternatively,  $\text{FCFE} = \text{FCFF} - [\text{interest paid} \times (1 - \text{tax rate})] + \text{net borrowing}$

$$= \$50,300 - \$500(1 - 0.4) + \$5,000 = \$55,000$$

## Other Cash Flow Ratios

Just as with the income statement and balance sheet, the cash flow statement can be analyzed either over time or by comparing it to those of other firms. Cash flow ratios can be categorized as performance ratios and coverage ratios.

### Performance Ratios

The **cash flow-to-revenue ratio** measures the amount of operating cash flow generated for each dollar of revenue:

$$\text{cash-flow-to-revenue ratio} = \frac{\text{CFO}}{\text{net revenue}}$$

The **cash return-on-assets ratio** measures the return of operating cash flow attributed to all providers of capital:

$$\text{cash-return-on-assets ratio} = \frac{\text{CFO}}{\text{average total assets}}$$

The **cash return-on-equity ratio** measures the return of operating cash flow attributed to shareholders:

$$\text{cash-return-on-equity ratio} = \frac{\text{CFO}}{\text{average total equity}}$$

The **cash-to-income ratio** measures the ability to generate cash from firm operations:

$$\text{cash-to-income ratio} = \frac{\text{CFO}}{\text{operating income}}$$

**Cash flow per share** is a variation of basic earnings per share measured by using CFO instead of net income:

$$\text{cash flow per share} = \frac{\text{CFO} - \text{preferred dividends}}{\text{weighted average number of common shares}}$$

Note: If common dividends were classified as operating activities under IFRS, they should be added back to CFO for calculating cash flow per share.

### Coverage Ratios

The **debt coverage ratio** measures financial risk and leverage:

$$\text{debt coverage ratio} = \frac{\text{CFO}}{\text{total debt}}$$

The **interest coverage ratio** measures the firm's ability to meet its interest obligations:

$$\text{interest coverage ratio} = \frac{\text{CFO} + \text{interest paid} + \text{taxes paid}}{\text{interest paid}}$$

Note: If interest paid was classified as a financing activity under IFRS, no interest adjustment is necessary.

The **reinvestment ratio** measures the firm's ability to acquire long-term assets with operating cash flow:

$$\text{reinvestment ratio} = \frac{\text{CFO}}{\text{cash paid for long-term assets}}$$

The **debt payment ratio** measures the firm's ability to satisfy long-term debt with operating cash flow:

$$\text{debt payment} = \frac{\text{CFO}}{\text{cash long-term debt repayment}}$$

The **dividend payment ratio** measures the firm's ability to make dividend payments from operating cash flow:

$$\text{dividend payment ratio} = \frac{\text{CFO}}{\text{dividends paid}}$$

The **investing and financing ratio** measures the firm's ability to purchase assets, satisfy debts, and pay dividends:

$$\text{investing and financing ratio} = \frac{\text{CFO}}{\text{cash outflows from investing and financing activities}}$$



### MODULE QUIZ 31.1

1. In preparing a common-size cash flow statement, each cash flow is expressed as a percentage of:
  - A. total assets.
  - B. total revenue.
  - C. the change in cash.
2. To calculate free cash flow to the firm based on operating cash flow, an analyst should add interest expense net of tax and subtract:
  - A. noncash charges.
  - B. fixed capital investment.
  - C. working capital investment.
3. The reinvestment ratio measures a firm's ability to use its operating cash flow to:
  - A. pay dividends.
  - B. invest in working capital.
  - C. acquire long-lived assets.

### KEY CONCEPTS

#### LOS 31.a

An analyst should determine whether a company is generating positive operating cash flow over time that is greater than its capital spending needs and whether the

company's accounting policies are causing reported earnings to diverge from operating cash flow.

A common-size cash flow statement shows each item as a percentage of revenue, or shows each cash inflow as a percentage of total inflows and each outflow as a percentage of total outflows.

### LOS 31.b

Free cash flow to the firm (FCFF) is the cash available to all investors, both equity owners and debtholders:

- $FCFF = \text{net income} + \text{noncash charges} + [\text{cash interest paid} \times (1 - \text{tax rate})] - \text{fixed capital investment} - \text{working capital investment}$
- $FCFF = CFO + [\text{cash interest paid} \times (1 - \text{tax rate})] - \text{fixed capital investment}$

Free cash flow to equity (FCFE) is the cash flow that is available for distribution to the common shareholders after all obligations have been paid.

$$FCFE = CFO - \text{fixed capital investment} + \text{net borrowing}$$

Cash flow performance ratios (e.g., cash return on equity or on assets) and cash coverage ratios (e.g., debt coverage or cash interest coverage) provide information about the firm's operating performance and financial strength.

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 31.1

1. **B** The cash flow statement can be converted to common-size format by expressing each line item as a percentage of revenue. (LOS 31.a)
2. **B** FCFF can be calculated from CFO by adding interest expense net of tax and subtracting fixed capital investment. (LOS 31.b)
3. **C** The reinvestment ratio is CFO/cash paid for long-term assets. (LOS 31.b)

# READING 32

## ANALYSIS OF INVENTORIES

### INTRODUCTION

This reading assumes that you are familiar with the cost flow methodologies first-in, first-out (FIFO), last-in, first-out (LIFO), and average cost. You should also be able to compute cost of sales (cost of goods sold, or COGS), gross profit margin, and ending inventory under each cost flow approach. You should also be aware of how to adjust financial statements from LIFO to FIFO using disclosures relating to the LIFO reserve. Ensure that you are aware of which costs can be capitalized in ending inventory and which costs must be expensed. These topics are covered in the prerequisite readings.

### MODULE 32.1: INVENTORY MEASUREMENT



Video covering this content is available online.

#### **LOS 32.a: Describe the measurement of inventory at the lower of cost and net realisable value and its implications for financial statements and ratios.**

Under IFRS, inventory is reported on the balance sheet at the lower of cost or net realizable value. **Net realizable value (NRV)** is equal to the expected sales price less the estimated selling costs and completion costs. If NRV is less than the balance sheet value of inventory, the inventory is “written down” to NRV, and the loss is recognized in the income statement either as a separate line item or by increasing cost of goods sold. If the value of the inventory recovers later, the inventory can be “written up,” and the gain is recognized in the income statement as a separate line item or by reducing COGS by the amount of the recovery. Because inventory is valued at the lower of cost or NRV, inventory cannot be written up by more than it was previously written down.



#### **PROFESSOR'S NOTE**

The write-down (or subsequent write-up) of inventory is usually accomplished through the use of a valuation allowance account, which is a contra-asset account similar to accumulated depreciation. By using a valuation allowance account, the firm is able to separate the original cost of inventory from the carrying value of the inventory.

Under U.S. GAAP, companies that use inventory cost methods other than LIFO or the retail method report inventories at the lower of cost or NRV. For companies using LIFO or the retail method, inventory is reported on the balance sheet at the **lower of cost or**

**market.** Market is usually equal to replacement cost, but it cannot be greater than NRV or less than NRV minus a normal profit margin. If replacement cost exceeds NRV, then market is NRV. If replacement cost is less than NRV minus a normal profit margin, then market is NRV minus a normal profit margin.



#### PROFESSOR'S NOTE

Think of lower of cost or market, where *market* cannot be outside a range of values. The range is from NRV minus a normal profit margin, to NRV. So, the size of the range is the normal profit margin. *Net* means the sales price less selling and completion costs.

The retail method is not explained in the Level I curriculum. Companies that resell merchandise can use this method. The methodology involves computing the cost of goods available for sale (beginning inventory + purchases). The cost of goods sold is estimated by taking sales and deducting the normal profit margin. Finally, ending inventory is computed as cost of goods sold less goods available for sale.

If the market value of inventory decreases below its cost, the inventory is written down to market on the balance sheet. The decrease in value is recognized in the income statement by increasing COGS for relatively small changes in value, or by recording the loss from the inventory write-down separately for a relatively large change in value. The market value becomes the new cost basis.

If there is a subsequent recovery in value, no write-up is allowed under U.S. GAAP. This applies to companies using lower of cost or NRV as well as those using lower of cost or market.

#### EXAMPLE: Inventory write-down

Zoom, Inc. (Zoom), sells digital cameras. Per-unit cost information pertaining to Zoom's inventory is as follows:

|                             |             |
|-----------------------------|-------------|
| Original cost               | \$210       |
| Estimated selling price     | \$225       |
| Estimated selling costs     | \$22        |
| Net realizable value        | \$203       |
| Replacement cost            | \$197       |
| <u>Normal profit margin</u> | <u>\$12</u> |

What are the per-unit carrying values of Zoom's inventory using (1) lower of cost or NRV and (2) lower of cost or market?

#### Answer:

Using the lower of cost or NRV, because the original cost of \$210 exceeds net realizable value ( $\$225 - \$22 = \$203$ ), the inventory is written down to the net realizable value of \$203. The \$7 decrease in value ( $\$203 \text{ NRV} - \$210 \text{ original cost}$ ) is reported in the income statement.

Using the lower of cost or market, market is equal to the replacement cost of \$197 because NRV of \$203 is greater than replacement cost, and NRV minus a normal profit margin ( $\$203 - \$12 = \$191$ ) is less than replacement cost. Because original cost exceeds market (replacement cost), the inventory is written down to \$197, and a \$13 loss (\$197 replacement cost – \$210 original cost) is reported in the income statement.

### **EXAMPLE: Inventory write-up**

Assume that in the year after the write-down in the previous example, NRV and replacement cost both increase by \$10. What is the impact of the recovery under IFRS, and under U.S. GAAP if lower of cost or market is used?

#### **Answer:**

Under IFRS, Zoom will write up inventory to \$210 per unit and recognize a \$7 gain in its income statement. The write-up (gain) is limited to the original write-down of \$7. The carrying value cannot exceed original cost.

Under U.S. GAAP, no write-up is allowed. The per-unit carrying value will remain at \$197. Zoom will simply recognize higher profit when the inventory is sold.

Recall from the prerequisite readings that LIFO ending inventory is based on older, lower costs (assuming inflation) than under FIFO. Because cost is the basis for determining whether an impairment has occurred, LIFO firms are less likely to recognize inventory write-downs than firms using FIFO or weighted average cost.

Analysts must understand how an inventory write-down or write-up affects a firm's ratios. For example, a write-down may significantly affect inventory turnover in current and future periods. Thus, comparability of ratios across periods may be an issue.

In certain industries, reporting inventory above historical cost is permitted under IFRS and U.S. GAAP. This exception applies primarily to producers and dealers of commodities, such as agricultural and forest products, mineral ores, and precious metals. Under this exception, inventory is reported at NRV, and any unrealized gains and losses from changing market prices are recognized in the income statement. If an active market exists for the commodity, the quoted market price is used to value the inventory. Otherwise, recent market transactions are used.

A write-down of inventory to NRV affects the financial statements and ratios in several ways. Assuming the write-down is reported as part of the cost of sales, these effects in the period of the write-down include the following:

- Because inventory is a current asset, an inventory write-down decreases both current and total assets.
- The current ratio (CA/CL) decreases. The quick ratio is unaffected because inventories are not included in its numerator.

- Inventory turnover (COGS/average inventory) increases, which decreases days' inventory on hand and the cash conversion cycle.
- The decrease in total assets increases total asset turnover and increases the debt-to-assets ratio.
- Equity decreases, increasing the debt-to-equity ratio.
- The increase in COGS decreases gross margin, operating margin, and net margin.
- The percentage decrease in net income can be expected to be greater than the percentage decrease in assets or equity. As a result, both return on assets (ROA) and return on equity (ROE) decrease.

For periods that follow a write-down of inventory to NRV, COGS may be decreased by lower inventory carrying values, which will increase profitability. Together with the decreases in assets and equity from the write-down, an increase in net income from decreased COGS will increase reported ROA and ROE in subsequent periods.

## MODULE 32.2: INFLATION IMPACT ON FIFO AND LIFO



Video covering this content is available online.

### **LOS 32.b: Calculate and explain how inflation and deflation of inventory costs affect the financial statements and ratios of companies that use different inventory valuation methods.**

During inflationary periods and with stable or increasing inventory quantities, LIFO COGS is higher than FIFO COGS. This is because the last units purchased have a higher cost than the first units purchased. Under LIFO, the more costly last units purchased are assumed to be the first units sold. Of course, higher COGS under LIFO will result in lower gross profit and net income compared to FIFO.

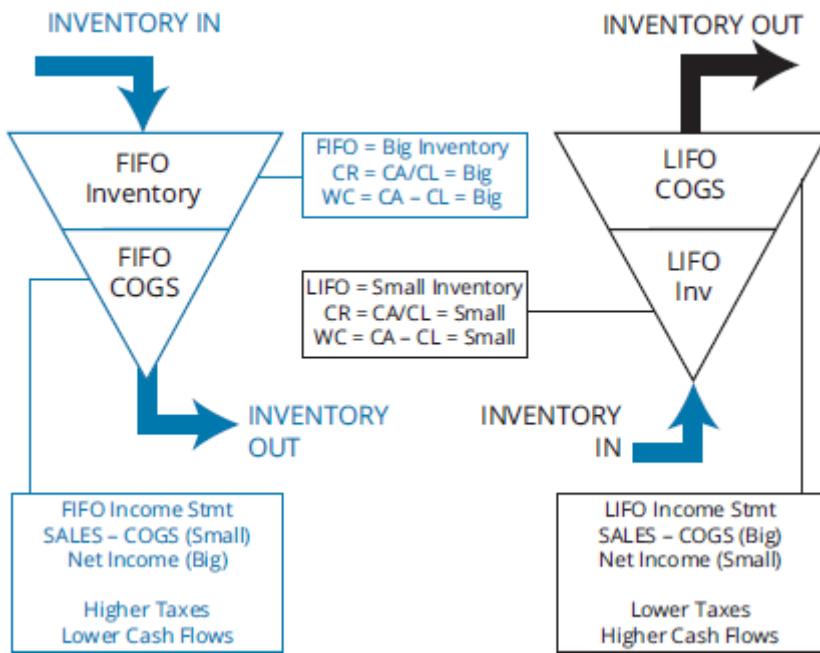
Using similar logic, we can see that LIFO ending inventory is lower than FIFO ending inventory because under LIFO, ending inventory is valued using older, lower costs.

During deflationary periods, assuming stable or increasing inventory quantities, the cost flow effects of using LIFO and FIFO will be reversed; that is, LIFO COGS will be lower, and LIFO ending inventory will be higher. This makes sense because the most recent lower-cost purchases are assumed to be sold first under LIFO, and the units in ending inventory are assumed to be the earliest purchases with higher costs.

Consider the diagram in Figure 32.1 to help visualize the FIFO-LIFO difference during periods of rising prices and growing inventory levels.

**Figure 32.1: LIFO and FIFO Diagram–Rising Prices and Growing Inventory**

## Balances



Remember, it's not the older or newer physical inventory units that are reported in the income statement and balance sheet; rather, it is the *costs* that are assigned to the units sold and to the units remaining in inventory.



### PROFESSOR'S NOTE

Be able to describe the effects of LIFO and FIFO, assuming inflation, in your sleep. When prices are falling, the effects are simply reversed. When you are finished with this review, take the time to look at these graphs and relationships again to solidify the concepts in your mind.

During periods of stable prices, the LIFO, FIFO, and average cost methods will yield the same results for inventory, COGS, and gross profit. During periods of trending prices (up or down), different cost flow methods may result in significant differences in these items.



### PROFESSOR'S NOTE

The presumption in this section is that inventory quantities are stable or increasing.

When prices are rising or falling, FIFO provides the most useful measure of ending inventory. Recall that FIFO inventory is made up of the most recent purchases. These purchase costs can be viewed as a better approximation of current cost, and thus a better approximation of economic value. LIFO inventory, by contrast, is based on older costs that may differ significantly from current economic value.

Changing prices can also produce significant differences between COGS under LIFO and FIFO. Recall that LIFO COGS is based on the most recent purchases. As a result, when prices are rising, LIFO COGS will be higher than FIFO COGS. When prices are falling, LIFO COGS will be lower than FIFO COGS. Because LIFO COGS is based on the most recent purchases, LIFO COGS produces a better approximation of current cost in the income statement.

When prices are changing, the average cost method will produce values of COGS and ending inventory between those of FIFO and LIFO.

Because COGS is subtracted from revenue in calculating gross profit, gross profit is also affected by the choice of cost flow method. Assuming inflation, higher COGS under LIFO will result in lower gross profit. In fact, all profitability measures (gross profit, operating profit, income before taxes, and net income) will be affected by the choice of cost flow method.

**Figure 32.2: Effects of Inventory Valuation Methods**

|                  | FIFO   | LIFO   |
|------------------|--------|--------|
| Cost of sales    | Lower  | Higher |
| Ending inventory | Higher | Lower  |
| Gross profit     | Higher | Lower  |

**Note:** This assumes increasing prices and stable or increasing inventory levels.

## Effects on Ratios

Again, assuming increasing prices and stable or rising inventory levels, we can trace the ratio effects of the adjustments of LIFO values to FIFO values.

*Profitability.* Compared to FIFO, LIFO produces higher COGS in the income statement and results in lower earnings. Any profitability measure that includes COGS will be higher under FIFO. For example, FIFO COGS will result in higher gross margins, operating margins, and net profit margins as compared to LIFO.

*Liquidity.* Compared to FIFO, LIFO results in a lower inventory value on the balance sheet. Because inventory (a current asset) is higher under FIFO, the current ratio, a popular measure of liquidity, is also higher under FIFO. Working capital is higher under FIFO as well, because current assets are higher.

*Activity.* Inventory turnover ( $\text{COGS} / \text{average inventory}$ ) is higher for firms that use LIFO compared to firms that use FIFO. Under LIFO, COGS is valued at more recent, higher costs (higher numerator), while inventory is valued at older, lower costs (lower denominator). Adjusting to FIFO values will result in lower turnover and higher days of inventory on hand ( $365 / \text{inventory turnover}$ ).

*Solvency.* Adjusting to FIFO results in higher total assets because inventory is higher. Higher total assets under FIFO result in higher stockholders' equity (assets – liabilities). Because total assets and stockholders' equity are higher under FIFO, the debt ratio and the debt-to-equity ratio are lower under FIFO compared to LIFO.

## LIFO Liquidation

A **LIFO liquidation** occurs when a LIFO firm's inventory quantities decline. Older, lower costs are included in COGS compared to a situation in which inventory quantities are not declining. LIFO liquidation results in higher profit margins and higher income taxes compared to what they would be if inventory quantities were not declining. The extra profit reported with a LIFO liquidation inflates operating margins by recognizing

historical inflationary gains from increasing inventory prices as income in the current period. Increases in profit margins from LIFO liquidation are not sustainable, however, because a firm cannot continue forever to sell existing inventory without replenishment.

Management could use a LIFO liquidation (draw down inventory) to artificially inflate current period earnings. Inventory declines can also be caused by events outside the management's control, such as strikes or materials shortages at a key supplier that make inventory reduction involuntary, or a decline in expected customer orders that results in a voluntary reduction in inventory to suit market conditions.

Analysts must look to the LIFO reserve disclosures in the footnotes to see if the LIFO reserve has decreased over the period, which would indicate the possibility of a LIFO liquidation that requires adjustment of profit margins if its impact has been significant.

#### **EXAMPLE: Comparing FIFO and LIFO with a LIFO liquidation**

Willock Corporation is a retailer incorporated at the start of Year 1. Sales prices and purchase costs have been inflating at 5% per annum. Using the data provided on sales and purchase units and prices compute Willocks gross profit and gross profit margin using FIFO and LIFO cost flow methodology. (Assume all purchases each year are made at the beginning of the year for the indicated prices.)

| <b>Data: Units</b>  | <b>Year 1</b> | <b>Year 2</b> | <b>Year 3</b> |
|---------------------|---------------|---------------|---------------|
| Sales               | 10,000        | 12,000        | 16,000        |
| Beginning Inventory | 0             | 4,000         | 7,000         |
| Purchases           | 14,000        | 15,000        | 10,000        |
| Available for sale  | 14,000        | 19,000        | 17,000        |
| Ending inventory    | (4,000)       | (7,000)       | (1,000)       |
| Units sold          | 10,000        | 12,000        | 16,000        |

| <b>Sales and purchase prices</b> | <b>Year 1</b> | <b>Year 2</b> | <b>Year 3</b> |
|----------------------------------|---------------|---------------|---------------|
| Sales price                      | \$100         | \$105         | \$110         |
| Purchase price                   | \$80          | \$84          | \$88          |

## Answer:

| FIFO Gross Profit   | Year 1           | Year 2           | Year 3         |
|---------------------|------------------|------------------|----------------|
|                     | \$               | \$               | \$             |
| Sales               | 1,000,000        | 1,260,000        | 1,760,000      |
| Beginning inventory | 0                | 320,000          | 588,000        |
| Purchases           | <u>1,120,000</u> | <u>1,260,000</u> | <u>880,000</u> |
| Available for sale  | 1,120,000        | 1,580,000        | 1,468,000      |
| Ending inventory    | <u>-320,000</u>  | <u>-588,000</u>  | <u>-88,000</u> |
| Cost of goods sold  | 800,000          | 992,000          | 1,380,000      |
| Gross profit        | \$200,000        | \$268,000        | \$380,000      |

| LIFO Gross Profit   | Year 1           | Year 2           | Year 3         |
|---------------------|------------------|------------------|----------------|
|                     | \$               | \$               | \$             |
| Sales               | 1,000,000        | 1,260,000        | 1,760,000      |
| Beginning inventory | 0                | 320,000          | 572,000        |
| Purchases           | <u>1,120,000</u> | <u>1,260,000</u> | <u>880,000</u> |
| Available for sale  | 1,120,000        | 1,580,000        | 1,452,000      |
| Ending inventory    | <u>-320,000</u>  | <u>-572,000</u>  | <u>-80,000</u> |
| Cost of goods sold  | 800,000          | 1,008,000        | 1,372,000      |
| Gross profit        | \$200,000        | \$252,000        | \$388,000      |

In Year 1, LIFO and FIFO gross profit is the same. This is because there was no beginning inventory and we assumed the purchases in the year were all at the same price. If purchases had been made at different prices during Year 1, FIFO and LIFO results would differ.

In Year 2, FIFO gives a higher gross margin because ending inventory is valued at the most recent purchase price of \$84, compared to LIFO which values 4,000 units of ending inventory at the older purchase price of \$80 and the remaining 3,000 units at \$84. This result should not be a surprise as both purchase prices and ending inventory quantities increased.

In Year 3, LIFO gives a higher gross margin even though purchase prices are inflating. This unusual result is caused by a LIFO liquidation. Inventory levels decreased during the year because the number of units purchased was less than the number of units sold.

| Key Ratios        | Year 1 | Year 2 | Year 3 |
|-------------------|--------|--------|--------|
| FIFO gross margin | 20.00% | 21.27% | 21.59% |
| LIFO gross margin | 20.00% | 20.00% | 22.05% |

The impact of the LIFO liquidation can be detected in the company's gross profit margins. In Year 2, because of both rising purchase prices and increasing inventory levels, FIFO reports a higher gross margin (gross profit/sales). In Year 3 the LIFO liquidation releases older purchase prices previously stored in ending inventory

through cost of goods sold, resulting in a lower cost of goods sold figure and a higher gross profit margin.



## MODULE QUIZ 32.1, 32.2

1. Kamp, Inc., sells specialized bicycle shoes. At year-end, due to a sudden increase in manufacturing costs, the replacement cost per pair of shoes is \$55. The original cost is \$43, and the current selling price is \$50. The normal profit margin is 10% of the selling price, and the selling costs are \$3 per pair. According to U.S. GAAP, which of the following amounts should each pair of shoes be reported on Kamp's year-end balance sheet?
  - A. \$42.
  - B. \$43.
  - C. \$47.
2. Poulter Products reports under IFRS and wrote its inventory value down from cost of \$400,000 to net realizable value of \$380,000. The *most likely* financial statement effect of this change is a(n):
  - A. increase in cost of sales.
  - B. decrease in depreciation charges.
  - C. loss reported as other comprehensive income.
3. Which of the following statements relating to U.S. GAAP inventory valuation is *most accurate*?
  - A. Companies using FIFO should report inventory in the balance sheet at the lower of cost or market value.
  - B. Inventory can be written up, but not by more than it was previously written down.
  - C. When establishing market value, net realizable value should be used as the upper limit if replacement cost exceeds net realizable value.
4. Which of the following statements relating to the effects of an inventory write-down is *least accurate*?
  - A. Asset turnover will increase.
  - B. The quick ratio will decrease.
  - C. The debt-to-equity ratio will increase.
5. Under which inventory cost flow assumption does inventory on the balance sheet *best* approximate its current cost?
  - A. First-in, first-out.
  - B. Weighted average cost.
  - C. Last-in, first-out.
6. In periods of rising prices and stable inventory quantities, which of the following *best* describes the effect on gross profit of using LIFO as compared to using FIFO?
  - A. Lower.
  - B. Higher.
  - C. The same.
7. In an inflationary environment, a LIFO liquidation will *most likely* result in an increase in:
  - A. inventory.
  - B. accounts payable.

C. operating profit margin.

## MODULE 32.3: PRESENTATION AND DISCLOSURE



Video covering this content is available online.

**LOS 32.c: Describe the presentation and disclosures relating to inventories and explain issues that analysts should consider when examining a company's inventory disclosures and other sources of information.**

**Inventory disclosures**, usually found in the financial statement footnotes, are useful for evaluating the firm's inventory management. The disclosures are also useful for adjusting a firm's financial statements to make them comparable with other firms in the industry.

Required inventory disclosures are similar under U.S. GAAP and IFRS and include the following:

- Cost flow method (LIFO, FIFO, etc.) used
- Total carrying value of inventory, with carrying value by classification (raw materials, work in progress, and finished goods), if appropriate
- Carrying value of inventories reported at fair value less selling costs
- The cost of inventory recognized as an expense (COGS) during the period
- Amount of inventory write-downs (valuation allowances) during the period
- Reversals of inventory write-downs during the period, including a discussion of the circumstances of reversal (IFRS only because U.S. GAAP does not allow reversals)
- Carrying value of inventories pledged as collateral

### Inventory Ratios

Merchandising firms, such as wholesalers and retailers, purchase inventory that is ready for sale. In this case, inventory is reported in one account on the balance sheet. Manufacturing firms normally report inventory using three separate accounts: raw materials, work in progress, and finished goods. Analysts can use these disclosures, along with other sources of information such as Management's Discussion and Analysis, economic data specific to the industry, industry trade publications, and other sections of the firm's financial reports, as a signal of a firm's future revenues and earnings.

For example, an increase in raw materials or work in progress inventory may indicate that the firm expects increase in demand. Higher demand should result in higher revenues and earnings. Conversely, an increase in finished goods inventory, while raw materials and work in progress are decreasing, may indicate decreasing demand and potential inventory write-downs in the future.

Analysts should also examine the relationship between sales and finished goods. Finished goods inventory growing faster than sales may indicate declining demand and excessive or potentially obsolete inventory. Obsolete inventory will result in lower

earnings in the future when the inventory is written down. In addition, too much inventory is costly, as the firm may incur storage costs, insurance premiums, and inventory taxes. Holding too much inventory uses cash that might be deployed more efficiently somewhere else.

The inventory turnover ratio measures how quickly a firm is selling its inventory. Generally, high inventory turnover (low days of inventory on hand) is desirable. However, inventory turnover can be too high. A firm with an inventory turnover ratio that is too high may not be carrying enough inventory to satisfy customers' needs, which can cause the firm to lose sales. High inventory turnover may also indicate that inventory write-downs have occurred. Write-downs are usually the result of poor inventory management.

To further assess the explanation for high inventory turnover, we can look at inventory turnover relative to sales growth within the firm and industry. High turnover with slower growth may be a sign of inadequate inventory quantities. Alternatively, sales growth at or above the industry average supports the conclusion that high inventory turnover reflects greater efficiency.

#### **EXAMPLE: Inventory ratio analysis**

Hyzer Corporation is a U.S. manufacturer of products for use in the sport of disc golf. Hyzer presents the following financial statements data:

| <b>Hyer Corporation<br/>Balance Sheets</b> | <b>20X5</b>  | <b>20X6</b>  | <b>20X7</b>  |
|--|--------------|--------------|--------------|
|  | <b>\$000</b> | <b>\$000</b> | <b>\$000</b> |
| <b>Assets</b>                              |              |              |              |
| Cash                                       | 950          | 1,250        | 2,675        |
| Trade receivables                          | 520          | 1,520        | 3,020        |
| Inventories                                | 500          | 900          | 300          |
| Total current assets                       | 1,970        | 3,670        | 5,995        |
| Gross plant and equipment                  | 5,600        | 5,400        | 5,400        |
| Accumulated depreciation                   | 2,400        | 2,980        | 3,650        |
| Net plant and equipment                    | 3,200        | 2,420        | 1,750        |
| Total assets                               | 5,170        | 6,090        | 7,745        |
| <b>Liabilities and equity</b>              |              |              |              |
| Trade payables                             | 320          | 220          | 720          |
| Accrued expenses                           | 75           | 175          | 275          |
| Interest payable                           | 45           | 195          | 215          |
| Tax payable                                | 80           | 156          | 295          |
| Short-term debt                            | 200          | 120          | 0            |
| Current liabilities                        | 720          | 866          | 1,505        |
| Long-term debt                             | 1,800        | 1,850        | 2,150        |
| Common stock                               | 1,000        | 1,100        | 1,050        |
| Additional paid-in-capital                 | 500          | 550          | 525          |
| Retained earnings                          | 1,150        | 1,724        | 2,515        |
| Stockholders' equity                       | 2,650        | 3,374        | 4,090        |
| Total liabilities and equity               | 5,170        | 6,090        | 7,745        |

|                      | <b>20X6</b>  | <b>20X7</b>  |
|----------------------|--------------|--------------|
|                      | <b>\$000</b> | <b>\$000</b> |
| Revenue              | 5,500        | 7,500        |
| Cost of sales        | 2,600        | 4,100        |
| Gross profit         | 2,900        | 3,400        |
| Operating expenses   | 1,900        | 2,150        |
| Operating profit     | 1,000        | 1,250        |
| Disposal (loss)/gain | (30)         | 80           |
| Interest expense     | 150          | 200          |
| Earnings before tax  | 820          | 1,130        |
| Taxes                | 246          | 339          |
| Net income           | 574          | 791          |

20X5 sales = \$5,300,000

A review of the footnote disclosure reveals that Hyzer uses FIFO to establish the cost of raw materials. Hyzer records balance sheet inventory values at the lower of cost and NRV.

The following footnote disclosure is given for inventory balances:

| Inventory net value      | 20X5<br>\$000 | 20X6<br>\$000 | 20X7<br>\$000 |
|--------------------------|---------------|---------------|---------------|
| Raw materials            | 120           | 207           | 68            |
| Valuation allowance      | <u>-20</u>    | <u>-27</u>    | <u>-2</u>     |
| Net carrying value       | 100           | 180           | 66            |
| Work in progress         | 50            | 95            | 31            |
| Valuation allowance      | <u>0</u>      | <u>-5</u>     | <u>-1</u>     |
| Net carrying value       | 50            | 90            | 30            |
| Finished goods           | 403           | 706           | 221           |
| Valuation allowance      | <u>-53</u>    | <u>-76</u>    | <u>-17</u>    |
| Net carrying value       | 350           | 630           | 204           |
| Total net carrying value | 500           | 900           | 300           |

Use the data in the financial statements to calculate and comment on the following ratios for 20X6 and 20X7:

- Inventory turnover and days of inventory on hand
- Gross profit margin and sales growth
- Current and quick ratios

#### Answer:

| Key ratios summary        | 20X6 | 20X7 |
|---------------------------|------|------|
| Inventory turnover        | 3.7  | 6.8  |
| Days of inventory on hand | 98   | 53   |
| Gross profit margin       | 53%  | 45%  |
| Sales growth              | 4%   | 36%  |
| Current ratio             | 4.24 | 3.98 |
| Quick ratio               | 3.20 | 3.78 |

Inventory turnover (cost of sales / average inventory):

$$20X6: \$2,600,000 / [(\$500,000 + \$900,000) / 2] = 3.71$$

$$20X7: \$4,100,000 / [(\$900,000 + \$300,000) / 2] = 6.83$$

Days of inventory on hand (365 / inventory turnover):

$$20X6: 365 / 3.71 = 98 \text{ days}$$

$$20X7: 365 / 6.83 = 53 \text{ days}$$

Inventory turnover has increased dramatically in 20X7, and as a result, days of inventory on hand has dropped. At first glance, this could be assumed to be due to improvements in working capital management. Inventory balances at year-end have dropped dramatically from \$900,000 in 20X6 to \$300,000 in 20X7, which is a significant decline—and therefore, is unlikely to be explained purely by improvements in inventory management.

The decrease in inventory balances could be misinterpreted as indicating that the company expects demand for its products to decline significantly. The inventory

disclosure shows that raw materials, work in progress, and finished goods have declined substantially in 20X7. Typically, if customer demand declined significantly, we would expect raw materials and work in progress to decline relative to finished goods. This indicates that raw materials were 20% of inventory in 20X6 (\$180,000 / \$900,000) and 22% in 20X7 (\$66,000 / \$300,000), while work in progress was 10% in 20X6 (\$90,000 / \$900,000) and remained at 10% in 20X7 (\$30,000 / \$300,000). Raw materials and work in progress have not declined proportionately relative to finished goods. This indicates that lower future demand is not expected.

Another clue for the analyst is that the valuation allowance for finished goods has decreased as a proportion of the cost of finished goods, rather than increased.

$$20X6: \$76,000 / \$706,000 = 10.7\%$$

$$20X7: \$17,000 / \$221,000 = 7.7\%$$

If product obsolescence due to expected future decreases in sales was a significant factor, the valuation allowance for finished goods should have increased proportionally. Remember that the valuation allowance indicates that NRV has declined below cost.

These factors combined indicate to the analyst that slowing customer demand and obsolescence is not the reason for the dramatic decline in 20X7 ending inventory.

Looking at sales growth, the analyst can see a significant increase in 20X7:

$$20X6: (\$5,500,000 / \$5,300,000) - 1 = 3.77\%$$

$$20X7: (\$7,500,000 / \$5,500,000) - 1 = 36.36\%$$

It would seem unlikely (but not impossible) that a company seeing such increases in sales would be facing a dramatic decline in the next period. This is another indicator that the declining inventory balances are not caused by obsolescence or falling demand.

Gross profit margins, however, did decline in 20X7, suggesting that the cost of raw materials, manufacturing costs, or both increased:

$$20X6: \$2,900,000 / \$5,500,000 = 52.73\%$$

$$20X7: \$3,400,000 / \$7,500,000 = 45.33\%$$

Positive sales growth, coupled with declining margins, shows that the cost of producing disc golf products has increased. This, coupled with the decline in inventory balances in 20X7, could indicate that the company is facing supply-side shocks. Declining margins reinforce the suspicion that the significant drop in inventory levels is unlikely to be solely explained by efficiency improvements. The sales growth of 36% in 20X7 should also make the analyst question why inventory balances have declined so substantially.

The analyst should seek out further explanation for the decline. Potential sources are as follows:

- Management discussion and analysis

- Significant events disclosed in the accounts
- Conferences and communication with the senior management
- Media and industry reports and journals
- The accounts of companies in the same industry

Looking at Hyzer's liquidity, the current ratio declined between 20X6 and 20X7 while the quick ratio improved. The major difference between the two measures is the inclusion of inventory in the current ratio.

Current ratio: (current assets / current liabilities)

20X6:  $\$3,670,000 / \$866,000 = 4.24$

20X7:  $\$5,995,000 / \$1,505,000 = 3.98$

Quick ratio: (cash + market securities + receivables) / current liabilities

20X6:  $\$2,770,000 / \$866,000 = 3.20$

20X7:  $\$5,695,000 / \$1,505,000 = 3.78$

Some analysts prefer the quick ratio because it removes the impact of inventory on liquidity. Inventory is one of the most illiquid of current assets, as there can be a significant delay (days of inventory on hand + days sales outstanding) between holding inventory and receiving cash. Using this measure, Hyzer's liquidity shows a moderate improvement.



### MODULE QUIZ 32.3

1. Which of the following inventory disclosures would *least likely* be found in the footnotes of a firm following IFRS?
  - A. The amount of loss reversals, from previously written-down inventory, recognized during the period.
  - B. The carrying value of inventories that collateralize a short-term loan.
  - C. The separate carrying values of raw materials, work in progress, and finished goods computed under the LIFO cost flow method.
2. Paul Neimer calculates the following horizontal common-size inventory data for Redpine Manufacturing, Inc.:

|                     | Year 1 | Year 2 | Year 3 | Year 4 |
|---------------------|--------|--------|--------|--------|
| Sales               | 1.00   | 1.10   | 1.18   | 1.25   |
| <b>Inventories:</b> |        |        |        |        |
| Raw materials       | 1.00   | 1.09   | 1.07   | 1.04   |
| Work in progress    | 1.00   | 1.11   | 1.15   | 1.17   |
| Finished goods      | 1.00   | 1.10   | 1.21   | 1.33   |

Based on these data, Neimer should *most likely* conclude that Redpine:

- A. has an increasing inventory turnover ratio.
  - B. anticipates declining demand for its products.
  - C. might be losing sales due to inadequate inventory.
3. Which of the following is *most likely* for a firm with high inventory turnover and lower sales growth than the industry average? The firm:

- A. is managing its inventory effectively.
  - B. may have obsolete inventory that requires a write-down.
  - C. may be losing sales by not carrying enough inventory.
4. During a period of increasing prices, compared to reporting under LIFO, a firm that reports using FIFO for inventory will have a:
- A. lower gross margin.
  - B. higher current ratio.
  - C. higher asset turnover.

## KEY CONCEPTS

### LOS 32.a

Under IFRS, inventories are valued at the lower of cost or net realizable value (NRV). Inventory write-ups are allowed, but only to the extent that a previous write-down to NRV was recorded.

Under U.S. GAAP, inventories are valued at the lower of cost or NRV for companies using cost methods other than LIFO or the retail method. For companies using LIFO or the retail method, inventories are valued at the lower of cost or market. Market is usually equal to replacement cost, but it cannot exceed NRV or be less than NRV minus a normal profit margin. No subsequent write-up is allowed for any company reporting under U.S. GAAP.

A write-down of inventory value from cost to NRV will do the following:

- Decrease inventory, assets, and equity. A contra account (valuation allowance) is used to reduce the carrying value of inventory and most often increase cost of sales. If the write-down is materially large, it will be disclosed on the face of the income statement as its own line item.
- Increase asset turnover, the debt-to-equity ratio, and the debt-to-assets ratio.
- Decrease net income and the net profit margin, as well as ROA and ROE for a typical firm.

### LOS 32.b

In periods where inventory levels and purchase costs are rising, the following occur:

- FIFO produces the highest ending inventory value and the lowest cost of sales.
- Average cost will produce ending inventory and cost of sales between LIFO and FIFO.
- LIFO produces the lowest ending inventory and the highest cost of sales.
- FIFO results in higher profitability and liquidity ratios, and lower inventory turnover and solvency ratios.
- If inventory levels are increasing but costs are decreasing, these results are reversed.

If LIFO is used and inventory levels decline, a LIFO liquidation has occurred, which will distort profit margins in that period.

Analysts may have to adjust financial statements to compare firms that use different inventory cost methods.

### **LOS 32.c**

Required inventory disclosures areas are as follows:

- The cost flow method (LIFO, FIFO, etc.) used
- Total carrying value of inventory and carrying value by classification (raw materials, work in progress, and finished goods), if appropriate
- Carrying value of inventories reported at fair value less selling costs
- The cost of inventory recognized as an expense (COGS) during the period
- Amount of inventory write-downs during the period
- Reversals of inventory write-downs during the period (IFRS only because U.S. GAAP does not allow reversals)
- Carrying value of inventories pledged as collateral

An analyst should examine inventory disclosures to determine the following:

- Whether the finished goods category is growing while raw materials and goods in process are declining, which may indicate decreasing demand and potential future inventory write-downs
- Whether raw materials and goods in process are increasing, which may indicate increasing future demand and higher earnings
- Whether increases in finished goods are greater than increases in sales, which may indicate decreasing demand or inventory obsolescence and potential future inventory write-downs

Inventory turnover, days of inventory on hand, and gross profit margin can be used to evaluate the quality of a firm's inventory management:

- Inventory turnover that is too low (high days of inventory on hand) may be an indication of slow-moving or obsolete inventory.
- High inventory turnover, together with low sales growth relative to the industry, may indicate inadequate inventory levels and lost sales because customer orders could not be fulfilled.
- High inventory turnover, together with high sales growth relative to the industry average, suggest that high inventory turnover reflects greater efficiency rather than inadequate inventory.

### **ANSWER KEY FOR MODULE QUIZZES**

#### **Module Quiz 32.1, 32.2**

1. **B** Market is equal to the replacement cost as long as replacement cost is within a specific range. The upper bound is net realizable value (NRV), which is equal to the selling price (\$50) less selling costs (\$3) for an NRV of \$47. The lower bound is NRV (\$47) less normal profit margin (10% of selling price = \$5) for a net amount of \$42. Since replacement cost is greater than NRV (\$47), market equals

NRV (\$47). Additionally, we have to use the lower of cost (\$43) or market (\$47) principle, so the shoes should be recorded at cost of \$43. (Module 32.1, LOS 32.a)

2. A The write-down in inventory value from cost to NRV is reported on the income statement either as an addition to cost of sales or as a separate line item, not as other comprehensive income. Depreciation will not be affected as inventory is not depreciated. (Module 32.1, LOS 32.a)
3. C When establishing market value, replacement cost should be used subject to upper and lower limits. The upper limit is net realizable value, and the lower limit is net realizable value minus the normal profit margin. The lower of cost or market value is only applicable to companies using either the LIFO or retail sales method. Companies using specific identification, FIFO, or average cost should use the lower of cost or NRV. Inventory write-downs under U.S. GAAP cannot be reversed. (Module 32.1, LOS 32.a)
4. B The quick ratio  $[(\text{cash} + \text{receivables} + \text{marketable securities}) / \text{current liabilities}]$  will not be affected because the numerator does not include inventory. Inventory write-downs will decrease the carrying value of inventory in the balance sheet, reducing current and total assets. The write-down will decrease income for the period. Asset turnover (revenue / average total assets) will increase as revenue (sales) is not affected, but balance sheet assets decline. The debt-to-equity ratio (interest-bearing liabilities / stockholders' equity) will increase as the write-down reduces net income and therefore retained earnings and stockholders' equity. (Module 32.1, LOS 32.a)
5. A Under FIFO, ending inventory is made up of the most recent purchases, thereby providing a closer approximation of current cost. (Module 32.2, LOS 32.b)
6. A Compared to FIFO, COGS calculated under LIFO will be higher because the most recent, higher-cost units are assumed to be the first units sold. Higher COGS under LIFO will result in lower gross profit (revenue – COGS). (Module 32.2, LOS 32.b)
7. C In a LIFO liquidation, older and lower costs are included in cost of sales. Thus, cost of sales per unit decreases and profit margins increase. (Module 32.2, LOS 32.b)

### Module Quiz 32.3

1. C While the separate carrying values of raw materials, work in progress, and finished goods are required disclosure for some firms, LIFO is not permitted under IFRS. (LOS 32.c)
2. B Redpine's finished goods inventory is growing faster than sales, while work in progress inventory is growing more slowly than sales and raw materials inventory is decreasing. These data are consistent with Redpine reducing production in response to decreasing demand. Inventory turnover ratios cannot be calculated directly from the common-size data given, but finished goods

inventory increasing faster than sales suggests inventory turnover is likely decreasing. (LOS 32.c)

3. **C** High inventory turnover coupled with low sales growth relative to the industry may be an indication of inadequate inventory levels. In this case, the firm may be losing sales by not carrying enough inventory. (LOS 32.c)
4. **B** Compared to using LIFO, using FIFO would produce lower COGS, higher gross operating income, and higher ending inventory, so current assets and the current ratio would be higher. Consequently, gross margin would be higher and asset turnover would be lower under the FIFO inventory method. (LOS 32.c)

## READING 33

# ANALYSIS OF LONG-TERM ASSETS

## INTRODUCTION

Before studying this reading, ensure you have reviewed capitalization versus expensing costs in our reading on Analyzing Income Statements and understand the implications of these approaches on the financial statements. You should also understand the various types of long-term assets, PP&E, and intangibles (from our reading on Understanding Balance Sheets and the prerequisites). Ensure you have understood the two models of recording assets in the balance sheet. Under U.S. GAAP, the cost method is required. IFRS allows companies to choose either the cost method or revaluation model for each class of asset. You should also ensure you understand depreciation and amortization methods (prerequisites).

### MODULE 33.1: INTANGIBLE LONG-LIVED ASSETS



Video covering this content is available online.

#### LOS 33.a: Compare the financial reporting of the following types of intangible assets: purchased, internally developed, and acquired in a business combination.

**Intangible assets** are long-term assets that lack physical substance, such as patents, brand names, copyrights, and franchises. Some intangible assets have finite lives, while others have indefinite lives.

The cost of a finite-lived intangible asset is amortized over its useful life. Indefinite-lived intangible assets are not amortized, but they are tested for impairment at least annually. If impaired, the reduction in value is recognized in the income statement as a loss in the period in which the impairment is recognized.

Intangible assets are also considered either identifiable or unidentifiable. Under IFRS, an **identifiable intangible asset** must be the following:

- Capable of being separated from the firm or arise from a contractual or legal right
- Controlled by the firm
- Expected to provide future economic benefits

In addition, the future economic benefits must be probable, and the asset's cost must be reliably measurable.

An **unidentifiable intangible asset** is one that cannot be purchased separately and may have an indefinite life. The most common example of an unidentifiable intangible asset is goodwill. Goodwill is the excess of purchase price over the fair value of the identifiable assets (net of liabilities) acquired in a business combination.

Not all intangible assets are reported on the balance sheet. Accounting for an intangible asset depends on whether the asset was created internally, purchased externally, or obtained as part of a business combination.

## Intangible Assets Created Internally

With some exceptions, costs to create intangible assets are expensed as incurred. Important exceptions are research and development costs (under IFRS) and software development costs.

Under IFRS, **research costs**, which are costs aimed at the discovery of new scientific or technical knowledge and understanding, are expensed as incurred. However, **development costs** may be capitalized. Development costs are incurred to translate research findings into a plan or design of a new product or process. To recognize an intangible asset in development, a firm must show that it can complete the asset and intends to use or sell the completed asset, among other criteria.

Under U.S. GAAP, both research and development costs are generally expensed as incurred. However, the costs of creating software for sale to others are treated in a manner similar to the treatment of research and development costs under IFRS. Costs incurred to develop software for sale to others are expensed as incurred until the product's technological feasibility has been established, after which the costs of developing a salable product are capitalized. Costs incurred developing software for internal use must be expensed until it is probable that the firm will complete the project and use the software as intended. Technological feasibility is more difficult to demonstrate than the probability of completing and using the software.

## Purchased Intangible Assets

Like tangible assets, an intangible asset purchased from another party is initially recorded on the balance sheet at cost, typically its fair value at acquisition.

If the intangible asset is purchased as part of a group, the total purchase price is allocated to each asset on the basis of its fair value. For analytical purposes, an analyst is usually more interested in the type of asset acquired rather than the value assigned on the balance sheet. For example, recently acquired franchise rights may provide insight into the firm's future operating performance. In this case, the allocation of cost is not as important.

The financial statement effects of capitalizing intangible assets are the same as the effects of capitalizing other expenditures. Capitalizing results in higher net income in the first year and lower net income in the subsequent years. Similarly, assets, equity, and operating cash flow are all higher when expenditures are capitalized.

A company that generates its intangible assets internally will have lower balance sheet assets than a company that purchases its intangibles. Internally generated intangibles are typically expensed, while purchased intangibles are capitalized. This can have a considerable impact on financial statements and ratios.

## Intangible Assets Obtained in a Business Combination

The **acquisition method** is used to account for business combinations. Under the acquisition method, the purchase price is allocated to the identifiable assets and liabilities of the acquired firm on the basis of fair value. This will involve establishing the fair value of any intangibles that the acquired company had internally developed and including them in the balance sheet at the date of acquisition. To capitalize these intangible assets, which had previously expensed as incurred, the asset must be an identifiable intangible asset. Any remaining amount of the purchase price is recorded as **goodwill** (see Figure 33.1). Goodwill is said to be an unidentifiable asset that cannot be separated from the business itself.

**Figure 33.1: Goodwill**

|   |            |
|---|------------|
| Purchase price  | X          |
| Fair market value of net assets acquired                                | (X)        |
| Fair market value of identifiable intangibles previously not recognized | <u>(X)</u> |
| Goodwill  | X          |

Only goodwill created in a business combination is capitalized on the balance sheet. The costs of any internally generated “goodwill” are expensed in the period incurred.



### MODULE QUIZ 33.1

1. The cost of an intangible asset is *most likely* to be amortized if the asset has a(n):
  - finite life and was purchased.
  - finite life and was created internally.
  - indefinite life and was acquired in a business combination.
2. StefoJo, PLC, is acquiring a controlling interest in Dykes Limited. Dykes has internally developed intangibles that have previously been expensed. Which of the following comments is *most accurate*?
  - StefoJo should capitalize any identifiable internally generated intangibles.
  - Goodwill generated resulting from Dykes' reputation and customer loyalty should be capitalized.
  - Capitalizing intangible assets Dykes had previously expensed will increase the goodwill recorded at the acquisition date.
3. Ferdinand, Inc., is developing software for internal use within its business operations. Assuming Ferdinand follows U.S. GAAP, which of the following statements is *least accurate*?
  - The software development costs can only be capitalized once the software is technically feasible.
  - Capitalized software development will increase earnings in the year of capitalization but reduce earnings in subsequent periods.

- C. The software development costs should be capitalized once it is probable that the software will be completed and used as intended.

## MODULE 33.2: IMPAIRMENT AND DERECOGNITION



Video covering this content is available online.

### LOS 33.b: Explain and evaluate how impairment and derecognition of property, plant, and equipment and intangible assets affect the financial statements and ratios.

Depreciation and amortization represent the spreading of an asset's cost to match the benefits earned over an asset's life, and they cause the balance sheet carrying value to decline. An **impairment** is an unanticipated decline in an asset's value, causing it to fall below the carrying value. **Derecognition** occurs when an asset is disposed of or retired.

## Impairments

Both IFRS and U.S. GAAP require firms to write down impaired assets by recognizing a loss in the income statement, but the standards are applied slightly differently. If the impairment loss is material in size and nature, it will be shown as an unusual or infrequent item.



### PROFESSOR'S NOTE

The following discussion applies to both tangible and intangible long-lived assets with finite lives that are held for use.

#### *Impairments Under IFRS*

Under IFRS, the firm must annually assess whether events or circumstances indicate that an impairment of an asset's value has occurred. For example, there may have been a significant decline in the market value of the asset, or a significant change in the asset's physical condition. If so, the asset's value must be tested for impairment.

An asset is impaired when its carrying value (original cost less accumulated depreciation) exceeds the **recoverable amount**. The recoverable amount is the greater of its fair value less any selling costs and its **value in use**. The value in use is the present value of its future cash flow stream from continued use and disposal. Value in use is a highly subjective figure requiring estimation of future cash flows, disposal proceeds, and the selection of an appropriate discount rate.

If impaired, the asset's value must be written down on the balance sheet to the recoverable amount. An impairment loss, equal to the excess of carrying value over the recoverable amount, is recognized in the income statement.

Under IFRS, an impairment loss on an identifiable long-lived asset can be reversed if the asset's value recovers in the future. However, the loss reversal is limited to the original impairment loss.

## **Impairments Under U.S. GAAP**

Under U.S. GAAP, an asset is tested for impairment only when events and circumstances indicate the firm may not be able to recover the carrying value through future use.

Determining an impairment and calculating the loss potentially involve two steps. In the first step, the asset is tested for impairment by applying a **recoverability test**. If the asset is impaired, the second step involves measuring the loss.

Regarding *recoverability*, an asset is considered impaired if the carrying value (original cost less accumulated depreciation) is greater than the asset's future *undiscounted* cash flow stream. Because the recoverability test is based on estimates of future undiscounted cash flows, tests for impairment involve considerable management discretion. Like value in use under IFRS, estimating the future undiscounted cash flows from an asset's use and disposal is highly subjective.

Regarding *loss measurement*, if impaired, the asset's value is written down to fair value on the balance sheet—and a loss, equal to the excess of carrying value over the fair value of the asset (or the *discounted* value of its future cash flows, if the fair value is not known), is recognized in the income statement. The discounted value of future cash flows is equivalent of value in use under IFRS.

Under U.S. GAAP, loss recoveries are typically not permitted.



### **PROFESSOR'S NOTE**

The difference between testing for impairment and measuring the impairment loss can be confusing. In testing for impairment under U.S. GAAP, undiscounted cash flows are used. Once impairment has been detected, the loss is based on fair value, or the discounted expected future cash flows. Using undiscounted cash flows to test for impairment keeps PP&E assets from becoming "impaired" by increases in the discount rate when interest rates increase. In measuring the impairment loss, U.S. GAAP uses fair value, not fair value less selling costs.

### **EXAMPLE: Asset impairment**

Information related to equipment owned by Brownfield Company follows:

|                                  |           |
|----------------------------------|-----------|
| Original cost                    | \$900,000 |
| Accumulated depreciation to date | \$100,000 |
| Expected future cash flows       | \$795,000 |
| Fair value                       | \$790,000 |
| Value in use                     | \$785,000 |
| Selling costs                    | \$30,000  |

Assuming Brownfield will continue to use the equipment, test the asset for impairment under both IFRS and U.S. GAAP and discuss the results.

### **Answer:**

The carrying value of the equipment is \$900,000 original cost – \$100,000 accumulated depreciation = \$800,000, and the recoverable amount under IFRS is \$785,000 (greater of \$785,000 value in use and \$760,000 fair value less selling costs). Under IFRS, the asset is written down on the balance sheet to the \$785,000 recoverable amount, and a \$15,000 loss (\$800,000 carrying value – \$785,000 recoverable amount) is recognized in the income statement.

Under U.S. GAAP, the asset is impaired because the \$795,000 expected future cash flows is less than the \$800,000 carrying value. The asset is written down on the balance sheet to its \$790,000 fair value, and a \$10,000 loss (\$800,000 carrying value – \$790,000 fair value) is recognized on the income statement.

Impairment reduces an asset's carrying value on the balance sheet. An impairment charge is recognized as a loss in the income statement, reducing assets and equity (retained earnings). In the year of impairment, return on assets (ROA) and return on equity (ROE) will decrease because the impairment charge reduces net income.

In subsequent periods, net income will be higher than it would have been without the impairment charge because depreciation or amortization will be lower (the asset has a lower depreciable value). Both ROA and ROE will increase in periods after the impairment charge because both equity and assets will fall as a result of the impairment charge. Asset turnover will increase in the period in which the impairment charge is taken, and in subsequent periods.

Asset impairment has no impact on cash flow because the impairment does not reduce taxable income; it is an unrealized loss until the asset is disposed of.

## **Analysis of Impairments**

An impairment loss essentially indicates that the firm has not recognized sufficient depreciation or amortization expense, and has overstated earnings as a result.

The judgment required in determining asset impairments gives management considerable discretion about the timing and amounts of impairment charges. Consequently, impairment decisions present an opportunity for management to manipulate earnings. Waiting to recognize an impairment loss until a period of relatively high earnings would tend to smooth earnings.

Alternatively, existing managements may take more impairment charges in periods when earnings will be poor due to external (macroeconomic or industry) factors. New managements may also choose to take more or greater impairment charges when they take over. In either case, the resulting low earnings might not be perceived as the "fault" of management, and lower values for assets and equity give a boost to ROA and ROE going forward.

## Intangible Assets With Indefinite Lives

Intangible assets with indefinite lives are not amortized; rather, they are tested for impairment at least annually. An impairment loss is recognized when the carrying amount exceeds fair value.

## Long-Lived Assets Held for Sale

If a firm intends to sell an asset, it is probable that the asset will be sold, and the asset is available for immediate sale, then it must be reclassified from *held for use* to *held for sale*. When a firm reclassifies an asset as held for sale, the asset is no longer depreciated or amortized. The held-for-sale asset is impaired if its carrying value exceeds its fair value less selling costs. If impaired, the asset is written down to net realizable value, and the loss is recognized in the income statement.

For long-lived assets held for sale, the loss can be reversed under IFRS and U.S. GAAP if the value of the asset recovers in the future. However, the loss reversal is limited to the original impairment loss. Thus, the carrying value of the asset after reversal cannot exceed the carrying value before the impairment was recognized.

## Derecognition

Eventually, long-term assets are removed from the balance sheet. Derecognition occurs when assets are sold, exchanged, or abandoned.

When a long-term asset is sold, the asset is removed from the balance sheet and the difference between the sale proceeds and the carrying value of the asset is reported as a gain or loss in the income statement, as seen in Figure 33.2. The carrying value is equal to original cost minus accumulated depreciation and any impairment charges.

**Figure 33.2: Derecognition of Long-Term Assets**

|                                |       |   |
|--------------------------------|-------|---|
| Disposal proceeds              | X     | Cash flow from investing                      |
| Carrying value before disposal | (X)   | Removed from balance sheet                    |
| Disposal gain (loss)           | X/(X) | Accounting gain or (loss) in income statement |

The gain or loss is reported in the income statement with other gains and losses, or reported separately as an unusual or infrequent item if material. Also, if the firm presents its cash flow statement using the indirect method, the gain or loss is removed from net income to compute cash flow from operations because the proceeds from selling a long-lived asset are an investing cash inflow.

If a long-lived asset is abandoned, the treatment is similar to a sale, except there are no proceeds. In this case, the carrying value of the asset is removed from the balance sheet, and a loss of that amount is recognized in the income statement.

If a long-lived asset is exchanged for another asset, a gain or loss is computed by comparing the carrying value of the old asset with fair value of the old asset (or the fair value of the new asset, if that value is clearly more evident). The carrying value of the old asset is removed from the balance sheet, and the new asset is recorded at its fair

value. If no reliable measure of fair value exists, the new asset is valued at the carrying value of the old asset.

A **spinoff** is the transfer of assets that constitute an entire division or subsidiary into a new legal entity, upon which the shares of the spinnee are subsequently distributed to its shareholders, and the shareholders do not surrender any stock of the spinnor.<sup>1</sup> See Figure 33.3 as follows.

**Figure 33.3: Spinoff**



Before the spinoff, Company A (the spinnor) owns Company B (the spinnee), and shareholders just have shares in Company A. After the spinoff, the shareholders have shares in both Company A and Company B. Company B is no longer included in the consolidated accounts of Company A.

Once the spinoff becomes probable, the balance sheet assets and liabilities of the spinnee will be transferred from assets held for use to assets held for sale in the spinnor's accounts. Assets held for sale may be referred to as assets held for distribution, in this context. No profit or loss is recorded on the disposal in the income statement.



## MODULE QUIZ 33.2

1. According to U.S. GAAP, an asset is impaired when:
  - A. the firm cannot fully recover the carrying amount of the asset through operations.
  - B. accumulated depreciation plus salvage value exceeds acquisition cost.
  - C. the present value of future cash flows from an asset exceeds its carrying value.
2. Using the following data, what is the income statement difference between an impairment recorded under U.S. GAAP and an impairment recorded under IFRS?

|                                  |           |
|----------------------------------|-----------|
| Original cost                    | \$250,000 |
| Accumulated depreciation to date | \$150,000 |
| Expected future cash flows       | \$105,000 |
| Fair value                       | \$95,000  |
| Value in use                     | \$90,000  |
| Selling costs                    | \$10,000  |

- A. \$0.
- B. \$5,000.

- C. \$10,000.
3. In the year after an impairment charge on a finite-lived identifiable intangible asset, compared to not taking the charge, net income is *most likely* to be:
- lower.
  - higher.
  - unaffected.
4. A firm recently recognized a \$15,000 loss on the sale of machinery used in its manufacturing operation. The original cost of the machinery was \$100,000 and the accumulated depreciation at the date of sale was \$60,000. What amount did the firm receive from the sale?
- \$25,000.
  - \$45,000.
  - \$85,000.
5. Other things equal, which of the following actions related to property, plant, and equipment will *most likely* decrease a firm's return on assets (ROA) in future periods?
- Impairment.
  - Derecognition.
  - Upward revaluation.
6. Sinclair S.r.l. has recently exchanged an old asset for a new asset. Which of the following comments is *least accurate*?
- The difference between the fair value and the carrying value of the disposed asset will be recognized in the income statement as a gain or loss.
  - The new asset will be recorded in the balance sheet at the fair value of the assets disposed of.
  - If the fair value of the asset received and the fair value of the asset disposed of cannot be established, a disposal loss will be recorded in the income statement equal to the carrying value of the disposed asset.

## MODULE 33.3: LONG-TERM ASSET DISCLOSURES



Video covering this content is available online.

**LOS 33.c: Analyze and interpret financial statement disclosures regarding property, plant, and equipment and intangible assets.**

### IFRS Disclosures

Under IFRS, the firm must disclose the following for each class of property, plant, and equipment (PP&E):

- Basis for measurement (usually historical cost)
- Depreciation method
- Depreciation expense in the period
- Useful lives or depreciation rate
- Gross carrying value and accumulated depreciation at the start and end of the period
- Reconciliation of carrying amounts from the beginning of the period to the end of the period

The firm must also disclose the following:

- Title restrictions and assets pledged as collateral
- Agreements to acquire PP&E in the future

If the revaluation (fair value) model is used, the firm must disclose the following:

- The revaluation date
- How fair value was determined
- Carrying value using the historical cost model
- Revaluation surplus in other comprehensive income (OCI)

Under IFRS, the disclosure requirements for intangible assets are similar to those for PP&E, except that the firm must disclose whether the useful lives are finite or indefinite.

For impaired assets, the firm must disclose the following:

- Amounts of impairment losses and reversals by asset class
- Where the losses and loss reversals are recognized in the income statement
- Circumstances that caused the impairment loss or reversal

## **U.S. GAAP Disclosures**

Under U.S. GAAP, the PP&E disclosures include the following:

- Depreciation expense by period
- Balances of major classes of assets by nature and function, such as land, improvements, buildings, machinery, and furniture
- Accumulated depreciation by major classes, or in total
- General description of depreciation methods used

Under U.S. GAAP, the disclosure requirements for intangible assets are similar to those for PP&E. In addition, the firm must provide an estimate of amortization expense for the next five years.

For impaired assets, the firm must disclose the following:

- A description of the impaired asset
- Circumstances that caused the impairment
- How fair value was determined
- The amount of loss
- Where the loss is recognized in the income statement

Under IFRS, the depreciation and amortization expenses may be shown on the face of the income statement if producing an income statement using the nature of the expense approach. If the company prepares the income statement using the function of the expense method, it will not be shown on the face; instead, it will be included in the cost of sales and sales general and admin. If the indirect method is used to produce cash

flow from operations, depreciation and amortization will appear as noncash charges. For companies adopting the direct method, depreciation will not appear in the computation of operating cash flows; however, U.S. GAAP requires the indirect method reconciliation of net income to operating cash flows to be disclosed in the footnotes. Cash received on asset disposals and spent on asset acquisitions are presented as cash flows from investing activities.

## Analyzing Long-Lived Asset Disclosures

Fixed-asset turnover shows revenue per dollar of fixed assets and indicates how efficiently a firm is using its long-term assets to generate sales. A higher ratio is interpreted as greater efficiency.

$$\text{fixed asset turnover} = \text{revenue} / \text{average fixed assets}$$

Financial statement disclosures provide an analyst considerable information about a company's fixed assets and depreciation (amortization) methods. An analyst can use the data to estimate the average age of the firm's assets. The average age is useful for two reasons:

1. Older, less-efficient assets may make a firm less competitive.
2. The average age of assets helps an analyst to estimate the timing of major capital expenditures and a firm's future financing requirements.

The level of detail provided in footnote disclosures regarding fixed assets and depreciation varies across firms. Because assets are often grouped by their useful lives, the following methods of estimating the average age, economic life, and remaining useful life of a firm's assets do not produce precise values, but they can highlight issues for further investigation. The following computations assume zero salvage values and straight-line depreciation, and as a result, they are less insightful for asset classes subject to accelerated depreciation methods and substantial salvage values.

Three useful calculations (in years) for an analyst are as follows.

### Average Age

$$\text{average age} = \frac{\text{accumulated depreciation}}{\text{annual depreciation expense}}$$

This calculation is more accurate for a firm that uses straight-line depreciation. The calculation can be significantly affected by the mix of assets.

### Total Useful Life

$$\text{total useful life} = \frac{\text{historical cost (gross cost)}}{\text{annual depreciation expense}}$$

Historical cost is gross PP&E before deducting accumulated depreciation.

### Remaining Useful Life

$$\text{remaining useful life} = \frac{\text{ending net PP\&E}}{\text{annual depreciation expense}}$$

Net PP&E is equal to original cost (gross PP&E) minus accumulated depreciation.



### PROFESSOR'S NOTE

The remaining useful life can also be approximated by subtracting the average age from the average depreciable life.

#### EXAMPLE: Calculating average age and total useful life

At the end of 20X8, a company has gross PP&E of \$3 million and accumulated depreciation of \$1 million. During the year, the depreciation expense was \$500,000.

What is the average age, total useful life, and remaining useful life of the company's PP&E?

#### Answer:

$$\text{average age} = \frac{\text{accumulated depreciation}}{\text{depreciation expense}} = \frac{\$1,000,000}{\$500,000} = 2 \text{ years}$$

$$\text{total useful life} = \frac{\text{historical cost}}{\text{depreciation expense}} = \frac{\$3,000,000}{\$500,000} = 6 \text{ years}$$

$$\text{remaining useful life} = \frac{\text{ending net PP&E}}{\text{depreciation expense}} = \frac{\$2,000,000}{\$500,000} = 4 \text{ years}$$

Another popular metric is the ratio of annual capital expenditures to depreciation expense. This ratio provides information about whether the firm is maintaining its production capacity by replacing its PP&E at the same rate as its assets are being depreciated.



#### MODULE QUIZ 33.3

1. Which of the following disclosures would *least likely* be found in the financial statement footnotes of a firm?
  - A. Accumulated depreciation.
  - B. Carrying values by asset class.
  - C. Average age of assets.
2. Metallurgy, Inc., reported depreciation expense of \$15 million for the most recent year. Beginning-of-year gross PP&E and accumulated depreciation were \$287 million and \$77 million, respectively. If end-of year gross PP&E and accumulated depreciation were \$300 million and \$80 million, the estimated remaining useful life of PP&E is *closest* to:
  - A. 10 years.
  - B. 15 years.
  - C. 20 years.
3. Ruby, Inc., reported depreciation expense of \$90 million for the most recent year. Beginning-of-year gross PP&E and accumulated depreciation were \$300 million and \$120 million, respectively. If end-of year gross PP&E and accumulated depreciation were \$350 million and \$200 million, the estimated average age of PP&E is *closest* to:
  - A. 1.3 years.
  - B. 1.6 years.
  - C. 2.2 years.
4. For impairments, U.S. GAAP *least likely* requires firms to disclose:

- A. amounts of impairment reversals by asset class.
- B. how fair value was determined.
- C. circumstances that led to the impairment.

## KEY CONCEPTS

### LOS 33.a

The cost of a purchased finite-lived intangible asset is amortized over its useful life. Indefinite-lived intangible assets are not amortized, but they are tested for impairment at least annually. The cost of internally developed intangible assets is expensed.

Under IFRS, research costs are expensed, but development costs may be capitalized. Under U.S. GAAP, both research and development costs are expensed as incurred, except in the case of software.

The acquisition method is used to account for assets acquired in a business combination. The purchase price is allocated to the fair value of identifiable assets of the acquired firm less its liabilities. Any excess of the purchase price above the fair value of the acquired firm's net assets is recorded as goodwill, an unidentifiable intangible asset that cannot be separated from the business itself.

Compared to expensing an asset's cost, capitalization results in the following:

- Lower expense and higher net income in period of acquisition, and higher expense (depreciation or amortization) and lower net income in each of the remaining years of the asset's life
- Higher assets and equity
- Lower CFI and higher CFO because the cost of a capitalized asset is classified as an investing cash outflow
- Higher ROE and ROA in the initial period, and lower ROE and ROA in subsequent periods because net income is lower, and both assets and equity are higher
- Lower debt-to-assets and debt-to-equity ratios because assets and equity are higher

### LOS 33.b

Impairment charges decrease net income, assets, and equity, which results in lower ROA and ROE and higher debt-to-equity and debt-to-assets ratios for a typical firm.

Under IFRS, an asset is impaired when its carrying value exceeds the recoverable amount. The recoverable amount is the greater of fair value less selling costs and the value in use (present value of expected cash flows). If impaired, the asset is written down to the recoverable amount. Loss recoveries are permitted, but not above historical cost.

Under U.S. GAAP, an asset is impaired if its carrying value is greater than the asset's undiscounted future cash flows. If impaired, the asset is written down to its fair value. Subsequent recoveries are not allowed for assets held for use.

Asset impairments result in losses in the income statement. Impairments have no impact on cash flow, as they have no tax or other cash flow effects until disposal of the

asset.

Derecognition of assets can result in either a gain or loss on the income statement. A loss will reduce net income and assets, while a gain will increase net income and assets.

When a long-lived asset is *sold*, the difference between the sale proceeds and the carrying (book) value of the asset is reported as a gain or loss in the income statement.

When a long-lived asset is *abandoned*, the carrying value is removed from the balance sheet, and a loss is recognized in that amount.

If a long-lived asset is *exchanged* for another asset, a gain or loss is computed by comparing the carrying value of the old asset with fair value of the old asset (or fair value of the new asset, if more clearly evident).

### LOS 33.c

There are differences in the disclosure requirements for long-lived assets under IFRS and U.S. GAAP. However, firms are generally required to disclose the following:

- Carrying values for each class of asset
- Accumulated depreciation and amortization
- Title restrictions and assets pledged as collateral
- For impaired assets, the loss amount and the circumstances that caused the loss
- For revalued assets (IFRS only), the revaluation date, how fair value was determined, and the carrying value using the historical cost model

Analysts can use disclosures of the historical cost, accumulated depreciation (amortization), and annual depreciation (amortization) expense to estimate average age of assets, total useful life of assets, and remaining useful life of assets.

$$\text{average age} = \frac{\text{accumulated depreciation}}{\text{annual depreciation expense}}$$

$$\text{total useful life} = \frac{\text{historical cost}}{\text{annual depreciation expense}}$$

$$\text{remaining useful life} = \frac{\text{ending net PP&E}}{\text{annual depreciation expense}}$$

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 33.1

1. A The cost of an intangible asset is amortized if the asset has a finite life and was purchased or acquired in a business combination. Development costs for internally generated intangible assets may be capitalized under IFRS, but research costs are expensed as incurred. (LOS 33.a)
2. A Any identifiable internally generated intangible assets that the targeted company had previously expensed must be included in the balance sheet assets acquired. Internally generated goodwill is not an identifiable intangible asset and would not

be included in the fair market value of assets acquired. The capitalization of previously unrecognized identifiable intangibles will increase the fair market value of assets acquired and reduce the amount of the purchase price allocated to goodwill. (LOS 33.a)

3. A Development costs for software intended for *external sale* may be capitalized once the software is considered technically feasible. Development costs for software intended for *use within the business* may be capitalized once it is probable that the software will be completed and used as intended. Capitalization stores costs in the balance sheet rather than recognizing them in the income statement at the time it is incurred, resulting in higher earnings in the year of capitalization. Future earnings will be lower if costs are capitalized, as the intangible asset is amortized over the period it generates benefits. (LOS 33.a)

## Module Quiz 33.2

1. A An asset is impaired when the firm cannot recover the carrying value. Under U.S. GAAP, recoverability is tested based on undiscounted future cash flows. (LOS 33.b)
2. C The carrying value of the asset is equal to  $\$250,000 - \$150,000 = \$100,000$ . Under U.S. GAAP, a two-step process is used. The recoverability test is used to identify if an impairment has occurred. An impairment has occurred if the carrying value is higher than the estimated undiscounted cash flows from the asset's use and disposal. In this case, \$105,000 is greater than the \$100,000 carrying value, so the asset is not impaired under U.S. GAAP. Under IFRS, carrying value is compared to the recoverable amount. The recoverable amount is the higher of fair value less selling costs and value in use. In this case, value in use would be used as \$90,000 is greater than \$85,000. IFRS would record an impairment of \$10,000, equal to carrying value less value in use. (LOS 33.b)
3. B Because a finite-lived identifiable intangible asset would be amortized, amortization expense in the year after the reduction from the impairment charge would be lower (the carrying value of the asset would most likely be lower), increasing net income. (LOS 33.b)
4. A Gain or loss is equal to the sale proceeds minus the carrying value (cost minus accumulated depreciation) at the time of sale. Given the loss of \$15,000 and carrying value of \$40,000 ( $\$100,000 - \$60,000$ ), we can solve for the proceeds of \$25,000 ( $-15,000 + 40,000$ ). (LOS 33.b)
5. C An upward revaluation will increase the book value of assets and increase depreciation expense in future periods (decreasing net income), both of which reduce ROA. Impairment would have the opposite effects, reducing the carrying value of assets and decreasing future depreciation. Derecognizing an asset may increase, decrease, or not affect ROA in future periods. (LOS 33.b)
6. C The gain or loss on an asset's exchange is calculated as the difference between the fair value of the asset that has been disposed of and the carrying value of the disposed asset. The new asset should be recorded in the balance sheet at the fair

value of the asset disposed of. If the fair value of the disposed asset is difficult to estimate, then the gain or loss on disposal is computed as the fair value of the asset acquired in the exchange less the carrying value of the asset disposed of. The new asset would be recorded at its fair value in the balance sheet. If neither the fair value of the asset disposed of nor acquired can be established, the new asset will be recorded at the carrying value of the disposed asset. In this situation, there will be no gain or loss recorded on disposal. (LOS 33.b)

### Module Quiz 33.3

1. **C** The average age is not a required disclosure. However, it can be calculated given other disclosures. (LOS 33.c)
2. **B** The remaining useful life can be estimated as ending net PP&E value divided by annual depreciation, so  $(300 - 80) / 15 = 14.66$  years. (LOS 33.c)
3. **C** The average age can be estimated as ending accumulated depreciation value divided by annual depreciation, so  $200 / 90 = 2.22$  years. (LOS 33.c)
4. **A** U.S. GAAP requires the disclosure of impairment losses, but not reversals. U.S. GAAP typically does not allow the reversal of impairments, with the exception of assets held for sale. (LOS 33.c)

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<sup>1</sup> Definition per U.S. GAAP, ASC 505-60.

## READING 34

# TOPICS IN LONG-TERM LIABILITIES AND EQUITY

### MODULE 34.1: LEASES



**LOS 34.a: Explain the financial reporting of leases from the perspectives of lessors and lessees.**

Video covering this content is available online.

Instead of purchasing an asset, a firm may choose to lease the asset. With a lease, a firm (the **lessee**) essentially purchases the right to use an asset from another firm (the **lessor**) for a specified period, which can range from a month to many years. The lessee makes periodic payments to the lessor for the use of the asset. Thus, a lease can be considered an alternative to financing the purchase of an asset.

To be a lease, a contract must meet the following three requirements:

1. It must refer to a specific asset.
2. It must give the lessee effectively all the asset's economic benefits during the term of the lease.
3. It must give the lessee the right to determine how to use the asset during the term of the lease.

The advantages of leasing rather than purchasing an asset may include the following:

- *Less initial cash outflow.* Typically, a lease requires only a small down payment, if any.
- *Less costly financing.* Because a lease is effectively secured by the leased asset if the lessee defaults, the interest rate implicit in a lease contract may be less than the interest rate would be on a loan to purchase the asset.
- *Less risk of obsolescence.* At the end of a lease, the lessee often returns the leased asset to the lessor, and therefore, does not bear the risk of an unexpected decline in the asset's end-of-lease value. Given that the lessor bears the risk of obsolescence, this increases the lessor's risk and is reflected in a higher implicit interest rate within the lease. Some leases include guaranteed residual income clauses, whereby the lessee guarantees a minimum value for the leased assets at the end of the lease term. In this case, the risk of obsolescence remains with the lessee.

Under IFRS and U.S. GAAP, any lease in which both the benefits and the risks of ownership are substantially transferred to the lessee is classified as a **finance lease**. If

either the benefits or the risks of ownership are not substantially transferred to the lessee, a lease is classified as an **operating lease**. Any given lease will be classified the same way by the lessee and the lessor.

Financial reporting standards require a lease to be classified as a finance lease if it meets *any* of the following five conditions:

1. Ownership of the leased asset transfers to the lessee.
2. The lessee has an option to buy the asset and is expected to exercise it.
3. The lease is for most of the asset's useful life.
4. The present value of the lease payments is greater than or equal to the asset's fair value.
5. The lessor has no other use for the asset (i.e., the asset is of a specialized nature only suitable for use by the lessee).

Leases that are not classified as finance leases are classified as operating leases.

## Lessee Accounting

IFRS requires the lessee to record a **right-of-use asset (ROU asset)** and a **lease liability** (both equal to the present value of the lease payments) on the balance sheet. This treatment is required for all leases, except those that are short term (up to 12 months) or are of low value (up to USD 5,000). This treatment creates a debt instrument (the lease liability) and an ROU asset, resulting in a balance sheet that is comparable to the lessee issuing debt and using the proceeds to buy an asset.

The ROU asset is intangible rather than PP&E. The ROU asset will be amortized over the term of the lease, with the amortization amount each period recorded on the income statement. Each lease payment is split between interest and principal repayment. The lease liability decreases each period by the principal portion of each lease payment. While the lease asset and the liability both begin with the same value and reach zero at the end of the lease, they will have different values during the life of the lease, as the following example illustrates.



### PROFESSOR'S NOTE

All the examples in the Level I CFA curriculum assume that payments are made in arrears (the end of each period) rather than at the start. In practice, most leases require payment at the start of each period. We follow the curriculum in our examples.

### EXAMPLE: Lessee accounting for a finance lease

The Affordable Company (Affordable) leases a machine for its own use for four years with annual payments of \$10,000. At the end of the lease, which is also the end of the machine's useful life, Affordable will return the machine to the lessor. The interest rate implicit in the lease is 5%. Assuming that the ROU asset is amortized on a straight-line basis over the term of the lease, calculate the impact of the lease on Affordable's financial statements for each of the four years.

## Answer:

The lease is classified as a finance lease because the lease is in effect for the asset's useful life.

The present value of the lease payments is as follows:

$$N = 4; I/Y = 5; PMT = -10,000; FV = 0; CPT \rightarrow PV = 35,460$$

This amount will be recognized on the balance sheet as an ROU asset and as a lease liability.

The ROU asset will be amortized straight-line over the four years, decreasing each year by  $\$35,460 / 4 = \$8,865$ . This amount will be recognized each year on the income statement as an amortization expense.

The lease liability will be treated as if it were an amortizing loan.

| Year | (1)<br>Beginning<br>Liability | (2)<br>Interest<br>Expense<br>$= (1) \times 5\%$ | (3)<br>Lease<br>Payment | (4)<br>Principal<br>Repayment<br>$= (3) - (2)$ | Ending<br>Lease<br>Liability<br>$= (1) - (4)$ | Book<br>Value<br>of ROU<br>Asset |
|------|-------------------------------|--|-------------------------|--|---|----------------------------------|
|      | \$                            | \$   | \$                      | \$   | \$  | \$                               |
| 0    |                               |  |                         |  | 35,460  | 35,460                           |
| 1    | 35,460                        | 1,773  | 10,000                  | 8,227  | 27,233  | 26,595                           |
| 2    | 27,233                        | 1,362  | 10,000                  | 8,638  | 18,595  | 17,730                           |
| 3    | 18,595                        | 930  | 10,000                  | 9,070  | 9,525   | 8,865                            |
| 4    | 9,525                         | 475  | 10,000                  | 9,525  | 0   | 0                                |

The interest expense will be recognized each year on the income statement, separately from the amortization expense for the ROU asset. On the balance sheet, the ROU asset value decreases by \$8,865 each year, and the lease liability is reduced by the principal repayment from Column 4. Note that the book value of the ROU asset is less than the book value of the lease liability during the life of the lease. This is because the principal repayment in the early years of the lease is less than the straight-line amortization of the ROU asset. In the later years, the principal repayment is greater than the straight-line amortization so that at the end of the lease, both the asset and the liability reach zero.

On the cash flow statement, the repayment of principal will be classified as a cash outflow from financing. Under IFRS, the interest portion of each payment may be classified as either an operating or a financing cash outflow. Under U.S. GAAP, the interest portion is classified as an operating cash outflow.

Under U.S. GAAP, other than these differences in cash flow classification, a finance lease (that is not short term) is reported, just as we have described for leases under IFRS.

For an *operating lease* (that is not short term) under U.S. GAAP, a lease liability is also recorded and amortized as under IFRS. However, the ROU asset is not amortized straight-line. Instead, it is amortized by the same amount each period as the decrease in

the lease liability, so that the asset and the liability are equal in each period of the lease. On the income statement, interest expense and amortization of the ROU asset are not reported separately as they are for a finance lease; they are combined and reported as lease expense. On the cash flow statement, the full lease payment is classified as an operating cash outflow.

### **EXAMPLE: Lessee accounting for an operating lease under U.S. GAAP**

Using the same data from the previous example, calculate the impact of the lease on Affordable's financial statements if Affordable reports under U.S. GAAP and the lease is classified as an operating lease.

#### **Answer:**

The lease liability will be treated the same way as it is for a finance lease, but the book value of the ROU asset will remain equal to the book value of the lease liability.

| Year | \$     | \$    | \$     | \$    | (1)<br>Beginning<br>Liability | (2)<br>Interest =<br>$(1) \times 5\%$ | (3)<br>Lease<br>Payment | (4)<br>Principal<br>Repayment<br>$= (3) - (2)$ | Ending<br>Lease<br>Liability<br>$= (1) - (4)$ | Book<br>Value<br>of ROU<br>Asset |
|------|--------|-------|--------|-------|-------------------------------|---------------------------------------|-------------------------|--|---|----------------------------------|
|      |        |       |        |       |                               |                                       |                         |  |   |                                  |
| 0    |        |       |        |       |                               |                                       |                         |  | 35,460  | 35,460                           |
| 1    | 35,460 | 1,773 | 10,000 | 8,227 | 27,233                        |                                       |                         |  | 27,233  | 27,233                           |
| 2    | 27,233 | 1,362 | 10,000 | 8,638 | 18,595                        |                                       |                         |  | 18,595  | 18,595                           |
| 3    | 18,595 | 930   | 10,000 | 9,070 | 9,525                         |                                       |                         |  | 9,525   | 9,525                            |
| 4    | 9,525  | 475   | 10,000 | 9,525 | 0                             |                                       |                         |  | 0   | 0                                |

On the balance sheet, the book value of the ROU asset is amortized by the same amount each period, as the lease liability (i.e., the amortization of the asset) is equal to the principal repayment.

On the income statement, the lease expense will equal interest plus amortization of the ROU asset, which will equal the lease payment. Amortization is equal to the principal repayment each period, and the principal repayment equals the lease payment minus interest. As a result, amortization plus interest each period is equal to the lease payment of \$10,000.

On the cash flow statement, the entire \$10,000 cash outflow is classified as cash from operations.

### **Comparison of finance and operating leases: U.S. GAAP**

| Balance Sheet |               |                 |                 |                 |  |
|---------------|---------------|-----------------|-----------------|-----------------|--|
| Year          | ROU Asset     |                 | Lease Liability |                 |  |
|               | Finance Lease | Operating Lease | Finance Lease   | Operating Lease |  |
|               | \$            | \$              | \$              | \$              |  |
| 0             | 35,460        | 35,460          | 35,460          | 35,460          |  |
| 1             | 26,595        | 27,333          | 27,233          | 27,233          |  |
| 2             | 17,730        | 18,595          | 18,595          | 18,595          |  |
| 3             | 8,865         | 9,525           | 9,525           | 9,525           |  |
| 4             | 0             | 0               | 0               | 0               |  |

| Income Statement |               |              |        |                                   |    |
|------------------|---------------|--------------|--------|-----------------------------------|----|
| Year             | Finance Lease |              |        | Lease Expense,<br>Operating Lease |    |
|                  | Interest      | Amortization | Total  |                                   | \$ |
|                  | \$            | \$           | \$     |                                   |    |
| 0                |               |              |        |                                   |    |
| 1                | 1,773         | 8,865        | 10,638 | 10,000                            |    |
| 2                | 1,362         | 8,865        | 10,227 | 10,000                            |    |
| 3                | 930           | 8,865        | 9,795  | 10,000                            |    |
| 4                | 475           | 8,865        | 9,340  | 10,000                            |    |

Note the following when comparing finance lease accounting and operating lease accounting:

- The lease liability is the same each year under both methods. The ROU asset is not the same, except at initiation of the lease and at the end of the lease. Operating leases report higher ROU assets.
- The ROU asset matches the lease liability in each year for the operating lease. The ROU asset only matches the lease liability at the start and end of the lease's life for the finance lease.
- Finance lease methodology reports both interest and amortization expenses in the income statement. Operating lease methodology reports a lease expense equal to the payment, which is not split into interest and amortization components.
- In the early years of a lease's life, the income statement expense is greater in total for a finance lease compared to an operating lease. In the later years, income statement expense is less for a finance lease. In total, the same amount of expense goes through the income statement under both methodologies.
- Both operating and finance leases should be treated as financial liabilities and included in leverage measures.

The impact on the financial statements is summarized in Figure 34.1.

**Figure 34.1: Impact on Financial Statements**

|   | Finance Lease<br>(IFRS and<br>U.S. GAAP) | Operating Lease<br>(U.S. GAAP) |
|---|--|--------------------------------|
| Balance sheet assets (ROU asset)        | Lower                                    | Higher                         |
| Balance sheet liabilities               | Same                                     | Same                           |
| Income statement earnings (early years) | Lower                                    | Higher                         |
| Income statement earnings (later years) | Higher                                   | Lower                          |
| EBIT                                    | Higher                                   | Lower                          |
| Interest expense                        | Higher                                   | Lower                          |
| Operating cash flows (CFO)              | Higher                                   | Lower                          |
| Financing cash flows (CFF)              | Lower                                    | Higher                         |

For short-term (<12 months) or low-value leases under IFRS, and for short-term leases under U.S. GAAP, no lease asset or liability is reported on the balance sheet. Each period, the lease payment is reported as rental expense on the income statement, spread straight-line over the life of the lease. A summary of the approaches is shown in Figure 34.2.

**Figure 34.2: Lessee Accounting**

唯一微信: xuebajun888s

| IFRS   |                      |                                  |
|--|----------------------|----------------------------------|
| <u>Operating lease</u>                           | <u>Finance lease</u> | <u>Short term or &lt;\$5,000</u> |
| Both treated as finance leases<br>for accounting |                      | Expensed straight-line           |
| U.S. GAAP  |                      |                                  |
| <u>Operating lease</u>                           | <u>Finance lease</u> | <u>Short term</u>                |
| Different methodology                            |                      | Expensed straight-line           |

## Lessor Accounting

Under both IFRS and U.S. GAAP, there are two lease classifications for lessors, finance leases and operating leases, just as for lessees. At the initiation of a finance lease, the lessor removes the leased asset from its balance sheet and adds a **lease receivable** asset, equal to the value of the expected lease payments. If this value is different from the asset's book value, the lessor will recognize a profit or a loss. Over the term of the lease, the lessor will use the effective interest method (the same method we have just seen for lessees) to amortize the lease receivable and will report the interest portion of the lease payments as income. This interest income is included in the lessor's revenue for the period if the firm is a manufacturer or dealer of the leased asset. On the cash flow statement, the entire cash inflow is classified as cash from operations.

If manufacturing or dealing in the leased equipment is the main business operation of the firm, the sales proceeds will be in the revenue line and the carrying value of the asset will be a cost of sale. In other words, the treatment is like selling inventory. Both IFRS and U.S. GAAP refer to this treatment as a **sales-type lease**.

If the lessor is a financing company, rather than a manufacturer of the leased equipment, a gain or loss is not recognized at initiation. Instead, the gain or loss is deferred, and it is recognized over the life of the lease as interest income (for a gain) or an expense (for a loss). IFRS and U.S. GAAP refer to these leases as **direct financing leases**.

### EXAMPLE: Lessor accounting for a finance lease

The Expensive Company is the lessor to Affordable Company from our lessee accounting example. Expensive is a manufacturer of the equipment being leased.

From the previous lessee examples, the lease had annual payments of \$10,000 over a four-year period. At the end of the lease, which is also the end of the machine's useful life, Affordable will return the machine to the lessor. The interest rate implicit in the lease is 5%. Expensive believes the asset will have a residual value of \$2,000 at the end of the lease period. The carrying value of the asset, recorded as inventory in the lessor's balance sheet, was \$30,000.

Calculate the impact of the lease on Expensive's financial statements for each of the four years if the lease is treated as a finance lease.

**Answer:**

#### Profit or loss on derecognition of asset:

The present value of the lease payments is computed at the 5% rate implicit in the lease. In our example, the PV of lease payments = \$35,460 (the same as in the lessee example). This is treated as revenue at the beginning of the lease.

$$\text{The present value of the expected residual value} = \frac{\$2,000}{(1.05)^4} = \$1,645.$$

The cost of sales is equal to the asset's carrying value less the present value of the residual value: \$30,000 - \$1,645 = \$28,355.

|   | \$              |
|---|-----------------|
| Revenue = present value of lease payments                       | 35,460          |
| Cost of sale = carrying value – present value of residual value | <u>(28,355)</u> |
| Gross profit or (loss)  | 7,105           |

#### Balance sheet lease receivable asset and interest income:

The sum of the present value of lease payments and the salvage value is referred to the **net investment in the lease** and will be the initial value of the lease receivable asset in the balance sheet.

$$\text{net investment in the lease} = \$35,460 + \$1,645 = \$37,105$$

The net investment in the lease is equal to the asset's fair value. This is because the interest rate implicit in the lease is the internal rate of return that makes the present

value of the lease payments received and the residual value equal the asset's fair value.

| Year | (1)<br>Beginning<br>Lease<br>Receivable<br>Asset (Net<br>Investment<br>in the<br>Lease) | (2)<br>Interest<br>Income<br>= (1) × 5% | (3)<br>Lease<br>Payment<br>Received | (4)<br>Principal<br>Repayment<br>= (3) – (2) | Ending<br>Lease<br>Receivable<br>Asset<br>= (1) – (4) |
|------|---|---|-------------------------------------|--|---|
|      | \$  | \$                                      | \$                                  | \$   | \$  |
| 0    |   |   |                                     |  | 37,105  |
| 1    | 37,105  | 1,855                                   | 10,000                              | 8,145  | 28,960  |
| 2    | 28,960  | 1,448                                   | 10,000                              | 8,552  | 20,408  |
| 3    | 20,408  | 1,020                                   | 10,000                              | 8,980  | 11,428  |
| 4    | 11,428  | 572                                     | 10,000                              | 9,428  | 2,000   |

At the end of the lease period, the lease receivable asset is equal to the expected residual value of the asset. If the lessor disposes of the asset for any amount that differs from the residual value, a further gain or loss will be reported in the income statement.

For an operating lease, the lessor does not remove the leased asset from its balance sheet. The lessor will continue to record the depreciation expense over the life of the asset. On the income statement, the lessor reports the lease payments as income, while depreciation and other costs associated with leasing the asset are reported as expenses. As with a finance lease, the entire cash inflow is classified as cash from operations.

### EXAMPLE: Lessor accounting for an operating lease

Using the same data, calculate the impact on Expensive's financial statements for each of the four years if the lease is treated as an operating lease. Assume straight-line depreciation with a salvage value of \$2,000.

### Answer:

The asset remains in the lessor's balance sheet, typically within plant, property, and equipment. The asset will continue to be depreciated over the life of the lease. No lease receivable asset is created. Payments from the lessee are treated as rental income (lease revenue) on a straight-line basis in the income statement.

$$\text{depreciation expense} = \frac{(\$30,000 - \$2,000)}{4 \text{ years}} = \$7,000$$

| Year | Net Plant,<br>Property, and<br>Equipment | Depreciation<br>Expense | Lease<br>Revenue | Net Income<br>Statement<br>Impact |
|------|--|-------------------------|------------------|-----------------------------------|
|      | \$                                       | \$                      | \$               | \$                                |
| 0    | 30,000                                   |                         |                  |                                   |
| 1    | 23,000                                   | 7,000                   | 10,000           | 3,000                             |
| 2    | 16,000                                   | 7,000                   | 10,000           | 3,000                             |
| 3    | 9,000                                    | 7,000                   | 10,000           | 3,000                             |
| 4    | 2,000                                    | 7,000                   | 10,000           | 3,000                             |

Comparing the financial statements for lessors using the finance lease and operating lease approaches shows that the choices have a dramatic impact, with the exception of the cash flow statement.

### Lessor: Finance vs. Operating Lease Comparison

| Year  | Balance Sheet           |                           | Income Statement        |   | Cash Flow Statement     |                           |
|-------|-------------------------|---------------------------|-------------------------|---|-------------------------|---------------------------|
|       | Finance<br><u>Lease</u> | Operating<br><u>Lease</u> | Finance<br><u>Lease</u> | Operating<br><u>Lease</u>                         | Finance<br><u>Lease</u> | Operating<br><u>Lease</u> |
|       | Lease<br>Receivable     | Net<br>PP&E               | Interest<br>Revenue     | Net of<br>Lease<br>Revenue<br>and<br>Depreciation | CFO                     | CFO                       |
|       | \$                      | \$                        | \$                      | \$  | \$                      | \$                        |
| 0     | 37,105                  | 30,000                    |                         |   |                         |                           |
| 1     | 28,960                  | 23,000                    | 8,960*                  | 3,000   | 10,000                  | 10,000                    |
| 2     | 20,408                  | 16,000                    | 1,448                   | 3,000   | 10,000                  | 10,000                    |
| 3     | 11,428                  | 9,000                     | 1,020                   | 3,000   | 10,000                  | 10,000                    |
| 4     | 2,000                   | 2,000                     | 572                     | 3,000   | 10,000                  | 10,000                    |
| Total |                         |                           | 12,000                  | 12,000  | 40,000                  | 40,000                    |

\*Year 1 contains the profit on the derecognition of the asset and Year 1 interest revenue (\$7,105 + \$1,855).

Note that the same total income hits the income statement under both treatments, but the amounts in each individual year vary.



### MODULE QUIZ 34.1

- Compared to purchasing a long-lived asset using debt financing, leasing the asset *most likely*:
  - is more costly to the lessee.
  - requires a greater initial cash outflow from the lessee.
  - allows the lessee to avoid the risk of obsolescence.
- Under IFRS, which of the following lease types *least likely* requires a lessee to create a right-of-use (ROU) asset and a lease liability?
  - Low-value leases.
  - Operating leases.

- C. Finance leases.
3. During the life of a long-term lease under IFRS, the lessee recognizes:
- interest expense only.
  - amortization expense and interest expense.
  - neither amortization expense nor interest expense.
4. Criteria for reporting a lease as a finance lease *least likely* include that the:
- present value of the lease payments is less than the fair value of the asset.
  - lease term is for substantially most of the asset's useful life.
  - lessee directs the use of the asset and retains the benefits from the asset's use.
5. For a lessor, operating leases result in:
- interest income recorded in the income statement.
  - a profit or loss at the beginning of the lease.
  - depreciation on the leased asset.
6. For a lessee with an operating lease, which of the following is *most accurate*?
- Both IFRS and U.S. GAAP report interest and amortization in the income statement.
  - For both IFRS and U.S. GAAP, the right-of-use (ROU) asset will equal the lease liability over the life of the lease.
  - IFRS will typically result in a lower ROU asset than U.S. GAAP.
7. For a lessor, cash flows from a lease are classified as:
- operating.
  - investing.
  - financing.
8. If the lessor in a finance lease is a manufacturer or dealer of leased equipment, the lessor will:
- retain the asset in its balance sheet and continue to depreciate it.
  - record higher revenues at lease inception when compared to an operating lease.
  - record lease revenue in its income statement rather than interest and amortization.

## MODULE 34.2: DEFERRED COMPENSATION AND DISCLOSURES



Video covering this content is available online.

### LOS 34.b: Explain the financial reporting of defined contribution, defined benefit, and stock-based compensation plans.

Pension plans and stock-based awards are examples of **deferred compensation**, where employees earn compensation in the current period but do not receive cash flows until later. Typically, the accounting for deferred compensation requires judgment and assumptions by management.

## Pension Plans

A **pension** is a form of deferred compensation earned over time through employee service. The most common pension arrangements are defined contribution plans and defined benefit plans.

A **defined contribution plan** is a retirement plan in which the firm contributes a sum each period to the employee's retirement account. The firm's contribution can be based on any number of factors, including years of service, the employee's age, compensation, profitability, or even a percentage of the employee's contribution. In any event, the firm makes no promise to the employee regarding the future value of the plan assets. The investment decisions are left to the employee, who assumes all of the investment risk.

The financial reporting requirements for defined contribution plans are straightforward. The pension expense is simply equal to the employer's contribution. Once the contribution is paid, there is no future obligation to report on the balance sheet as a liability.

In a **defined benefit plan**, the firm promises to make periodic payments to employees after retirement. The benefit is usually based on the employee's years of service and the employee's compensation at, or near, retirement. For example, an employee might earn a retirement benefit of 2% of her final salary for each year of service. Consequently, an employee with 20 years of service and a final salary of \$100,000 would receive \$40,000 ( $\$100,000 \text{ final salary} \times 2\% \times 20 \text{ years of service}$ ) each year upon retirement until death. Because the employee's future benefit is defined, the employer assumes the investment risk.

A company that offers defined pension benefits typically funds the plan by contributing assets to a separate legal entity, usually a trust. The plan assets are managed to generate the income and principal growth necessary to pay the pension benefits as they come due. The fair value of plan assets is just the current value of the pool of assets at today's date.

Financial reporting for a defined benefit plan is much more complicated than for a defined contribution plan because the employer must estimate the value of the future obligation to its employees. The obligation involves forecasting numerous variables, such as future compensation levels, employee turnover, average retirement age, mortality rates, and an appropriate discount rate. Due to the complexity, firms employ the services of external actuaries to estimate the values. The liability side of the pension plan is the present value of the expected payments to the employees from retirement to death discounted back to today's date.

For a defined benefit plan, the **net pension asset** or **net pension liability**, referred to as **funded status**, is a key element for analysis. If the fair value of the plan's assets is greater than the estimated pension obligation, the plan is said to be *overfunded*, and the sponsoring firm records a net pension asset on its balance sheet. If the fair value of the plan's assets is less than the estimated pension obligation, the plan is *underfunded*, and the firm records a net pension liability.

For plans relating to post-retirement health care benefits, the liability represents the present value of expected health care premiums post retirement. These plans are typically not prefunded with a pool of assets; therefore, they will always be a liability on the balance sheet.

The change in the net pension asset or liability is recognized on the firm's financial statements each year. Some components are included in net income, while others are

recorded as changes to other comprehensive income (OCI). The total economic cost of running the plan is the same under U.S. GAAP and IFRS; however, the split between the income statement and OCI differs.



#### PROFESSOR'S NOTE

Accounting for defined benefit pension plans is addressed in more detail at Level II.

## Accounting for Defined Benefit Plans Under IFRS

The change in funded status comprises three elements:

- 1. Service cost.** This represents the present value of the additional benefits employees are entitled to after retirement because they have worked an additional year. This element also includes “past service costs,” which represent changes to the benefits earned in previous periods resulting from alterations to the plan and other factors.
- 2. Net interest expense or income.** This is calculated as the net pension asset or liability times the plan’s discount rate. If the plan’s beginning funded status is a net asset, the company will report interest income; if the plan is underfunded at the start of the year, the company will report interest expense.



#### PROFESSOR'S NOTE

Due to the interest element, analysts should treat a balance sheet liability as a debt instrument for leverage computations.

- 3. Remeasurements.** There are two sources of remeasurement: actuarial gains and losses, and the difference between actual and expected returns on plan assets. Actuarial gains and losses are changes in the net pension asset or liability that result from changing actuarial estimates, such as the rate of salary growth, discount rate, employee turnover, retirement age, and mortality rates. The difference between expected and actual return on plan assets results from the expected return being included in the income statement and the actual return being a component of funded status in the balance sheet.

The income statement expense under IFRS only includes service costs and net interest expense or income. Remeasurement gains and losses are taken directly to other comprehensive income within stockholders’ equity.

## Accounting for Defined Benefit Plans Under U.S. GAAP

The change in a net pension asset or liability has five components under U.S. GAAP. The first three are recognized in the income statement each period, while the last two go to other comprehensive income.

1. Service costs for the current period.
2. Interest expense or income.
3. The expected return on plan assets.
4. Past service costs.

## 5. Actuarial gains and losses.

One of the differences from IFRS pension accounting is that past service costs are recognized in other comprehensive income, rather than in the income statement as part of employee service costs. These costs are amortized over the employees' service period. Actuarial gains and losses are typically treated the same way, but U.S. GAAP allows firms to recognize them in the period incurred.

For manufacturing companies, pension expense is allocated to inventory and cost of goods sold for employees who provide direct labor to production and to salary or administrative expenses for other employees. As a result, pension expense does not appear separately on the income statement for manufacturing companies. An analyst must examine the financial statement notes to find the details of these companies' pension expense.

## Share-Based Compensation

Share-based compensation is designed to align the interest of managers and stockholders and reduce agency costs (which we described in the Corporate Issuers topic area). Share-based compensation does not require cash outflows from the company, but issuing employees stock will dilute the proportional ownership of existing shareholders and reduce earnings per share.

A criticism of share-based compensation is that an individual employee is unlikely able to directly influence the company's stock price—which, to a certain extent, is driven by the ebbs and flows of the markets. There is also a danger that stock award may make managers too risk-averse, to prevent declines in the value of their holdings. Stock options, on the other hand, may cause managers to take on too much risk, because options have asymmetrical payoffs. An option has value if the stock price is above the exercise price, but its value cannot fall below zero if the stock price is below the exercise price.

IFRS and U.S. GAAP both require the company to estimate the **fair value** of any stock-based compensation at the **grant date**, and to expense it to the income statement over the **vesting period**. The vesting period (service period) is the time between the grant date and when the employee receives the stock or can first exercise a stock option.

**1. Stock grants.** These are shares awarded outright, with restrictions, or contingent on performance. The fair value of the stock grant is the share price on the grant date. If vesting is not immediate, the compensation expense will be recognized between the grant date and the vesting date, which is known at the service period. If vesting is immediate, then the full fair value is recognized as an expense in the income statement on the grant date.

**2. Performance shares.** These are stock grants that depend on meeting a set performance target. Typically, the performance targets are not share price related, but instead focus on metrics like return on equity. While this addresses the concern that the individual may have little influence over share price, it may create incentives for managers to manipulate financial statements.

Stock grants that do not vest until certain criteria are met (typically, length of service or performance goals) are often referred to as **restricted stock units**.

**Employee stock options** are options to invest in the company's stock at a given price (the exercise price) at a future date. Unlike stock grants, which have value as long as the stock price is greater than zero, an option only has value if the stock price is above the exercise price. If an employee stock option is exercised, the company issues new shares in return for the exercise price. Option valuation models, such as the Black-Scholes-Merton or binomial models, are needed to compute the fair value of the option on the grant date. Some of the inputs that the models require are highly subjective—in particular, the assumed volatility of the company's stock price over the life of the option. The fair value is then expensed between the grant date and the vesting date (the date the option can first be exercised).

Stock grants have the following effects on financial statements:

1. The grant date is when the fair value is established. Fair value is normally the market price on this date.
2. If vesting is immediate, the full fair value is expensed to the income statement, and both common stock and additional paid-in capital (APIC) are increased by this amount.
3. If there is a length of time between the grant date and the vesting period (service period), a compensation expense is recognized in each year over the service period in the income statement on a straight-line basis. This appears in equity in an account such as a *share-based compensation reserve* or APIC. Over the entire service period, the total amount of the fair value of the option on the grant date will have been expensed to the income statement.
4. At the end of the service period, any amount remaining in an equity reserve will be recycled into common stock and APIC.

Stock options have the following effects on financial statements:

1. The fair value of the option is established using the option valuation methodology adopted.
2. As with grants, at the grant date, there is no impact on common stock or APIC, and the fair value is spread, straight-line, over the service period as a compensation expense in the income statement and an increase in APIC or a share-based compensation reserve (IFRS 2 does not specify a required equity account).
3. For both grants and options, the expense in the income statement reduces retained earnings; however, stockholders' equity remains constant by increasing equity by the same amount.
4. On exercise of the option, cash increases by the exercise price received.

Stockholders' equity increases by the same amount, split between common stock at par and APIC, with any amount in an equity reserve also being recycled into APIC.

**Stock-based appreciation rights (SARs)** generate cash for the holders that is linked to stock performance. The employee receives payments based on the change in value of the company's shares without needing to hold the stock. These have the advantage of aligning employees' and shareholders' interest without creating new shares and diluting existing shareholders. They have payoffs similar to stock options, and so do not introduce bias toward risk-averse behavior. The downside for the company is that they

result in cash outflows when the stock performs well. Non-exchange-traded firms may use a version of this called **phantom stock**, where the cash payments are related to the performance of a hypothetical stock.

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### **LOS 34.c: Describe the financial statement presentation of and disclosures relating to long-term liabilities and share-based compensation.**

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## **Lease Disclosures**

The objective of lease disclosures is to provide users of financial statements with a basis to assess the effect of leasing activities on the entity's financial position, performance, and cash flows. To achieve that objective, lessees and lessors disclose both qualitative and quantitative information.

As indicated in IFRS 16, here is what lessee disclosures must include:

- The carrying amount included in the balance sheet for the ROU asset by class of underlying asset
- Total cash outflows relating to the lease
- The interest expense included in the income statement resulting from the lease liability
- Depreciation (amortization) expensed in the period on the ROU asset, by class of underlying asset
- Expenses relating to variable lease payments not included in lease liabilities



#### **PROFESSOR'S NOTE**

Variable lease payments are included in the disclosure for lessees and lessors, but they are not defined by the Level I curriculum. There are two types of variable lease payments. The first is where the rental payments are linked to an index or rate (e.g., a market reference interest rate or the rate of inflation). The current lease liability and ROU asset are based on the current value of the index or rate and then are remeasured when there are changes. The second type relates to variable payments depending on future sales or use of the asset. These items are not included in the lease liability or ROU asset, and instead are expensed when occurred.

- Additions to ROU assets
- Maturity analysis of lease liabilities and the split between current and long-term liabilities



#### **PROFESSOR'S NOTE**

Next year's principal repayment will be a current liability, and the remaining principal repayments will be reported in long-term liabilities.

- Income statement expenses relating to low-value and short-term leases
- Quantitative and qualitative information on the following:
  - The nature of the leasing activities

- Future cash outflows to which the lessee is exposed to that are not reflected in the lease liability (could include any guarantees of the leased asset's residual value)
- Restrictions and covenants imposed by the lease
- Sale and leaseback transactions (where the lessee sells the asset to the lessor and then immediately leases it back)

As indicated in IFRS 16, lessors must disclose the following for finance leases:

- Selling profit or loss on derecognition of the asset
- Finance income (interest) recognized in the income statement relating to the net investment in the lease (lease receivable asset)
- Income relating to variable lease payments not included in the measurement of the net investment in the lease
- Qualitative and quantitative explanation of significant changes in the net investment in the lease
- Maturity analysis of lease payments receivable
- Reconciliation of undiscounted lease payments to the net investment in the lease

As indicated in IFRS 16, lessors must disclose the following for operating leases:

- Lease income recognized in the income statement, separately disclosing income for variable lease payments that do not depend on an index or rate
- Maturity analysis of lease payments receivable—at a minimum, must show undiscounted lease payments to be received in each of the next five years and aggregated amounts beyond five years.
- The underlying asset remains in the lessor's balance sheet and must comply with the disclosure for the following:
  - IAS 16 for leases of property, plant and equipment, disaggregated by class
  - IAS 36: Impairments

## Pension Disclosures

For defined contribution plans, the only disclosure requirement of IAS 19 is separate disclosure of the employer's contribution expensed in the income statement.

For defined benefit plans, IAS 19 sets out the following objectives:

1. Explain the characteristics and risks of its defined benefit plan. Much of the risk in defined benefit plans relates to the funded status of the plan—and in particular, underfunded plans.
2. Identify amounts in the financial statements relating to defined benefit plans.
3. Describe how defined benefit plans affect amounts, timings, and uncertainties relating to future cash flows. (Note that the cash flows relating to defined benefit plans are the employers' contribution.)

While the firm has discretion regarding how to achieve these objectives, some minimum disclosures are required. Disclosure requirements are as follows:

- The nature of the plan, governance, regulatory framework, and risk exposures

- Reconciliations of beginning and ending values for funded status, the present value of the defined benefit obligation, and plan assets, showing components of the change (includes changes in the balance sheet net asset or liability that are taken to the income statement expense and to OCI)
- Sensitivity analysis showing how changes to key actuarial assumptions (discount rate, rate of salary growth, mortality rates, etc.) affect the present value of the defined benefit obligation
- Composition of plan assets by asset type
- Expected employer contributions for the next period and beyond
- The maturity profile of the defined benefit obligation

## Share-Based Compensation Disclosures

The objective of these disclosures is to provide users of the accounts with sufficient information to understand the nature and extent of stock-based compensation arrangements, including their impacts on current and future cash flows. Firms must disclose:

- The nature of the plan and key details such as grant date, vesting date, and service period, as well as settlement characteristics of employee stock options (physical delivery or cash settlement)
- How the fair value at the grant date was determined
- The effect of share-based transactions on earnings and the financial position (i.e., impacts on the income statement and balance sheet)



### MODULE QUIZ 34.2

1. A net pension asset or liability can be associated with:
  - A. defined benefit pension plans only.
  - B. defined contribution pension plans only.
  - C. either defined benefit or defined contribution pension plans.
2. Which of the following is *most accurate* concerning defined benefit pension plans under both IFRS and U.S. GAAP?
  - A. The income statement expense is the same.
  - B. The amounts taken to other comprehensive income (OCI) are the same.
  - C. The total periodic cost of the plan is the same.
3. Which of the following is *least likely* a criticism of employee stock options?
  - A. The binary nature of option payoffs may encourage excessive risk taking.
  - B. The fair value requires subjective estimates at the grant date.
  - C. They result in cash outflows for the company on exercise.

## KEY CONCEPTS

### LOS 34.a

Advantages of leasing rather than purchasing an asset may include a smaller initial cash outflow, lower-cost financing, and less risk of obsolescence.

A lease transfers the benefits and risks of ownership of the asset to the lessee. A finance lease must meet at least one of the following criteria:

1. Ownership of the leased asset transfers to the lessee.
2. The lessee has an option to buy the asset and is expected to exercise it.
3. The lease is for most of the asset's useful life.
4. The present value of the lease payments is greater than or equal to the asset's fair value.
5. The lessor has no other use for the asset (i.e., the asset is of a specialized nature only suitable for use by the lessee).

If none are met, the lease is an operating lease.

### **Lessee Reporting**

Under IFRS, for both finance and operating leases, except for short-term leases, a lessee reports a right-of-use (ROU) asset and a lease liability on its balance sheet, both equal to the present value of the promised lease payments. The interest portion of each lease payment is reported as an interest expense, while the principal repayment portion of each payment reduces the lease liability. For short-term or low-value leases, rent expense is reported on the income statement, and no balance sheet entries are required.

Under U.S. GAAP, reporting for a finance lease is the same as under IFRS. For an operating lease, the reporting is similar as under IFRS, except that the entire lease payment is recorded as a lease expense and the amortization of the ROU asset is equal to the principal repayment. For short-term leases, rent expense is reported on the income statement, and no balance sheet entries are required.

### **Lessor Accounting**

A lease that is classified as finance or operating by the lessee is classified the same way by the lessor.

Under both IFRS and U.S. GAAP, with a finance lease, the lessor removes the leased asset from its balance sheet and adds a lease receivable asset. The lessor reports the interest portion of the lease payments as income. For an operating lease, the lessor keeps the leased asset on its balance sheet, reports lease payments as income, and reports depreciation and other costs as expenses.

For a lessor, finance leases can be sales-type leases or direct financing leases. For a dealer or manufacturer of the leased equipment, the sales-type treatment is used. A profit or loss is recorded on the leased asset, as if it was inventory sold at initiation of the lease. For a direct financing lease, any gain or loss on derecognition is deferred and recognized in the income statement over the life of the lease as interest.

### **LOS 34.b**

#### **Defined Benefit Pension Plan Reporting**

A firm reports a net pension liability on its balance sheet if the fair value of a defined benefit plan's assets is less than the estimated pension obligation, or a net pension asset if the fair value of the plan's assets is greater than the estimated pension obligation. The

change in the net pension asset or liability is reflected in a firm's income statement, and as changes to accumulated other comprehensive income (OCI) each period.

IFRS refers to the estimated pension liability as the present value of defined benefit obligations (PVDBO), while U.S. GAAP uses the term projected benefit obligation (PBO). In practice, the PVDBO and the PBO are the same. Both are equal to the benefits earned to date, to be paid between retirement and death, discounted back to the balance sheet date. The computations are complex and require actuaries to estimate the assumptions and values.

Given consistent actuarial assumptions, the total periodic cost of the defined benefit plan is the same under IFRS and U.S. GAAP. The amounts taken in the income statement and OCI, however, differ.

Service cost is the present value of the additional benefits earned by employees for being a member of the plan for an additional service period. Both IFRS and U.S. GAAP include this in the income statement expense.

The interest cost is the increase in the PVDBO (PBO) due to the passage of time. IFRS nets the interest cost with the expected return on plan assets to show interest income or expense. U.S. GAAP shows these two components separately as they can be computed using different rates. Whether reported net or separately, they are a component of the income statement expense.

Changes to the estimated pension liability as a result of actuarial estimates changing and the difference between actual and expected return on plan assets are taken directly to OCI. IFRS refers to these amounts as remeasurements, while U.S. GAAP refers to them as actuarial gains and losses. U.S. GAAP may potentially amortize these amounts through future income statement expenses, while IFRS does not.

Past service costs are changes to the estimated pension liability as a result of benefits earned in prior periods changing if the plan is amended. IFRS expenses these amounts in the income statement in the year of change. U.S. GAAP takes these amounts to OCI and then amortizes them to the income statement over the remainder of the employees' service life.

### **Defined Contribution Pension Plan Reporting**

A pension expense for a defined contribution pension plan is equal to the employer's contributions. There is no balance sheet asset or liability reported, providing the employer's contribution has been made by year-end.

### **Stock Grants and Options Reporting**

Stock grants and stock options serve to reward employees and align employees and shareholders' interest to reduce agency cost. Advantages to the company include the lack of cash outflows. Disadvantages include the employees' relative lack of influence over the company's stock price and dilution of existing shareholders.

Stock grants can have immediate or delayed vesting. The fair value of a stock grant is established on the grant date and is equal to the stock's fair value. If vesting is immediate, the fair value is expensed to the income statement, and common stock and

additional paid-in capital (APIC) are adjusted in the balance sheet, as if the company was issuing shares. If there is a period between the grant and vesting, it is referred to as the service period. The fair value of the stock grant is spread straight-line as a compensation expense in the income statement and increases common stock and APIC in the balance sheet.

Stock options give the employee the right to buy shares in the future at the exercise price. A criticism of employee stock options is that the binary nature of payoffs can lead to excessive risk taking. The fair value of the option must be estimated using subjective assumptions. The fair value is then expensed straight-line to the income statement over the vesting period. The vesting period is from the grant date until the first date the options can be exercised. A compensation expense is recorded in the income statement, and APIC increased in the balance sheet. At the point the options are exercised in the future cash increases by the exercise price received, common stock increases by the par value of share issued and any balance is taken to APIC. If the options expire and are not exercised, no adjustments need to be made.

#### **LOS 34.c**

Both IFRS and U.S. GAAP set out the objectives of disclosure for leases, defined benefit pension plans, and stock-based compensation. The objective of the disclosure is to provide the users of the accounts with sufficient information to understand the nature, risks, and extent of leases and compensation plans, including their impacts on current and expected cash flows. While companies have discretion over the disclosure needed to achieve these objectives, the accounting standards provide guidance.

### **ANSWER KEY FOR MODULE QUIZZES**

#### **Module Quiz 34.1**

1. **C** Avoiding the risk of obsolescence is one of the advantages of leasing assets instead of purchasing them. At the end of a lease, the lessee often returns the leased asset to the lessor, and therefore does not bear the risk of an unexpected decline in the asset's end-of-lease value. The interest rate implicit in a lease contract may be less than the interest rate on a loan to purchase the asset. The terms of a lease may not require all the covenants typically included in loan agreements or bond indentures. (LOS 34.a)
2. **A** Both operating leases and finance leases report an ROU asset and a lease liability, and both are accounted for identically. Under U.S. GAAP, operating and financing leases also report both an ROU asset and lease liability; however, the accounting for the two types is slightly different. Exceptions exist for low-value assets and leases with durations of less than one year under IFRS (U.S. GAAP has no monetary value criteria). (LOS 34.a)
3. **B** At lease inception, the lessee records a right-of-use (ROU) asset and a lease liability, both equal to the present value of the lease payments. In each period over the life of the lease, the lessee recognizes interest expense for the interest

portion of the lease payments and amortization expense on the ROU asset. (LOS 34.a)

4. **A** IFRS and U.S. GAAP treat a lease as a finance lease (for both lessee and lessor) if any of the following criteria are met:
  1. Ownership of the leased asset transfers to the lessee.
  2. The lessee has an option to buy the asset and is expected to exercise it.
  3. The lease is for most of the asset's useful life.
  4. The present value of the lease payments is greater than or equal to the asset's fair value.
  5. The lessor has no other use for the asset (i.e., the asset is of a specialized nature only suitable for use by the lessee).

(LOS 34.a)
5. **C** For a lessor, the asset remains in their balance sheet if treated as an operating lease, and is depreciated over its life. There is no derecognition of the asset, so there is no gain or loss at the outset of the lease. Payments from the lessee are treated as rental income. (LOS 34.a)
6. **C** U.S. GAAP reports an income statement expense that is equal to the lease payment. While conceptually, the amount contains both interest and amortization, they are not shown separately on the income statement. IFRS reports both interest and amortization in the income statement, and the aggregate of the two amounts will not equal the lease payment. Under U.S. GAAP, the ROU asset and the lease liability are equal at all points over the lease's life. Under IFRS, the only points where the ROU asset is the same as the lease liability are at initiation and the end of the lease. IFRS will result in a lower ROU asset than U.S. GAAP. Under IFRS, the ROU asset is amortized over the life of the asset (using either straight-line or accelerated methods). Under U.S. GAAP, the amortization is equal to the principal payment on the liability. Principal payments initially are lower due to the high interest cost, but as the lease ages and the liability decreases, the interest element of each payment will decrease and the principal element will increase. The result is that accumulated amortization under IFRS is greater than U.S. GAAP, resulting in a lower ROU asset. (LOS 34.a)
7. **A** Cash flows from a lease are operating cash inflows for the lessor. (LOS 34.a)
8. **B** Finance leases for a lessor may be classified as either sales-type leases or direct financing leases. If the lessor is a manufacturer or dealer of the leased equipment, the asset is treated as inventory sold at the outset of the lease. Revenue is reported as well as a cost of sales amount. The revenue is the present value of lease receipts. Cost of sales is the carrying value of the asset less the present value of any residual value. The lease is a direct financing lease if the lessor is a financing company (buying an asset on behalf of the lessee and leasing it out). Any gain or loss on derecognition of the asset does not affect the income statement on lease initiation. The gain or loss is deferred and recognized in the income

statement, as interest, over the life of the lease. For an operating lease, revenue is recognized when lease payments from the lessee fall due. (LOS 34.a)

## Module Quiz 34.2

1. A Defined benefit pension plans can be overfunded and result in a net pension asset, or they can be underfunded and result in a net pension liability. Defined contribution plans do not result in balance sheet assets or liabilities because they are neither owned by the sponsoring firm nor obligations of the sponsoring firm. (LOS 34.b)
2. C The total cost of the defined benefit pension plan is identical for both IFRS and U.S. GAAP. IFRS and U.S. GAAP differ in the amounts recognized in the income statement and the amounts taken to OCI. (LOS 34.b)
3. C On exercise, the company receives the option's exercise price (a cash inflow to the company) and creates new shares. This dilutes existing stockholders' ownership proportions in the company. The fair value of the option at the grant date requires subjective estimation—in particular, the volatility of the company's stock price over the service period. By nature, options have binary payoffs, being either zero if the stock price is below the exercise price or positive if the stock price is above the exercise price. This may lead to excessive risk taking because the option holder gains if the stock price increases, but if the stock price decreases the option holder does not experience losses except in the sense that the options go unexercised. (LOS 34.b)

# READING 35

## ANALYSIS OF INCOME TAXES

### INTRODUCTION

There is a lot of overlap between the prerequisite materials and this reading. The prerequisites go into greater detail about the computation of tax bases for assets and liabilities, which may help with your understanding of this reading. The prerequisites also contain a numerical example of the impact of the enacted tax rate changing on existing deferred tax assets and liabilities.

### MODULE 35.1: DIFFERENCES BETWEEN ACCOUNTING PROFIT AND TAXABLE INCOME



Video covering this content is available online.

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#### LOS 35.a: Contrast accounting profit, taxable income, taxes payable, and income tax expense and temporary versus permanent differences between accounting profit and taxable income.

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Financial accounting standards (IFRS and U.S. GAAP) are often different than income tax laws and regulations. As a result, the amount of income tax expense recognized in the income statement may differ from the actual taxes owed to the taxing authorities.

Let's begin by defining the terms we will use to distinguish items on a company's tax return (the information it files with its country's tax authorities) from the comparable items on its financial statements.

### Tax Return Terminology

- **Taxable income.** This is income subject to tax based on the tax return.
- **Taxes payable.** This is the tax liability caused by *taxable income*. This is also known as the current tax expense, but do not confuse this with *income tax expense* (see next).
- **Income tax paid.** This is the actual cash flow for income taxes, including payments or refunds from other years.
- **Tax loss carryforward.** This is a current or past loss that can be used to reduce taxable income (thus, taxes payable) in the future. It can result in a deferred tax asset.
- **Tax base.** This is the net amount of an asset or liability used for tax reporting purposes.

# Financial Reporting Terminology

- **Accounting profit.** This is pretax financial income based on financial accounting standards (also known as *income before tax* and *earnings before tax*).
- **Income tax expense.** This is the expense recognized in the income statement that includes taxes payable and *changes* in deferred tax liabilities and assets.
- **Deferred tax liabilities.** These are balance sheet amounts that result from an excess of income tax expense over taxes payable that are expected to result in future cash outflows.
- **Deferred tax assets.** These are balance sheet amounts that result from an excess of taxes payable over income tax expense that are expected to be recovered from future operations. These can also result from tax loss carryforwards.
- **Valuation allowance.** This is the reduction of deferred tax assets based on the likelihood the assets will not be realized.
- **Carrying value.** This is the net balance sheet value of an asset or liability.
- **Permanent difference.** This is a difference between taxable income (tax return) and pretax income (income statement) that will not reverse in the future.
- **Temporary difference.** This is a difference between the tax base and the carrying value of an asset or liability that will result in either taxable amounts or deductible amounts in the future. Several examples of how temporary differences arise are presented later in this review.

## Differences Between Tax and Financial Reporting

Differences between the treatment of an accounting item for tax reporting and for financial reporting can occur when the following occur:

- The timing of revenue and expense recognition in the income statement and the tax return differ
- Certain revenues and expenses are recognized in the income statement, but never on the tax return or vice versa
- Assets and/or liabilities have different carrying amounts and tax bases
- Gain or loss recognition in the income statement that differs from the tax return
- Tax losses from prior periods may offset future taxable income
- Financial statement adjustments may not affect tax return, or may be recognized in different periods

Differences between the balance sheet carrying value and the tax base of an asset may be permanent or temporary. Temporary timing differences result from the same total amounts passing through the income statement and tax returns over time, but with differences in each individual period. These temporary timing differences result in the creation of deferred tax assets and deferred tax liabilities, which we will discuss next. Permanent timing differences do not result in deferred tax assets or liabilities.

## Deferred Tax Liabilities

A **deferred tax liability (DTL)** is created when the income tax expense (income statement) is greater than taxes payable (tax return) due to temporary differences. DTLs occur when

- revenues (or gains) are recognized in the income statement before they are included on the tax return due to temporary differences, and
- expenses (or losses) are tax deductible before they are recognized in the income statement.

DTLs are expected to reverse (i.e., they are caused by temporary differences) and result in future cash outflows when the taxes are paid. These may be referred to as “taxable temporary differences” because the firm will pay more tax when they reverse.

A DTL is most often created when an accelerated depreciation method is used on the tax return and straight-line depreciation is used on the income statement.

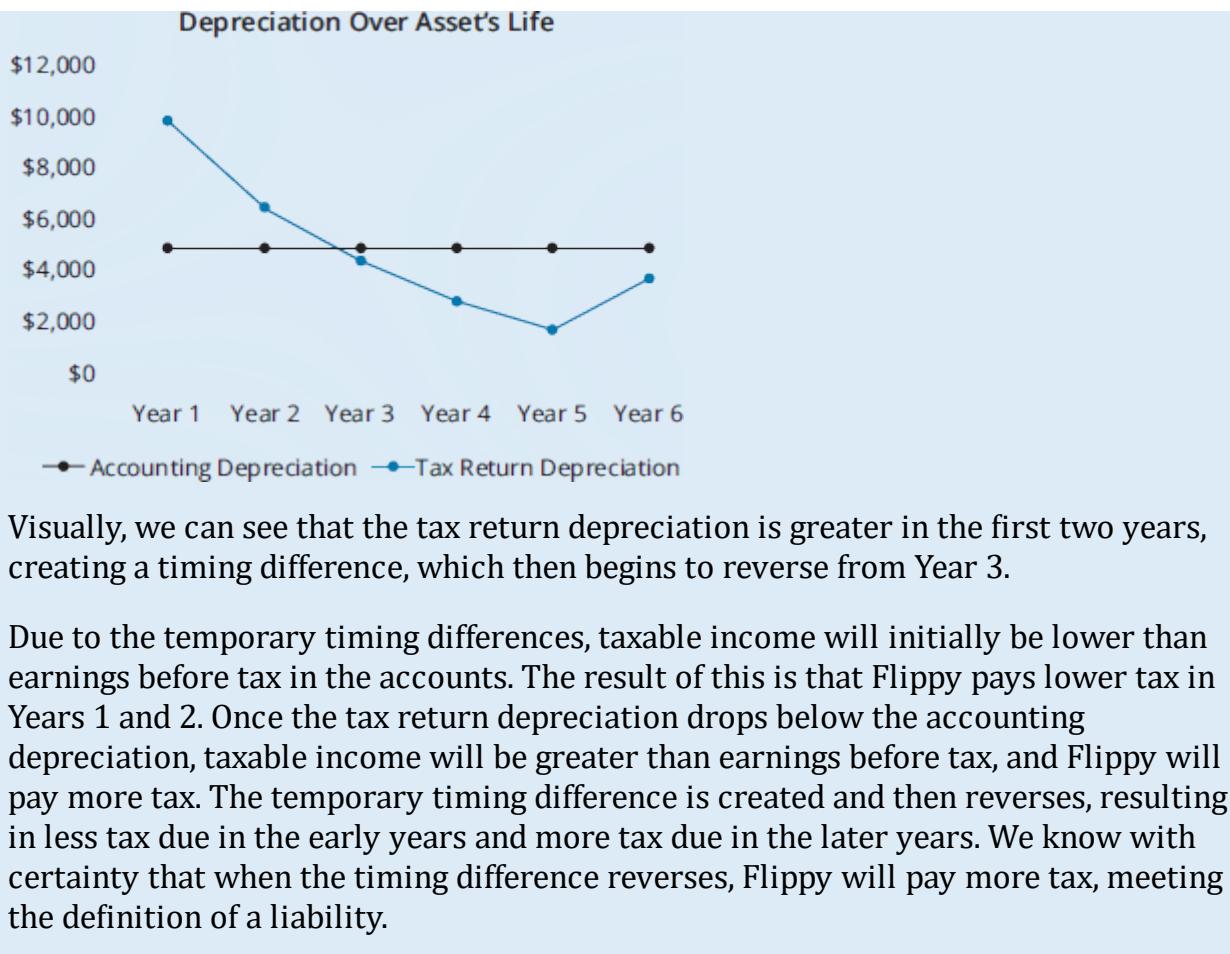
### EXAMPLE: Temporary timing differences

Flippy Discs Corporation purchased an injection-molding machine for \$30,000 at the start of the current period. The machine has a useful economic life of six years and no expected residual value. For accounting purposes, the machine will be depreciated straight line; however, a double declining balance will be used by the tax authorities. Calculate depreciation for accounting and for tax, and discuss the timing differences.

### Answer:

|                         | Year 1   | Year 2  | Year 3  | Year 4  | Year 5  | Year 6  | Total    |
|-------------------------|----------|---------|---------|---------|---------|---------|----------|
| Accounting depreciation | \$5,000  | \$5,000 | \$5,000 | \$5,000 | \$5,000 | \$5,000 | \$30,000 |
| Tax return depreciation | \$10,000 | \$6,667 | \$4,444 | \$2,963 | \$1,975 | \$3,951 | \$30,000 |

The total amount of depreciation over the life of the asset is the same. The accelerated method used in the tax returns results in more depreciation in the early years of the asset's life, but less in the later years relative to the straight-line method. This is a classic example of a taxable temporary difference.



Visually, we can see that the tax return depreciation is greater in the first two years, creating a timing difference, which then begins to reverse from Year 3.

Due to the temporary timing differences, taxable income will initially be lower than earnings before tax in the accounts. The result of this is that Flippy pays lower tax in Years 1 and 2. Once the tax return depreciation drops below the accounting depreciation, taxable income will be greater than earnings before tax, and Flippy will pay more tax. The temporary timing difference is created and then reverses, resulting in less tax due in the early years and more tax due in the later years. We know with certainty that when the timing difference reverses, Flippy will pay more tax, meeting the definition of a liability.

## Deferred Tax Assets

A **deferred tax asset (DTA)** is created when taxes payable (tax return) are greater than income tax expense (income statement) due to temporary differences. DTAs occur when

- revenues (or gains) are taxable before they are recognized in the income statement,
- expenses (or losses) are recognized in the income statement before they are tax deductible, and
- tax loss carryforwards are available to reduce future taxable income.

Similar to DTLs, DTAs are expected to reverse through future operations. However, DTAs are expected to provide future tax savings, while DTLs are expected to result in future cash outflows. Timing differences that lead to the creation of DTAs may be referred to as “deductible temporary differences” because the creation or increase of a DTA will reduce the income statement tax expense. A firm that has taxable losses in excess of its taxable income can carry those excess losses forward and use them to reduce taxable income (and taxes) in future periods.

Post-employment benefits, unearned revenue, warranty expenses, and tax loss carryforwards are typical causes of DTAs.

# Taxable and Deductible Temporary Differences

Initially, if taxable income (on the tax return) is lower than earnings before tax (on the income statement) because of a temporary timing difference, a DTL will be created. If taxable income is initially greater than earnings before tax, a DTA will be created.

Another way of analyzing temporary differences is to compare the balance sheet carrying values of assets and liabilities to their tax base values (Figure 35.1).

**Figure 35.1: Comparison of Carrying Value to Tax Base for Temporary Timing Differences**

| Balance Sheet | Carrying Value vs.<br>Tax Base | Deferred Tax Asset or<br>Liability |
|---------------|--------------------------------|------------------------------------|
| Asset         | Carrying value > tax base      | Deferred tax liability             |
| Asset         | Carrying value < tax base      | Deferred tax asset                 |
| Liability     | Carrying value > tax base      | Deferred tax asset                 |
| Liability     | Carrying value < tax base      | Deferred tax liability             |



## PROFESSOR'S NOTE

The tax base of balance sheet assets and liabilities and the method of computation is covered in the FSA prerequisite readings.

# Permanent Differences

A **permanent difference** between taxable income and pretax income is one that will not reverse in the future. Permanent differences do not create DTAs or DTLs.

Permanent differences can be caused by revenue that is not taxable, expenses that are not deductible, or tax credits that result in a direct reduction of taxes. For example, in the United States, interest received on municipal bonds is typically not taxable (but appears on the financial statements as pretax income), and the cost of life insurance on key company officers is typically not tax deductible (but appears on the financial statements as a pretax expense).

Permanent differences cause the firm's effective tax rate to differ from the statutory tax rate. We will examine statutory, effective, and cash tax rates later in this reading.

# Tax Expense

A company's tax expense is the amount included in the income statement and may be referred to as a tax provision. It includes the amount the company owes the tax authorities (tax payable) based on this year's taxable income, along with any changes in DTAs and DTLs:

$$\text{tax expense} = \text{tax payable} + \Delta\text{DTL} - \Delta\text{DTA}$$

Creation of, or increases in, DTLs increase tax expense. Creation of, or increases in, DTAs reduce tax expense. This is because DTAs are expected to provide future tax savings, while DTLs are expected to result in future cash outflows for tax. Because the firm's actions in the current period either caused deferred tax items to be created or

changed their values, the accruals concept requires the changes to be recognized in tax expense in the current period.

## Changes in the Enacted Tax Rate

Changes in the company's statutory tax rate will also result in changes to DTLs and DTAs. Both DTLs and DTAs are created at the statutory tax rate in effect at the point of the initial timing difference. If the statutory tax rate changes, existing DTLs and DTAs must be adjusted. Because a DTL or DTA must reverse to zero when the timing differences reverse, they need to reflect the statutory tax rate expected to be in effect when reversal occurs. An increase in the statutory rate will increase both DTAs and DTLs, while a decrease will reduce them. Like any other change in a DTA or DTL, this will also affect tax expense in the income statement.



### MODULE QUIZ 35.1

1. Which of the following tax definitions is *least accurate*?
  - A. Taxable income is income based on the rules of the tax authorities.
  - B. Taxes payable are the amount due to the government.
  - C. Income tax expense equals pretax income times the statutory tax rate.
2. If the tax base of an asset is less than the carrying value of the asset and the difference is not expected to reverse in the future, this will result in:
  - A. the creation of a DTL.
  - B. the creation of a DTA.
  - C. neither the creation of a DTA nor a DTL.
3. Which of the following is *least likely* to result in the creation of a deferred tax asset (DTA)?
  - A. Expenses or losses that are tax deductible before they are recognized in the income statement.
  - B. Revenues or gains that are taxable before they are recognized in the income statement.
  - C. Tax loss carryforwards that are available to reduce future taxable income.
4. Sidewinder Corporation has a year-end accounts receivable carrying value of \$500,000 after including a doubtful debt provision of 5% of year-end receivables. In the tax returns, bad debt is only deducted when it is written off. This treatment will *most likely* result in:
  - A. the creation of a DTL.
  - B. the creation of a DTA.
  - C. neither the creation of a DTA nor a DTL.
5. Roadrunner, Inc., reported the following information in its tax returns and financial statements:

| <b>Tax return extract:</b>          | <b>\$</b> |
|-------------------------------------|-----------|
| Tax payable for the year ended 20X7 | 500,000   |
| Balance sheet extracts:             |           |
| DTA year-end 20X7                   | 300,000   |
| DTA year-end 20X6                   | 350,000   |
| DTL year-end 20X7                   | 500,000   |
| DTL year-end 20X6                   | 400,000   |

Which of the following is *closest* to the tax expense reported in Roadrunner's 20X7 income statement?

- A. \$500,000.
  - B. \$550,000.
  - C. \$650,000.
6. An increase in the tax rate causes the balance sheet value of a DTA to:
- A. decrease.
  - B. increase.
  - C. remain unchanged.

## MODULE 35.2: DEFERRED TAX ASSETS AND LIABILITIES



Video covering this content is available online.

**LOS 35.b: Explain how deferred tax liabilities and assets are created and the factors that determine how a company's deferred tax liabilities and assets should be treated for the purposes of financial analysis.**

### Creation of DTAs and DTLs

As discussed, DTAs and DTLs result from temporary timing differences between earnings before tax and taxable income. For a timing difference to be temporary, the amount that passes through the income statement and the tax return over the life of the asset or liability must be the same, even though the amounts differ that pass through each during individual periods.

#### EXAMPLE: Deferred tax assets and liabilities

Firebird Corporation is a new subsidiary set up at the start of the year by its parent company, Wraith Incorporated. Firebird's statutory tax rate is 30%, and it has no permanent timing differences. Tax returns and income statements are presented for the first three years of its operation.

#### Tax return: Firebird Corporation

|                  | Year 1<br>\$000 | Year 2<br>\$000 | Year 3<br>\$000 |
|------------------|-----------------|-----------------|-----------------|
| Revenue          | 100,000         | 120,000         | 130,000         |
| Cost of sales    | 28,500          | 34,200          | 37,050          |
| Other expenses   | 19,950          | 23,940          | 25,935          |
| Depreciation     | 10,000          | 10,000          | 10,000          |
| Warranty costs   | 2,000           | 5,000           | 8,000           |
| Interest expense | <u>10,000</u>   | <u>12,000</u>   | <u>12,500</u>   |
| Taxable income   | 29,550          | 34,860          | 36,515          |
| Tax payable 30%  | 8,865           | 10,458          | 10,955          |

### Income statement: Firebird Corporation

|                     | Year 1<br>\$000 | Year 2<br>\$000 | Year 3<br>\$000 |
|---------------------|-----------------|-----------------|-----------------|
| Revenue             | 95,000          | 114,000         | 123,500         |
| Cost of sales       | <u>28,500</u>   | <u>34,200</u>   | <u>37,050</u>   |
| Gross profit        | 66,500          | 79,800          | 86,450          |
| Other expenses      | 19,950          | 23,940          | 25,935          |
| Depreciation        | 8,000           | 8,000           | 8,000           |
| Interest expense    | <u>10,000</u>   | <u>12,000</u>   | <u>12,500</u>   |
| Earnings before tax | 28,550          | 35,860          | 40,015          |
| Tax expense         | <u>8,565</u>    | <u>10,758</u>   | <u>12,005</u>   |
| Net income          | 19,985          | 25,102          | 28,010          |

Firebird acquired PP&E for \$40 million at the start of Year 1. For financial statement reporting, the PP&E is depreciated straight-line over five years, while for tax reporting, it is depreciated straight-line over four years. Its residual value is assumed to be zero in both cases.

Firebird estimates that warranty expense will be 5% of gross revenues. For this example, we will assume all of the year-end liability values for warranties are likely to pass through future tax returns as the expenditure is incurred.

Analyze the differences between the tax return and the income statement, and calculate any deferred tax items that Firebird will recognize.

#### Answer:

The first noticeable difference is the revenue figures. Remember that revenue is reported net of any returns and allowances in the income statement (e.g., items such as estimated warranty provisions and customer discounts). The tax return has a line for warranty costs, which indicates that these may be the source of some of the difference. Another significant difference between the two statements are the depreciation lines. Finally, the tax return shows tax payable on taxable income, which differs from the tax expense in the income statement. The latter includes tax payable and changes in DTAs and DTLs.

## 1. Timing differences related to depreciation

$$\text{tax allowable depreciation} = \frac{\$40,000,000 - \$0}{4 \text{ years}} = \$10,000,000$$

$$\text{accounting depreciation} = \frac{\$40,000,000 - \$0}{5 \text{ years}} = \$8,000,000$$

In total, \$40 million of depreciation will pass through the tax returns and income statements, but different amounts will be reported for each individual year.

Depreciation will be higher in the tax returns than in the income statement for each of the first four years. Firebird will recognize a DTL because the firm pays lower tax initially and higher tax on the reversal of the timing difference. We may also say the asset's carrying value is greater than its tax base, resulting in a DTL. After Year 4, depreciation in the tax return will be zero, while depreciation in the income statement will continue, causing the timing difference to reverse.

| End of Period     | Year 1<br>\$000 | Year 2<br>\$000 | Year 3<br>\$000 | Year 4<br>\$000 | Year 5<br>\$000 |
|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Carrying value    | 32,000          | 24,000          | 16,000          | 8,000           | 0               |
| Tax base          | <u>30,000</u>   | <u>20,000</u>   | <u>10,000</u>   | <u>0</u>        | <u>0</u>        |
| Timing difference | 2,000           | 4,000           | 6,000           | 8,000           | 0               |
| DTL @ 30%         | 600             | 1,200           | 1,800           | 2,400           | 0               |
| Δ DTL             | +600            | +600            | +600            | +600            | -2,400          |

The timing difference grows over the first four years and then reverses in Year 5. Carrying value is equal to the asset's cost less accumulated accounting depreciation. The tax base can be viewed as cost less accumulated tax-allowable depreciation. (Formally, it is defined as the total depreciation that will pass through the tax returns in future periods.)

## 2. Timing differences related to warranties

A warranty is a commitment to replace or repair a good if it becomes defective during the stated warranty period. Due to the accruals process—and in particular, the matching concept—the cost of meeting future warranty claims must be estimated and accounted for at the time of the sale. The estimated future warranty expense is deducted from revenue, and a warranty liability is created in the balance sheet. Tax authorities, however, are unwilling to allow companies to save tax on *estimated* expenses. As a result, they typically require the expenditure to repair or replace faulty goods to have been incurred before they allow a deduction in the tax returns.

The following table shows the warranty provision, given Firebird's estimate of 5% of sales, and the expenditure actually incurred in each of the three years (from the tax return).

|                      | Year 1 | Year 2 | Year 3 |
|----------------------|--------|--------|--------|
|                      | \$000  | \$000  | \$000  |
| Warranty provision   | 5,000  | 6,000  | 6,500  |
| Warranty expenditure | 2,000  | 5,000  | 8,000  |

The balance sheet liability will increase by each year's warranty provision, offset by the actual expense incurred:

| Carrying Value                          | Year 1  | Year 2  | Year 3  |
|---|---------|---------|---------|
|   | \$000   | \$000   | \$000   |
| Warranty liability (at start of period) | 0       | 3,000   | 4,000   |
| Warranty provision                      | 5,000   | 6,000   | 6,500   |
| Warranty expenditure                    | (2,000) | (5,000) | (8,000) |
| Warranty liability (at end of period)   | 3,000   | 4,000   | 2,500   |

The tax base of a liability is its carrying value less the amount that *will* pass through future tax returns. (There is one exception to this, which is any form of revenue received in advance. These amounts are taxed when received—in other words, before income statement recognition—and the tax base becomes the carrying value of the liability less amounts that *will not* pass through tax returns in the future.)

Recall that we have assumed all of the year-end liability values for warranties are likely to pass through future tax returns as the expenditure is incurred. This will result in a zero value for the tax base in each year.

| End of Period     | Year 1 | Year 2 | Year 3 |
|-------------------|--------|--------|--------|
|                   | \$000  | \$000  | \$000  |
| Carrying value    | 3,000  | 4,000  | 2,500  |
| Tax base          | 0      | 0      | 0      |
| Timing difference | 3,000  | 4,000  | 2,500  |
| DTA @ 30%         | 900    | 1,200  | 750    |
| Δ DTA             | +900   | +300   | -450   |

### 3. Income tax expense

Now that we have calculated the deferred tax items, we can illustrate how income tax expense was determined for financial statement reporting.

|                 | Year 1 | Year 2 | Year 3 |
|-----------------|--------|--------|--------|
|                 | \$000  | \$000  | \$000  |
| Tax payable     | 8,865  | 10,458 | 10,955 |
| + Change in DTL | 600    | 600    | 600    |
| - Change in DTA | (900)  | (300)  | 450    |
| Tax expense     | 8,565  | 10,758 | 12,005 |

# Realizability of Deferred Tax Assets

Although deferred taxes are created from temporary differences that are expected to reverse in the future, neither DTAs nor DTLs are carried on the balance sheet at their discounted present value. However, DTAs are assessed at each balance sheet date to determine the likelihood that the company will have sufficient future taxable income to recover the tax assets. Without future taxable income, a DTA is worthless.

If there is sufficient doubt that the benefits of DTAs will be realized in future periods, both IFRS and U.S. GAAP require companies to recognize the diminished value of the DTAs. Under IFRS, companies simply reduce a DTA, which increases tax expense in that period. U.S. GAAP employs different mechanics with the same result. Under U.S. GAAP, the full DTA is still carried on the balance sheet, but it must be reduced by a **valuation allowance**. The valuation allowance is a contra account that reduces the net balance sheet value of the DTA. Creating or increasing a valuation allowance increases income tax expense and decreases net income.

It is up to management to defend the valuation of all DTAs. If a company has order backlogs or existing contracts that are expected to generate future taxable income, a valuation allowance might not be necessary. However, if a company has cumulative losses over the past few years or a history of inability to use tax loss carryforwards, then the company likely needs to reduce its DTAs to reflect the likelihood they may never be realized. Because of the subjective nature of estimating future profitability, adjustments to DTAs could be a source of potential earnings management.

## Treatment for Analytical Purposes

If DTLs are expected to reverse in the future, an analyst should treat them as liabilities. If, however, an analyst does not expect them to reverse in the foreseeable future (typically because of expected continued growth in capital expenditures), the recommended adjustment is to treat them as equity (decrease the DTL and increase equity by the same amount). The key question is, “When or will the total DTL be reversed in the future?” In practice, the treatment of deferred taxes for analytical purposes varies. An analyst must decide on the appropriate treatment on a case-by-case basis.



### MODULE QUIZ 35.2

1. If the tax base of an asset exceeds the asset's carrying value and a reversal is expected in the future, then:
  - A. a DTA is created.
  - B. a DTL is created.
  - C. neither a DTA nor a DTL is created.
2. Enigma KK uses straight-line depreciation in its accounts, while using accelerated depreciation for tax purposes. For both financial and tax reporting, the company assumes a five-year useful economic life and zero residual value. In the current year, accounting depreciation is ¥10,000,000 and tax allowable depreciation is ¥8,000,000. Which of the following statements relating to the impact of depreciation in the current year is *most accurate*?
  - A. The DTL will increase.

- B. The tax expense will be greater than tax payable.  
C. The carrying value of the asset is greater than the tax base.
3. A U.S. GAAP reporting firm reports an increased valuation allowance at the end of the current period. What effect will this have on the firm's income tax expense in the current period?
- A. Increase.  
B. Decrease.  
C. No effect.
4. An analyst is comparing a firm to its competitors. The firm has a DTL that results from accelerated depreciation for tax purposes. The firm is expected to continue increasing its purchases of PP&E in the foreseeable future. How should the liability be treated for analysis purposes?
- A. It should be treated as equity at its full value.  
B. It should be treated as a liability at its full value.  
C. The present value should be treated as a liability, with the remainder being treated as equity.

## MODULE 35.3: TAX RATES AND DISCLOSURES



Video covering this content is available online.

### LOS 35.c: Calculate, interpret, and contrast an issuer's effective tax rate, statutory tax rate, and cash tax rate.

Some firms' reported income tax expense differs from the amount that would result from multiplying its earnings before taxes by the statutory income tax rate. Recall that the statutory rate is the tax rate of the jurisdiction where the firm operates. Any differences generally result from the following:

- Different tax rates in different tax jurisdictions (countries)
- Permanent tax differences: tax credits, tax-exempt income, nondeductible expenses, and tax differences between capital gains and operating income
- Changes in tax rates and legislation
- Tax holidays in some countries

Typically, temporary timing differences do not cause the statutory and effective rates to differ.

Analysts should consider the following three tax rates:

1. **Statutory tax rate:** corporate income tax rate in which the company is domiciled
2. **Effective tax rate** =  $\frac{\text{income tax expense}}{\text{pretax income}}$
3. **Cash tax rate** =  $\frac{\text{cash taxes paid}}{\text{pretax income}}$

The footnote disclosure in the financial statements must reconcile the statutory tax rate to the effective tax rate. Understanding the differences between reported income tax expense and the amount based on the statutory income tax rate will enable the analyst to better forecast future earnings and cash flow.

When estimating future earnings and cash flows, the analyst should understand each element of the reconciliation, including its relative impact, how it has changed with time, and how it is likely to change in the future.

When analyzing trends in tax rates, it is important to only include reconciliation items that are continuous in nature rather than those that are sporadic. Items such as different tax rates in different countries, tax-exempt income, and nondeductible expenses tend to be continuous. Other items are almost always sporadic, such as large asset sales and tax holiday savings. Watch for special conditions such as termination dates for a tax holiday or a requirement to pay the accumulated taxes at some point in the future. An analyst should review the disclosures of each financial statement based on the footnotes and management discussion and analysis.

### **EXAMPLE: Analyzing a tax rate reconciliation**

Novelty Distribution Company (NDC) does business in the United States and abroad. NDC's reconciliation between effective and statutory tax rates for three years is provided in the following table. Analyze the changes in effective tax rates over the three years shown.

### **Statutory U.S. federal income tax rate reconciliation**

|   | 20X3   | 20X4   | 20X5   |
|---|--------|--------|--------|
| Statutory U.S. federal income tax rate                        | 35.0%  | 35.0%  | 35.0%  |
| State income taxes, net of related federal income tax benefit | 2.1%   | 2.2%   | 2.3%   |
| Benefits and taxes related to foreign operations              | (6.5%) | (6.3%) | (2.7%) |
| Tax rate changes  | 0.0%   | 0.0%   | (2.0%) |
| Capital gains on sale of assets                               | 0.0%   | (3.0%) | 0.0%   |
| Special items   | (1.6%) | 8.7%   | 2.5%   |
| Other, net  | 0.8%   | 0.7%   | (1.4%) |
| Effective income tax rates                                    | 29.8%  | 37.3%  | 33.7%  |

### **Answer:**

In some cases an analyst may want to convert the reconciliation from percentages to absolute numbers. However, for this example, the trends can be analyzed simply by using the percentages.

The effective tax rate is upward trending over the three-year period. Contributing to the upward trend is an increase in the state income tax rate and a decrease in benefits related to taxes on foreign income. In 20X4, a loss related to the sale of assets partially offset an increase in taxes created by special items. In 20X3 and 20X5, the special items and the other items also offset each other. The fact that the special items and other items are so volatile over the three-year period suggests that it will be difficult for an analyst to forecast the effective tax rate for NDC for the foreseeable future without additional information. This volatility also reduces comparability with other firms.

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**LOS 35.d: Analyze disclosures relating to deferred tax items and the effective tax rate reconciliation and explain how information included in these disclosures affects a company's financial statements and financial ratios.**

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Companies are required to disclose details on the sources of the temporary differences that cause DTAs and DTLs to be reported on the balance sheet. Common examples of temporary differences include the following:

- A DTL results from using *accelerated depreciation for tax purposes* and straight-line depreciation for the financial statements. An analyst should consider the firm's growth rate and capital spending levels when determining whether the difference will actually reverse.
- *Impairments* generally result in a DTA because the write-down is recognized immediately in the income statement, but the deduction on the tax return is generally not allowed until the asset is sold or disposed of.
- *Restructuring* generates a DTA because the costs are recognized for financial reporting when the restructuring is announced, but they are not deducted for tax until actually paid. Restructuring usually results in significant cash outflows (net of the tax savings) in the years after the restructuring costs are reported.
- In the United States, firms that use LIFO for their financial statements are required to use LIFO for tax purposes, so no temporary differences result. However, in countries where this is not a requirement, temporary differences can result from the *choice of inventory cost flow method*.
- *Post-employment benefits* and *deferred compensation* are both recognized for financial reporting when earned by the employee, but they are not deducted for tax purposes until actually paid. These can result in a DTA that will be reversed when the benefits or compensation are paid.
- A deferred tax adjustment is made to stockholders' equity to reflect the future tax impact of unrealized gains or losses on *available-for-sale marketable securities* that are taken directly to equity. No DTL is added to the balance sheet for the future tax liability when gains or losses are realized.

Typically, the following deferred tax information is disclosed:

- DTLs, DTAs, any valuation allowance, and the net change in the valuation allowance over the period
- Any unrecognized DTL for undistributed earnings of subsidiaries and joint ventures
- Current-year tax effect of each type of temporary difference
- Components of income tax expense
- Reconciliation of reported income tax expense and the tax expense based on the statutory rate
- Tax loss carryforwards and credits

## EXAMPLE: Analyzing deferred tax item disclosures

WCCO, Inc.'s, income tax expense has consistently been larger than taxes payable over the last three years. WCCO disclosed in the footnotes to its 20X5 financial statements the major items recorded as DTAs and DTLs (in millions of dollars), as shown in the following table.

### Deferred tax disclosures

|   | 20X5       | 20X4      | 20X3       |
|---|------------|-----------|------------|
| Employee benefits                                 | \$278      | \$310     | \$290      |
| International tax loss carryforwards              | <u>101</u> | <u>93</u> | <u>115</u> |
| Subtotal  | 379        | 403       | 405        |
| Valuation allowance                               | (24)       | (57)      | (64)       |
| Deferred tax assets                               | 355        | 346       | 341        |
| Property, plant, and equipment                    | 452        | 361       | 320        |
| Unrealized gains on available-for-sale securities | <u>67</u>  | <u>44</u> | <u>23</u>  |
| Deferred tax liabilities                          | 519        | 405       | 343        |
| Deferred income taxes                             | \$164      | \$59      | \$2        |

Given this information, explain why income tax expense has exceeded taxes payable over the last three years. Also explain the effect of the change in the valuation allowance on WCCO's earnings for 20X5.

### Answer:

The company's DTA balance results from international tax loss carryforwards and employee benefits (most likely, pension and other post-retirement benefits), offset by a valuation allowance. The company's DTL balance results from property, plant, and equipment (most likely from using accelerated depreciation methods for tax and straight-line on the financial statements) and unrealized gains on securities classified as available for sale (because the unrealized gain is not taxable until realized).

Income tax expense is equal to taxes payable plus deferred income tax expense (change in DTLs minus change in DTAs). Because DTLs have been growing faster than DTAs, deferred income tax expense has been positive, resulting in income tax expense being higher than taxes payable.

Management decreased the valuation allowance by \$33 million in 20X5. This resulted in a reduction in deferred income tax expense and an increase in reported earnings for 20X5. Decreasing the valuation allowance implies that management has increased its estimate of future taxable income against which it can use DTAs.



### MODULE QUIZ 35.3

1. Which of the following rates is *most likely* to be useful for the analyst for forecasting future earnings?
  - A. The statutory tax rate.

- B. The effective tax rate.  
 C. The cash tax rate.
2. Valkyrie AG is a German company that has a wholly owned subsidiary in Italy. Valkyrie earns pretax income of €100 million in each country. If the tax rate in Germany is 30% and the tax rate in Italy is 20%, what is the company's effective tax rate?  
 A. 20%.  
 B. 25%.  
 C. 30%.
3. Reactor SA is a French firm with significant global operations:

| Earnings Before Tax | Year 1 | Year 2 | Year 3 |
|---------------------|--------|--------|--------|
|                     | €m     | €m     | €m     |
| French operations   | 200    | 150    | 210    |
| Overseas operations | 50     | 75     | 90     |
| Total               | 250    | 225    | 300    |

| Income Taxes<br>(Income Statement) | Year 1 | Year 2 | Year 3 |
|------------------------------------|--------|--------|--------|
|                                    | €m     | €m     | €m     |
| Current:                           |        |        |        |
| French operations                  | 56     | 30     | 59     |
| Overseas operations                | 12     | 20     | 21     |
|                                    | 68     | 50     | 80     |
| Deferred:                          |        |        |        |
| French operations                  | 8      | (4)    | 6      |
| Overseas operations                | (1)    | 2      | 2      |
|                                    | 7      | 2      | 8      |
| Total                              | 75     | 48     | 88     |

The effective tax rate was highest in:

- A. Year 1.  
 B. Year 2.  
 C. Year 3.
4. Which of the following is *least likely* to explain why the statutory and effective tax rates differ?  
 A. The presence of permanent timing differences.  
 B. Overseas business operations.  
 C. Changes in deferred tax assets (DTAs) and deferred tax liabilities (DTLs).

## KEY CONCEPTS

### LOS 35.a

Deferred tax terminology is as follows:

- **Taxable income.** Income subject to tax based on the tax return.
- **Accounting profit.** Pretax income from the income statement based on financial accounting standards.

- *Deferred tax assets (DTAs)*. Balance sheet asset value that results when taxes payable (tax return) are greater than income tax expense (income statement) and the difference is expected to reverse in future periods.
- *Deferred tax liabilities (DTLs)*. Balance sheet liability value that results when income tax expense (income statement) is greater than taxes payable (tax return) and the difference is expected to reverse in future periods.
- *Valuation allowance*. Reduction of DTAs (contra account) based on the likelihood that the future tax benefits will not be realized.
- *Taxes payable*. The tax liability from the tax return. Note that this term also refers to a liability that appears on the balance sheet for taxes due but not yet paid.
- *Income tax expense*. Expense recognized in the income statement that includes taxes payable and changes in DTAs and DTLs.

If taxable income is less than pretax income and the cause of the difference is expected to reverse in future years, a DTL is created. If taxable income is greater than pretax income and the difference is expected to reverse in future years, a DTA is created.

The balance of a DTA or DTL is equal to the difference between the tax base and the carrying value of the asset or liability, multiplied by the tax rate.

Income tax expense and taxes payable are related through the change in the DTA and the change in the DTL:

$$\text{income tax expense} = \text{taxes payable} + \Delta\text{DTL} - \Delta\text{DTA}$$

A permanent difference is a difference between taxable income and pretax income that will not reverse in the future. Permanent differences do not create DTAs or DTLs.

When a firm's enacted tax rate increases (decreases), DTAs and DTLs are both increased (decreased) to reflect the new rate. Changes in these values will also affect income tax expense.

### **LOS 35.b**

A DTL is created when income tax expense (income statement) is higher than taxes payable (tax return). Deferred tax liabilities occur when revenues (or gains) are recognized in the income statement before they are taxable on the tax return, or expenses (or losses) are tax deductible before they are recognized in the income statement.

A DTA is created when taxes payable (tax return) are higher than income tax expense (income statement). DTAs are recorded when revenues (or gains) are taxable before they are recognized in the income statement, when expenses (or losses) are recognized in the income statement before they are tax deductible, or when tax loss carryforwards are available to reduce future taxable income.

The tax base for a depreciable fixed asset is the amount of tax-allowable depreciation that will be deducted in future tax returns.

The tax base of a liability is equal to the liability's carrying value less amounts that will be included in future taxable income. With liabilities relating to income received in

advance, the tax base is equal to the carrying value of the liability less any amounts that will not be included in future taxable income.

|                                     |                        |
|-------------------------------------|------------------------|
| Asset carrying value > tax base     | Deferred tax liability |
| Asset carrying value < tax base     | Deferred tax asset     |
| Liability carrying value > tax base | Deferred tax asset     |
| Liability carrying value < tax base | Deferred tax liability |

If it is more likely than not that some or all of a DTA will not be realized (because of insufficient future taxable income to recover the tax asset), then the gross DTA must be reduced by a valuation allowance under U.S. GAAP. Under IFRS a firm reports a smaller DTA if future recoverability is uncertain but does not report a valuation allowance.

DTLs that are not expected to reverse, typically because of expected continued growth in capital expenditures, should be treated for analytical purposes as equity. If DTLs are expected to reverse, they should be treated for analytical purposes as liabilities.

### LOS 35.c

Firms are required to reconcile their effective income tax rate with the applicable statutory rate in the country where the business is domiciled. Analyzing trends in individual reconciliation items can aid in understanding past earnings trends and in predicting future effective tax rates. Where adequate data are provided, they can also be helpful in predicting future earnings and cash flows, or for adjusting financial ratios.

Tax rates are as follows:

1. Statutory tax rate: corporate income tax rate in which the company is domiciled

$$2. \text{ Effective tax rate} = \frac{\text{income tax expense}}{\text{pretax income}}$$

$$3. \text{ Cash tax rate} = \frac{\text{cash taxes paid}}{\text{pretax income}}$$

### LOS 35.d

Typically, the following deferred tax information is disclosed in the footnotes:

- DTLs, DTAs, any valuation allowance, and the net change in the valuation allowance over the period
- Any unrecognized DTL for undistributed earnings of subsidiaries and joint ventures
- Current-year tax effect of each type of temporary difference
- Components of income tax expense
- Reconciliation of reported income tax expense and the tax expense based on the statutory rate
- Tax loss carryforwards and credits

## ANSWER KEY FOR MODULE QUIZZES

## Module Quiz 35.1

1. **C** Pretax income and income tax expense are not always linked because of temporary and permanent differences. (LOS 35.a)
2. **C** Timing differences that do not reverse, referred to as permanent differences, do not result in the creation of DTAs or DTLs. If the timing difference was expected to reverse, a DTL would be created because carrying value > tax base. (LOS 35.a)
3. **A** Expenses that are tax deductible before they are recognized in the income statement result in deferred tax liabilities. For example, accelerated depreciation in the tax returns versus straight-line depreciation in the accounts results in more depreciation being recognized in the tax returns, in early periods, and results in carrying value exceeding the tax base. If revenues or gains are taxable before they are recognized in the income statement, DTAs are created. Unearned revenue is a good example of this. Tax loss carryforwards result from negative taxable income. Rather than triggering the tax authorities to pay tax to the firm, they are deferred and can be offset against future taxable income. As a result, the firm will pay less tax in the future, and a DTA is created. (LOS 35.a)
4. **B** The doubtful debt provision reduces the balance sheet carrying value, but not the tax base of receivables. If the tax base of the asset is greater than the carrying value, this results in a DTA. (LOS 35.a)
5. **C** The income statement tax expense = tax payable +  $\Delta$ DTL -  $\Delta$ DTA.  
Increases in DTLs increase the tax expense, and increases in DTAs reduce the tax expense. The opposite is true of decreases.  
 $\text{Change in DTA: } \$300,000 - \$350,000 = -\$50,000$   
 $\text{Change in DTL: } \$500,000 - \$400,000 = \$100,000$   
 $\text{Tax expense} = \$500,000 + \$100,000 - (-\$50,000) = \$650,000$   
(LOS 35.a)
6. **B** An increase in the tax rate will increase any DTAs and DTLs. (LOS 35.a)

## Module Quiz 35.2

1. **A** If the tax base of an asset exceeds the carrying value, a DTA is created. Taxable income will be lower in the future when the reversal occurs. (LOS 35.b)
2. **C** The carrying value is higher than the tax base of the asset due to the use of accelerated depreciation in the tax returns versus straight-line in the accounts. As this year's tax allowable depreciation is now lower than this year's accounting depreciation, the DTL will begin to decline. Decreases in the DTL reduce the tax expense. The difference between carrying value and tax base will decrease as the timing difference reverses until, at the end of the asset's life, they both equal zero. (LOS 35.b)
3. **A** Recognizing a greater valuation allowance reduces the net value of a DTA, which increases income tax expense in the current period. (LOS 35.b)

4. A The DTL is not expected to reverse in the foreseeable future because the firm is expected to continue to increase its investment in depreciable assets, and accelerated depreciation for tax on the newly acquired assets delays the reversal of the DTL. The liability should be treated as equity at its full value. (LOS 35.b)

### Module Quiz 35.3

1. B The effective rate is most useful for forecasting future earnings; however, it may need to be adjusted to remove the impact of transitory components. The statutory rate is the tax rate where the company is domiciled for reporting purposes. The cash tax rate is most applicable when forecasting future tax payments and cash flows. (LOS 35.c)

2. B Tax in Germany = €100 million × 30% = €30 million

Tax in Italy = €100 million × 20% = €20 million

$$\text{Effective tax rate} = \frac{30 + 20}{100 + 100} = \frac{50}{200} = 25\%$$

(LOS 35.c)

3. A The effective tax rate is measured as the tax expense divided by earnings before tax.

$$\text{Year 1} = \frac{\text{€75 million}}{\text{€250 million}} = 0.3 = 30\%$$

$$\text{Year 2} = \frac{\text{€48 million}}{\text{€225 million}} = 0.213 = 21.3\%$$

$$\text{Year 3} = \frac{\text{€88 million}}{\text{€300 million}} = 0.293 = 29.3\%$$

(LOS 35.c)

4. C Changes in DTAs and DTLs do not cause statutory and effective rates to differ. Permanent timing differences do cause the rates to differ, as these items affect either taxable income or pretax earnings, but not both. Overseas business operations result in tax being paid to overseas tax authorities, which are unlikely to have the same statutory rate as the firm's domicile country. (LOS 35.c)

# READING 36

## FINANCIAL REPORTING QUALITY

### MODULE 36.1: REPORTING QUALITY



Video covering  
this content is  
available online.

**LOS 36.a: Compare financial reporting quality with the quality of reported results (including quality of earnings, cash flow, and balance sheet items).**

**Financial reporting quality** refers to the characteristics of a firm's financial statements. The primary criterion for judging financial reporting quality is adherence to generally accepted accounting principles (GAAP) in the jurisdiction in which the firm operates. However, given that GAAP provide choices of methods, estimates, and specific treatment of many items, compliance with GAAP by itself does not necessarily result in financial reporting of the highest quality.

High quality financial reporting must be *decision useful*. Two characteristics of decision-useful financial reporting are *relevance* and *faithful representation*. Relevance refers to the fact that information presented in the financial statements is useful to users of financial statements in making decisions. Relevant information must also be *material* in that knowledge of it would likely affect the decisions of users of financial statements. Faithful representation encompasses the qualities of *completeness*, *neutrality*, and the absence of errors. We develop the concept of neutrality of financial reports later in this reading.

The **quality of earnings** is, in many respects, a separate issue. The quality of reported earnings (not the quality of earnings reports) can be judged based on the sustainability of the earnings as well as on their level. Sustainability can be evaluated by determining the proportion of reported earnings that can be expected to continue in the future. Increases in reported earnings resulting from changes in exchange rates or by sales of assets that have appreciated over many periods are not typically sustainable, whereas higher profits from increased efficiency or increasing market share would generally be considered sustainable.

One dollar of high-quality earnings is expected to add more value to a company than one dollar of low-quality earnings, based on the criterion of sustainability. The higher probability that high-quality earnings will continue in future periods increases their impact on the value of the firm, calculated as the present value of expected future earnings. At the other end of the sustainability spectrum, a one-time gain of a dollar

from favorable currency exchange rate movements is not likely to be repeated and, therefore, has a smaller impact on estimates of a company's value.

The importance of the level of earnings is that reported earnings must be high enough to sustain the company's operations and existence over time, as well as high enough to provide an adequate return to the company's investors. Both of these concerns are important in determining the quality of a company's reported earnings. Sustainability of reported cash flows is also a consideration in determining the quality of reported earnings, as are the value of items reported on the balance sheet. Inadequate accruals for probable liabilities and overstatement of asset values can both decrease the quality of reported earnings and bring sustainability into question.

From our discussion here, we can see that it is quite possible that a firm has high financial reporting quality but a low quality of reported earnings. Reported earnings may be GAAP-compliant and relevant, represent the company's economic activities faithfully, and be decision useful as a result, but have low sustainability or be low enough in amount that the provision of adequate investor returns or the sustainability of the company itself are called into question.

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### **LOS 36.b: Describe a spectrum for assessing financial reporting quality.**

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Combining both financial reporting quality and the quality of reported earnings, we can categorize the quality of financial reports along a spectrum from best to worst. At the high-quality end of the spectrum, we have financial reports that are compliant with GAAP, decision useful, and report earnings that are sustainable and represent an adequate return on invested capital. At the opposite end of the spectrum are financial reports that are essentially fictitious (fraudulent). When reporting quality is that low, the quality of the reported earnings themselves is impossible to assess. We can identify several levels of quality between these two extremes.

Here is one possible categorization of the quality levels of financial reports, from best to worst:

1. Reporting is compliant with GAAP and decision useful; earnings are sustainable and adequate.
2. Reporting is compliant with GAAP and decision useful, but earnings quality is low (earnings are not sustainable or not adequate).
3. Reporting is compliant with GAAP, but earnings quality is low and reporting choices and estimates are biased.
4. Reporting is compliant with GAAP, but the amount of earnings is actively managed to increase, decrease, or smooth reported earnings.
5. Reporting is not compliant with GAAP, although the numbers presented are based on the company's actual economic activities.
6. Reporting is not compliant and includes numbers that are essentially fictitious or fraudulent.

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### LOS 36.c: Explain the difference between conservative and aggressive accounting.

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Ideally, financial statements should be neutral or unbiased in order to offer the most value to analysts. In general, we describe the choices made within GAAP with respect to reported earnings as **conservative accounting** if they tend to decrease the company's reported earnings and financial position (on the balance sheet) for the current period. We describe choices that increase reported earnings or improve the financial position for the current period as **aggressive accounting**.

Aggressive accounting often results in decreased earnings in future periods, while conservative accounting will tend to increase future period earnings. Both these types of bias are sometimes used by management, for different periods, in an attempt to smooth earnings over time because greater earnings volatility tends to reduce the value of a company's shares. Often **earnings smoothing** is accomplished through adjustment of accrued liabilities that are based on management estimates. During periods of higher-than-expected earnings, management may employ a conservative bias by adjusting an accrued liability upward to reduce reported earnings for that period. This effectively allows deferral of the recognition of these earnings to a future period for which earnings are less than expected. In such a future period, the accrued liability is adjusted downward to increase reported earnings in that period, perhaps to meet market expectations. Deferral of reported earnings through conservative bias in financial reporting so they can be used opportunistically in a future period is sometimes referred to as putting earnings in the "cookie jar" (presumably to be "enjoyed" later).

Some examples of conservative versus aggressive financial reporting based on management choices and estimates are shown in Figure 36.1.

**Figure 36.1: Aggressive and Conservative Accounting**

| Aggressive  | Conservative   |
|---|--|
| Capitalizing current period costs                   | Expensing current period costs                       |
| Longer estimates of the lives of depreciable assets | Shorter estimates of the lives of depreciable assets |
| Higher estimates of salvage values                  | Lower estimates of salvage values                    |
| Straight-line depreciation                          | Accelerated depreciation                             |
| Delayed recognition of impairments                  | Early recognition of impairments                     |
| Less accrual of reserves for bad debt               | More accrual of reserves for bad debt                |
| Smaller valuation allowances on deferred tax assets | Larger valuation allowances on deferred tax assets   |

Bias can also be present in the way that financial results are presented. A company may present transparent financial statements that help analysts and investors to understand the results and the activities that led to them. Alternatively, a company may provide minimal disclosure in an attempt to emphasize positive developments and obscure information about negative developments.

We should avoid thinking about conservatism in financial reporting as “good” and aggressive reporting as “bad.” Conservative bias can also be considered as a deviation from neutral reporting or faithful representation that reduces the usefulness of financial statements to analysts and investors.

Sometimes GAAP themselves can introduce conservatism by imposing a higher standard of verification for revenue and profit than for expenses and accrual of liabilities. For example:

- Research costs are typically expensed in the period incurred because of the uncertainty about the future benefits to be provided from research activities, while the associated revenue is not recognized until some future period.
- Accruals for legal liabilities are recorded when a future payment becomes “probable,” while the standard for recognizing increasing accrued asset value is stricter.
- Under U.S. GAAP, write-downs of inventory values are required when their future value is likely impaired, but increases in inventory value may not be recorded until the inventory is actually sold.

While conservative bias in financial reporting is not ideal for users of financial statements, it may be beneficial in reducing the probability of future litigation from users claiming they were misled, in reducing current period tax liability (when deductions for tax must also be deducted in the financial statements), and in protecting the interests of those who have less complete information than company management, such as buyers of the company’s debt.

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**LOS 36.d: Describe motivations that might cause management to issue financial reports that are not high quality and conditions that are conducive to issuing low-quality, or even fraudulent, financial reports.**

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One important motivation for aggressive accounting choices is to meet or exceed a benchmark number for earnings per share. Specifically, managers may be motivated to report earnings that are greater than:

- Earnings guidance offered earlier by management.
- Consensus analyst expectations.
- Those of the same period in the prior year.

The manager’s motivation here may be career oriented, seeking to enhance her reputation and improve future career opportunities. Because beating certain benchmarks is important to subsequent stock price movements, managers may be motivated by incentive compensation (bonuses) that depends on stock returns. Other possible motivations are to gain credibility with equity market investors or improve the way the company is viewed by its customers and suppliers.

For companies that are highly leveraged and unprofitable, aggressive accounting may be motivated by a desire to avoid violating debt covenants.

When earnings exceed benchmark levels, managers may make conservative accounting choices in ways that allow these earnings to be shown in future periods, increasing the

probability that future period earnings will meet or exceed the relevant benchmark amount.

Three factors that typically exist in cases where management provides low-quality financial reporting are motivation, opportunity, and a rationalization of the behavior. So to the sources of *motivation* previously listed, we can add conditions that increase the *opportunity* to present low-quality financial reports. Circumstances in which low-quality, or even fraudulent, financial reporting is more probable are:

- The company has weak internal controls.
- The board of directors provides inadequate oversight.
- Applicable accounting standards provide a large range of acceptable accounting treatments, provide for inconsequential penalties in the case of accounting fraud, or both.

The third likely element of low-quality financial reporting is *rationalization* by management for less-than-ethical actions. Most people who do something they know is wrong tell themselves a story that seems (at least to them) to justify breaking the rules. Whether the story is “I’ll fix it next period” or “I have to do it to get my bonus and pay for my parents’ care,” the resulting behavior is the same.

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### **LOS 36.e: Describe mechanisms that discipline financial reporting quality and the potential limitations of those mechanisms.**

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Each country has its own regulatory body responsible for publicly traded securities and the markets in which they trade. For example, in the United States, the regulatory body is the Securities and Exchange Commission (SEC). In the U.K., it is the Financial Conduct Authority (FCA). The International Organization of Securities Commissions (IOSCO) coordinates securities regulation on an international basis with over 200 members, such as national securities regulators, stock exchanges, and regional authorities. One such regional authority, the European Securities and Markets Authority (ESMA), coordinates policy among the securities regulators of countries in the European Union.

Securities regulations typically require:

- A registration process for the issuance of new publicly traded securities.
- Specific disclosure and reporting requirements, including periodic financial statements and accompanying notes.
- An independent audit of financial reports.
- A statement of financial condition (or management commentary) made by management.
- A signed statement by the person responsible for the preparation of the financial reports.
- A review process for newly registered securities and periodic reviews after registration.

Enforcement actions by securities regulators may include fines, suspension of participation in issuance and trading of securities, and public disclosure of the results of disciplinary proceedings. Regulators may also pursue criminal prosecution of fraudulent or otherwise illegal activities.

In addition to the audit opinion, a requirement for securities that trade in the United States is that management must include an assessment of the effectiveness of the firm's internal controls.

Note that an unqualified or "clean" audit opinion is not a guarantee that no fraud has occurred but only offers reasonable assurance that the financial reports (prepared under the direction of management) have been "fairly reported" with respect to the applicable GAAP. The auditor is selected and paid by the firm being audited.

Another source of discipline on financial reporting quality is private contracts, such as those with lenders. Such contracts will often specify how financial measures referenced in the loan covenants will be calculated. The counterparties to private contracts with the firm have an incentive to see that the firm produces high-quality financial reports.

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### **LOS 36.f: Describe presentation choices, including non-GAAP measures, that could be used to influence an analyst's opinion.**

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Firms will sometimes report accounting measures that are not defined or required under GAAP. Such **non-GAAP measures** typically exclude some items in order to make the firm's performance look better than it would using measures defined and required by GAAP. The claim is often made that certain items are excluded because they are one-time or nonoperating costs that will not affect operating earnings going forward, because the items are non-cash charges, or to "improve comparability with companies that use different accounting methods" for depreciation or restructuring charges.

In the United States, companies that report non-GAAP measures in their financial statements are required to:

- Display the most comparable GAAP measure with equal prominence.
- Provide an explanation by management as to why the non-GAAP measure is thought to be useful.
- Reconcile the differences between the non-GAAP measure and the most comparable GAAP measure.
- Disclose other purposes for which the firm uses the non-GAAP measure.
- Include, in any non-GAAP measure, any items that are likely to recur in the future, even those treated as nonrecurring, unusual, or infrequent in the financial statements.

IFRS require that firms using non-IFRS measures in financial reports must:

- Define and explain the relevance of such non-IFRS measures.
- Reconcile the differences between the non-IFRS measure and the most comparable IFRS measure.

Overall, the supposition is that firms use non-GAAP measures in an attempt to control the metrics on which they are evaluated and to reduce the focus of analysts and investors on GAAP measures.



## MODULE QUIZ 36.1

1. A firm reports net income of \$40 million. The firm's financial statements disclose in Management's Discussion and Analysis that \$30 million of net income is attributable to a gain on the sale of assets. Based only on this information, for this period, the firm is *best* described as having high quality of:
  - A. financial reporting only.
  - B. both earnings and financial reporting.
  - C. neither earnings nor financial reporting.
2. Which of the following financial reports are considered to be of the lowest quality?  
Financial reports that reflect:
  - A. unsustainable earnings.
  - B. biased accounting choices.
  - C. departures from accounting principles.
3. Financial reporting is *most likely* to be decision useful when management's accounting choices are:
  - A. neutral.
  - B. aggressive.
  - C. conservative.
4. Which of the following is *least likely* to be a motivation to overreport earnings?
  - A. Reduce tax obligations.
  - B. Meet analyst expectations.
  - C. Remain in compliance with bond covenants.
5. With respect to conditions that may lead to low-quality financial reporting, ineffective internal controls are *best* described as a(n):
  - A. motivation.
  - B. opportunity.
  - C. rationalization.
6. A limitation on the effectiveness of auditing in ensuring financial reporting quality is that:
  - A. detecting fraud is not the objective of audits.
  - B. public firms are not required to obtain audit opinions.
  - C. auditors may only issue a qualified or unqualified opinion but do not explain why.
7. Under IFRS, a firm that presents a nonstandard financial measure is *least likely* required to:
  - A. provide the same measure for at least two prior periods.
  - B. explain the reasons for presenting the nonstandard measure.
  - C. reconcile the nonstandard measure to a comparable standard measure.

## MODULE 36.2: ACCOUNTING CHOICES AND ESTIMATES

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**LOS 36.g: Describe accounting methods (choices and estimates) that could be used to manage earnings, cash flow, and balance**



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## Revenue Recognition

One example of how a firm's choices affect the timing of revenue recognition is the choice of where in the shipping process the customer actually takes title to the goods. A firm may choose terms with their customer of **free-on-board (FOB)** at the shipping point (the firm's loading dock) or FOB at the destination (the customer's location). Choosing terms of FOB at the shipping point will mean that revenue is recognized earlier compared to FOB at the destination.

Firms can also manage the timing of revenue recognition by accelerating or delaying the shipment of goods. If additional revenue is required to meet targets, firms can offer discounts or special financing terms to increase orders in the current period, or ship goods to distributors without receiving an order. Overloading a distribution channel with more goods than would normally be sold during a period is referred to as **channel stuffing**. In periods where high earnings are expected, management may wish to delay recognition of revenue to the next period and hold or delay customer shipments to achieve this.

In a **bill-and-hold transaction**, the customer buys the goods and receives an invoice but requests that the firm keep the goods at their location for a period of time. The use of fictitious bill-and-hold transactions can increase earnings in the current period by recognizing revenue for goods that are actually still in inventory. Revenue for future periods will be decreased as real customer orders for these bill-and-hold items are filled but not recognized in revenue, offsetting the previous overstatement of revenue.

## Estimates of Credit Losses

One example of accounting choices that affect financial reports is the estimation of losses from uncollectable customer credit accounts. On the balance sheet, the reserve for uncollectible debt is an offset to accounts receivable. If management determines the probability that accounts receivable will be uncollectible is lower than their current estimate, a decrease in the reserve for uncollectible accounts will increase net receivables reported on the balance sheet, reduce expenses on the income statement, and increase net income. An increase in the allowance for bad debt would have the opposite effect, decreasing net receivables on the balance sheet, increasing expenses, and decreasing net income.

A firm that simply underestimates the percentage of receivables that will be uncollectible will report higher receivables and higher net income as a result. At some point, when actual uncollectible accounts exceed the low estimate, the firm will report an additional expense that will reduce net income and net receivables.

Management can adjust the bad-debt reserve in order to smooth earnings. In periods of high earnings, the allowance for bad debt is increased to reduce reported earnings, in effect storing these earnings for later use. In subsequent periods, if earnings are below benchmark values, the bad-debt reserve can be reduced to meet earnings targets.

Other reserves recorded by a company, such as a reserve for warranty expense, can also be changed to manage reported earnings. A decrease in the estimated warranty expense as a percentage of sales will increase earnings, while an increase in the reserve for warranty expense will decrease earnings for the period.

## Valuation Allowance

Another example of a contra account that can be used to manage earnings is a valuation allowance. Recall that a valuation allowance reduces the carrying value of a deferred tax asset based on the probability it will not be realized. Similar to the effects of an allowance for bad debt, increasing a valuation allowance will decrease the net deferred tax asset on the balance sheet and reduce net income for the period, while a decrease in the valuation allowance will increase the net deferred tax asset and increase net income for the period.

As with the contra account for bad debt, the valuation allowance can be understated to show higher asset values and adjusted over time to smooth earnings.

## Depreciation Methods and Estimates

Compared to straight-line depreciation, using an accelerated method of depreciation increases expenses, and decreases net income, in the early years of an asset's life. In the later years of an asset's life, expenses are lower and net income higher when an accelerated depreciation method is used. The carrying value of a depreciable asset on the balance sheet will decrease more rapidly with accelerated depreciation than with straight-line depreciation.

Estimates of the useful life of a depreciable asset and its salvage value upon disposal can also affect net income and the carrying value of the asset. A greater salvage value will slow depreciation so the carrying value of the asset is greater, depreciation expense is less, and net income is higher. A smaller salvage value will have the opposite effects. If the salvage value of an asset is set higher than the actual sale price at the end of the asset's life, a loss on the sale of the asset will decrease net income in the period in which the asset is sold.

Using a longer estimated useful life of a depreciable asset decreases the periodic depreciation expense and increases net income in the early years of the asset's life compared to using a shorter estimated useful life.

## Amortization and Impairment

Management choices and estimates regarding amortization of purchased intangible assets are similar to those for depreciation of tangible assets. The intangible asset *goodwill* is not amortized but is subject to a test for impairment. By ignoring or delaying recognition of an impairment charge for goodwill, management can increase earnings in the current period.

## **Inventory Method**

The choice of inventory cost flow methods can have significant effects on both reported earnings and the balance sheet value of inventory. Consider the choice between FIFO and weighted-average inventory costing methods. During periods of rising prices, COGS under the FIFO method will be less than COGS under the weighted-average costing method. Gross profit, gross margin, and earnings will all be greater under the FIFO method than under the weighted-average method as a result. Balance sheet inventory value will be greater under FIFO than under the weighted-average method.

During periods of decreasing prices, the opposite is true; FIFO COGS are greater than weighted-average COGS and FIFO gross profits, gross margin, and earnings less than under the weighted-average method. With decreasing prices, balance sheet inventory will be less under FIFO than under the weighted-average cost method.

In terms of relevance, in an environment of either increasing or decreasing prices, FIFO results in more accurate balance sheet inventory values because inventory value is closer to current replacement cost than under the weighted average cost method. Conversely, COGS are closer to current (replacement) cost under the weighted-average cost method so that gross profit and margin better reflect economic reality. Gross profit under FIFO is distorted in that it includes gains from rising prices (or losses from decreasing prices), so the weighted-average cost method produces “better” information on the income statement. Financial reports that are transparent and provide users with the information needed to understand how the choice of inventory costing method affects income statement and balance sheet values are considered to be higher quality.

## **Related-Party Transactions**

If a public firm does business with a supplier that is private and controlled by management, adjusting the price of goods supplied can shift profits either to or from the private company to manage the earnings reported by the public company.

## **Capitalization**

Any expense that can be capitalized creates an asset on the balance sheet, and the impact of the expense on net income can be spread over many years. Consider a firm that has a marketing expense of \$1.5 million and chooses to capitalize this expense and amortize it over three years. In the period in which the expense is incurred, capitalization will reduce the expense on the income statement from \$1.5 million to \$0.5 million, increasing pretax income by \$1 million. At the end of the year, the related balance sheet asset is \$1 million, and an amortization expense of \$0.5 million will be taken (and reduce net income) in each of the following two years. Greater capitalization of research and development costs will shift net income into the current period in the same way.

Capitalization also affects cash flow classifications. If an expense is capitalized, the entire amount is classified as an investing cash outflow so that operating cash flow is increased by that amount.

## Other Cash Flow Effects

Management can affect the classification of cash flows through other methods, primarily with the goal of increasing reported cash flow from operations. Taking longer to pay suppliers increases operating cash flows and is referred to as **stretching payables**. Delaying payments that would normally be made near the end of a reporting period until the beginning of the next accounting period will increase operating cash flow in the current period and reduce it in the subsequent period. There is no effect on reported earnings in the current period from stretching payables.

Capitalizing interest expense will decrease cash flow from investing and increase cash flow from operations, along with its effects on the pattern of earnings from depreciating the interest expense over time rather than expensing it all in the current period. More generally, the ability under IFRS to classify interest and dividends paid as either CFO or CFF, and interest and dividends received as either CFO or CFI, gives management an additional way to manage reported operating cash flow.

## MODULE 36.3: WARNING SIGNS

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**LOS 36.h: Describe accounting warning signs and methods for detecting manipulation of information in financial reports.**

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Following is a list of several warning signs that analysts should look for. The presence of these issues does not indicate fraud or even earnings manipulation, but in each case, the presence of one or more warning signs requires more analysis in order to determine whether there is a real business reason for the item or if earnings manipulation or fraud is driving the decisions and results. Avoiding investment in the company is one alternative when analysts and investors cannot obtain satisfactory answers to the questions raised when multiple warning signs are present.

### Revenue Recognition

- Changes in revenue recognition methods.
- Use of bill-and-hold transactions.
- Use of barter transactions.
- Use of rebate programs that require estimation of the impact of rebates on net revenue.
- Lack of transparency with regard to how the various components of a customer order are recorded as revenue.
- Revenue growth out of line with peer companies.
- Receivables turnover is decreasing over multiple periods.
- Decreases in total asset turnover, especially when a company is growing through acquisition of other companies.
- Inclusion of nonoperating items or significant one-time sales in revenue.

## Inventories

- Declining inventory turnover ratio.
- LIFO liquidations—drawing down inventory levels when LIFO (U.S. GAAP only) inventory costing is used so that COGS reflects the lower costs of items acquired in past periods, which increases current period earnings.

## Capitalization Policies

- Firm capitalizes costs that are not typically capitalized by firms in their industry.

## Relationship of Revenue and Cash Flow

- The ratio of operating cash flow to net income is persistently less than one or declining over time.

## Other Warning Signs

- Depreciation methods, estimated asset lives, or estimates of salvage values are out of line with those of peer companies in the industry.
- Fourth-quarter earnings show a pattern (either high or low) compared to the seasonality of earnings in the industry or seasonality of revenue for the firm.
- The firm has significant transactions with related parties (entities controlled by management).
- Certain expenses are classified as nonrecurring but appear regularly in financial reports.
- Gross or operating profit margins are noticeably higher than are typical for the industry and peer companies.
- Management typically provides only minimal financial reporting information and disclosure.
- Management typically emphasizes non-GAAP earnings measures and uses special or nonrecurring designations aggressively for charges.
- Growth by purchasing a large number of businesses can provide many opportunities to manipulate asset values and future depreciation and amortization and make comparisons to prior period earnings problematic.

Analysts should consider adjusting prior-period earnings when large restructuring or impairment charges are recognized. Analysts sometimes take such events to be good news because they anticipate better firm performance going forward when poorly performing assets are disposed of. Because the charges represent, to some extent, “corrections” of previously understated expenses and overstated asset values, analysts should consider spreading these costs across prior periods and restating prior earnings to give a more realistic picture of true earnings trends.



### MODULE QUIZ 36.2, 36.3

1. For the current period, inappropriate capitalization is *most likely* to:

- A. overstate revenues.
  - B. understate liabilities.
  - C. understate expenses.
2. A potential warning sign that a firm is engaging in channel stuffing is an unusual increase in the firm's:
- A. receivables turnover.
  - B. days of sales outstanding.
  - C. number of days of payables.

## KEY CONCEPTS

### LOS 36.a

Financial reporting quality refers to the characteristics of a firm's financial statements. High-quality financial reporting adheres to generally accepted accounting principles (GAAP) and is decision useful in terms of relevance and faithful representation.

Quality of reported results refers to the level and sustainability of a firm's earnings, cash flows, and balance sheet items. High-quality earnings are high enough to provide the firm's investors with an adequate return and are sustainable in future periods.

### LOS 36.b

A spectrum for assessing financial reporting quality considers both the quality of a firm's financial statements and the quality of its earnings. One such spectrum, from highest quality to lowest, is the following:

- Reporting is compliant with GAAP and decision useful; earnings are sustainable and adequate.
- Reporting is compliant and decision useful, but earnings quality is low.
- Reporting is compliant, but earnings quality is low and reporting choices and estimates are biased.
- Reporting is compliant, but earnings are actively managed.
- Reporting is not compliant, but the numbers presented are based on the company's actual economic activities.
- Reporting is not compliant and includes numbers that are fictitious or fraudulent.

### LOS 36.c

Biased accounting choices that can be made within GAAP include conservative and aggressive accounting. Conservative accounting choices tend to decrease the company's reported earnings and financial position for the current period. Aggressive accounting choices tend to increase reported earnings or improve the financial position for the current period.

Some managers employ conservative bias during periods when earnings are above target and aggressive bias during poor periods of below-target earnings to artificially smooth earnings.

#### **LOS 36.d**

Motivations for firm managers to issue low-quality financial reports may include pressure to meet or exceed earnings targets, career considerations, increasing their compensation, improving perceptions of the firm among customers and suppliers, or meeting the terms of debt covenants.

Conditions that are often present when managers issue low-quality financial reports include motivations, opportunities, and rationalizations. Weak internal controls, inadequate oversight by the board of directors, and wide ranges of acceptable accounting treatments are among the factors that may provide opportunities for low-quality reporting.

#### **LOS 36.e**

Mechanisms that help to discipline financial reporting quality include regulation, auditing, and private contracts. Regulators typically require public companies to provide periodic financial statements and notes, including management commentary, and obtain independent audits.

A clean audit opinion offers reasonable assurance that financial statements are free from material errors but does not guarantee the absence of error or fraud. The fact that firms select and pay their auditors may limit the effectiveness of auditing to discipline financial reporting quality.

#### **LOS 36.f**

Firms may attempt to influence analysts' valuations by presenting non-GAAP measures, such as earnings that exclude certain nonrecurring items. IFRS requires firms to define and explain the relevance of any non-GAAP measures and reconcile them to the most comparable IFRS measure. Similar requirements apply to U.S. public firms.

#### **LOS 36.g**

Accounting choices and estimates that can be used to manage earnings include:

- Revenue recognition choices such as shipping terms (FOB shipping point versus FOB destination), accelerating shipments (channel stuffing), and bill-and-hold transactions.
- Estimates of reserves for uncollectible accounts or warranty expenses.
- Valuation allowances on deferred tax assets.
- Depreciation methods, estimates of useful lives and salvage values, and recognition of impairments.
- Inventory cost flow methods.
- Capitalization of expenses.
- Related-party transactions.

#### **LOS 36.h**

Accounting warning signs that indicate a need for closer analysis may include:

- Revenue growth out of line with comparable firms, changes in revenue recognition methods, or lack of transparency about revenue recognition.
- Decreases over time in turnover ratios (receivables, inventory, total asset).
- Bill-and-hold, barter, or related-party transactions.
- Net income not supported by operating cash flows.
- Capitalization decisions, depreciation methods, useful lives, salvage values out of line with comparable firms.
- Fourth-quarter earnings patterns not caused by seasonality.
- Frequent appearance of nonrecurring items.
- Emphasis on non-GAAP measures, minimal information and disclosure in financial reports.

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 36.1

1. **A** Because a large proportion of net income is due to a one-time gain, this period's earnings are likely not sustainable and the firm may be said to have low quality of earnings for the period. Clear disclosure of this fact in the financial statements suggests high quality of financial reporting. (LOS 36.a)
2. **C** In the spectrum of financial reporting quality, financial reports that depart from generally accepted accounting principles are considered to be of lower quality than those that reflect biased accounting choices. Financial reports that reflect unsustainable earnings, such as one-time gains, can still be of high quality if they state the situation clearly. (LOS 36.b)
3. **A** Financial reporting is most likely to be decision useful when accounting choices are neutral. Either aggressive or conservative accounting choices by management may be viewed as biases. (LOS 36.c)
4. **A** Reducing tax obligations would be a reason to *underreport* earnings. The other choices are motivations to *overreport* earnings. (LOS 36.d)
5. **B** Ineffective internal controls are a condition that provides an opportunity for low-quality financial reporting. (LOS 36.d)
6. **A** The objective of audits is to provide reasonable assurance that financial statements are presented fairly. A firm that is engaging in accounting fraud may deceive its auditor. Regulators in most countries require publicly traded firms to obtain independent audits of their financial statements. Auditors may issue a qualified opinion noting certain aspects of financial statements that are inconsistent with accounting principles or an adverse opinion if they find that financial statements are materially misstated and do not conform with GAAP. (LOS 36.e)

- 7. A** IFRS require a firm that presents a nonstandard financial measure to reconcile that measure to an IFRS measure and explain why the firm believes the nonstandard measure is relevant to users of the financial statements. Presenting the nonstandard measure for prior periods is not a requirement. (LOS 36.f)

### **Module Quiz 36.2, 36.3**

- 1. C** Management may make inappropriate capitalization decisions to understate expenses by creating balance sheet assets for items that should instead be recognized as expenses in the current period, increasing net income in the current period. Revenues and liabilities are unlikely to be affected by capitalization decisions. (Module 36.2, LOS 36.g)
- 2. B** Channel stuffing, which includes activities such as accelerating deliveries to distributors or sending customers unordered merchandise, would likely increase accounts receivable as a percentage of revenues. This would decrease the receivables turnover ratio and increase days of sales outstanding. Payables would not be affected. (Module 36.3, LOS 36.h)

## READING 37

# FINANCIAL ANALYSIS TECHNIQUES

## INTRODUCTION

This reading presents a “tool box” for an analyst. It would be nice if you can calculate all these ratios, but it is imperative that you understand what firm characteristic each one is measuring—and even more important that you know whether a higher or lower ratio is better in each instance.

Different analysts calculate some ratios differently. It would be helpful if analysts were always careful to distinguish between total liabilities, total interest-bearing debt, long-term debt, and creditor and trade debt, but they do not. Some analysts routinely add deferred tax liabilities to debt or exclude goodwill when calculating assets and equity; others do not. Statistical reporting services almost always disclose how each of the ratios they present was calculated. So do not get too tied up in the details of each ratio, but understand what each one represents and what factors would likely lead to significant changes in a particular ratio.

The DuPont formulas have been with us for a long time and were in the curriculum way back in the 1980s. Decomposing ROE into its components is an important analytic technique, and it should definitely be in your tool box.

## MODULE 37.1: INTRODUCTION TO FINANCIAL RATIOS



Video covering this content is available online.

### LOS 37.a: Describe tools and techniques used in financial analysis, including their uses and limitations.

In the first FSA reading, we were introduced to the six steps of the financial statement analysis framework. We now return to look in more detail at Step 3, which is to “Make any appropriate adjustments to the financial statements. Calculate ratios and perform statistical analysis. Prepare exhibits such as graphs and common-size balance sheets.”

The journey we have taken through the accounting principles, with the focus on areas subject to choice, estimation, and subjectivity, enables us to adjust the financial statements in line with the objectives of our analysis. We can now move on to the calculation of ratios.

Analysts use various tools and techniques to convert financial statement data into formats that facilitate analysis. These include ratio analysis, common-size analysis,

graphical analysis, and regression analysis.

## Ratio Analysis

Ratios are useful tools for expressing relationships among data that can be used for internal comparisons and comparisons across firms. They are often most useful in identifying questions that need to be answered, rather than answering questions directly. Specifically, ratios can be used to do the following:

- Project future earnings and cash flow.
- Evaluate a firm's flexibility (its ability to grow and meet obligations even when unexpected circumstances arise).
- Assess management's performance.
- Evaluate changes in the firm and industry over time.
- Compare the firm with industry competitors.

Analysts must also be aware of the limitations of ratios, including the following:

- Financial ratios are not useful when viewed in isolation. They are only informative when compared to those of other firms, or to the company's historical performance.
- Comparisons with other companies are made more difficult by different accounting treatments. This is particularly important when comparing U.S. firms to non-U.S. firms.
- It is difficult to find comparable industry ratios when analyzing companies that operate in multiple industries.
- Conclusions cannot be made by calculating a single ratio. All ratios must be viewed relative to one another.
- Determining the target or comparison value for a ratio is difficult, requiring some range of acceptable values.

Ratios must be evaluated in the context of prior period results, the company's stated strategy, analyst expectations, the current position in the business cycle, and against other firms in the industry.

Definitions of ratios can vary widely among the analytical community. For example, some analysts use all liabilities when measuring leverage, while other analysts only use interest-bearing obligations. The important thing is for each individual analyst to use ratios consistently. Analysts must also understand that reasonable values of ratios can differ among industries.

## Common-Size Analysis

**Common-size statements** normalize balance sheets and income statements and allow the analyst to more easily compare performance across firms, and for a single firm over time:

- A **vertical common-size balance sheet** expresses all balance sheet accounts as a percentage of total assets.

$$\text{vertical common-size balance sheet ratios} = \frac{\text{balance sheet account}}{\text{total assets}}$$

- A **vertical common-size income statement** expresses all income statement items as a percentage of sales.

$$\text{vertical common-size income statement ratios} = \frac{\text{income statement account}}{\text{sales}}$$

In addition to comparisons of financial data across firms and time, common-size analysis is appropriate for quickly viewing certain financial ratios. For example, the gross profit margin, operating profit margin, and net profit margin are all clearly indicated within a common-size income statement. Vertical common-size income statement ratios are especially useful for studying trends in costs and profit margins.

The sample common-size statements in Figure 37.1 show balance sheet items as percentages of assets, and income statement items as percentages of sales.

**Figure 37.1: Vertical Common-Size Balance Sheet and Income Statement**

| <b>Balance Sheet, Fiscal Year-End</b> | <b>20X6</b>    | <b>20X5</b>    | <b>20X4</b>    |
|---------------------------------------|----------------|----------------|----------------|
| <b>Assets</b>                         |                |                |                |
| Cash & cash equivalents               | 0.38%          | 0.29%          | 0.37%          |
| Accounts receivable                   | 5.46%          | 5.61%          | 6.20%          |
| Inventories                           | 5.92%          | 5.42%          | 5.84%          |
| Deferred income taxes                 | 0.89%          | 0.84%          | 0.97%          |
| Other current assets                  | 0.41%          | 0.40%          | 0.36%          |
| <b>Total current assets</b>           | <b>13.06%</b>  | <b>12.56%</b>  | <b>13.74%</b>  |
| Gross fixed assets                    | 25.31%         | 23.79%         | 25.05%         |
| Accumulated depreciation              | 8.57%          | 7.46%          | 6.98%          |
| <b>Net gross fixed assets</b>         | <b>16.74%</b>  | <b>16.32%</b>  | <b>18.06%</b>  |
| Other long-term assets                | 70.20%         | 71.12%         | 68.20%         |
| <b>Total assets</b>                   | <b>100.00%</b> | <b>100.00%</b> | <b>100.00%</b> |
| <b>Liabilities</b>                    |                |                |                |
| Accounts payable                      | 3.40%          | 3.40%          | 3.79%          |
| Short-term debt                       | 1.00%          | 2.19%          | 1.65%          |
| Other current liabilities             | 8.16%          | 10.32%         | 9.14%          |
| <b>Total current liabilities</b>      | <b>12.56%</b>  | <b>15.91%</b>  | <b>14.58%</b>  |
| Long-term debt                        | 18.24%         | 14.58%         | 5.18%          |
| Other long-term liabilities           | 23.96%         | 27.44%         | 53.27%         |
| <b>Total liabilities</b>              | <b>54.76%</b>  | <b>57.92%</b>  | <b>73.02%</b>  |
| Preferred equity                      | 0.00%          | 0.00%          | 0.00%          |
| Common equity                         | 45.24%         | 42.08%         | 26.98%         |
| <b>Total liabilities &amp; equity</b> | <b>100.00%</b> | <b>100.00%</b> | <b>100.00%</b> |
| <b>Income Statement, fiscal year</b>  |                |                |                |
| <b>Revenues</b>                       | <b>20X6</b>    | <b>20X5</b>    | <b>20X4</b>    |
| Cost of goods sold                    | 59.62%         | 60.09%         | 60.90%         |
| <b>Gross profit</b>                   | <b>40.38%</b>  | <b>39.91%</b>  | <b>39.10%</b>  |
| Selling, general & administrative     | 16.82%         | 17.34%         | 17.84%         |
| Depreciation                          | 2.39%          | 2.33%          | 2.18%          |
| Amortization                          | 0.02%          | 3.29%          | 2.33%          |
| Other operating expenses              | 0.58%          | 0.25%          | -0.75%         |
| Operating income                      | 20.57%         | 16.71%         | 17.50%         |
| Interest and other debt expense       | 2.85%          | 4.92%          | 2.60%          |
| Income before taxes                   | 17.72%         | 11.79%         | 14.90%         |
| Provision for income taxes            | 6.30%          | 5.35%          | 6.17%          |
| <b>Net income</b>                     | <b>11.42%</b>  | <b>6.44%</b>   | <b>8.73%</b>   |

Even a cursory inspection of the income statement in Figure 37.1 can be quite instructive. Beginning at the bottom, we can see that the profitability of the company has increased nicely in 20X6 after falling slightly in 20X5. We can examine the 20X6 income statement values to find the source of this greatly improved profitability. The

cost of goods sold seems to be stable, with an improvement (decrease) in 20X6 of only 0.48%. SG&A was down approximately 0.5% as well.

These improvements from (relative) cost reduction, however, only begin to explain the 5% increase in the net profit margin for 20X6. Improvements in two items, amortization and interest and other debt expense, appear to be the most significant factors in the firm's improved profitability in 20X6. Clearly, the analyst must investigate further in both areas to learn whether these improvements represent permanent improvements, or whether these items can be expected to return to previous percentage-of-sales levels in the future.

We can also note that interest expense as a percentage of sales was approximately the same in 20X4 and 20X6. We must investigate the reasons for the higher interest costs in 20X5 to determine whether the current level of 2.85% can be expected to continue into the next period. In addition, more than 3% of the 5% increase in net profit margin in 20X6 is due to a decrease in amortization expense. Because this is a noncash expense, the decrease may have no implications for cash flows looking forward.

This discussion should make clear that common-size analysis doesn't tell an analyst the whole story about this company, but it can certainly point the analyst in the right direction to find out the circumstances that led to the increase in the net profit margin—and to determine the effects, if any, on firm cash flow going forward.

Another way to present financial statement data that is quite useful when analyzing trends over time is a **horizontal common-size balance sheet or income statement**. The divisor here is the first-year values, so they are all standardized to 1.0 by construction. Figure 37.2 illustrates this approach.

**Figure 37.2: Horizontal Common-Size Balance Sheet Data**

|                                | 20X4 | 20X5 | 20X6 |
|--------------------------------|------|------|------|
| Inventory                      | 1.0  | 1.1  | 1.4  |
| Cash and marketable securities | 1.0  | 1.3  | 1.2  |
| Long-term debt                 | 1.0  | 1.6  | 1.8  |
| PP&E (net of depreciation)     | 1.0  | 0.9  | 0.8  |

Trends in the values of these items, as well as the relative growth in these items, are readily apparent from a horizontal common-size balance sheet.



#### PROFESSOR'S NOTE

We have presented data in Figure 37.1 with information for the most recent period on the left, and in Figure 37.2, we have presented the historical values from left to right. Both presentation methods are common, and on the exam, you should pay special attention to which method is used in the data presented for any question.

We can view the values in the common-size financial statements as ratios. Net income is shown on the common-size income statement as net income or revenues, which is the net profit margin, and it tells the analyst the percentage of each dollar of sales that remains for shareholders after all expenses related to the generation of those sales are

deducted. One measure of financial leverage, long-term debt to total assets, can be read directly from the vertical common-size financial statements. Specific ratios commonly used in financial analysis and the interpretation of their values are covered in detail in this reading.

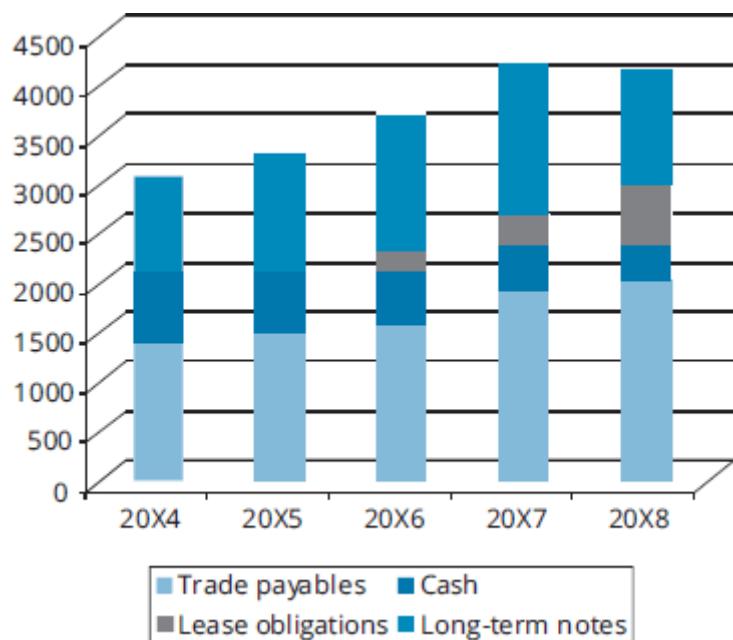
## Graphical Analysis

Graphs can be used to visually present performance comparisons and composition of financial statement elements over time.

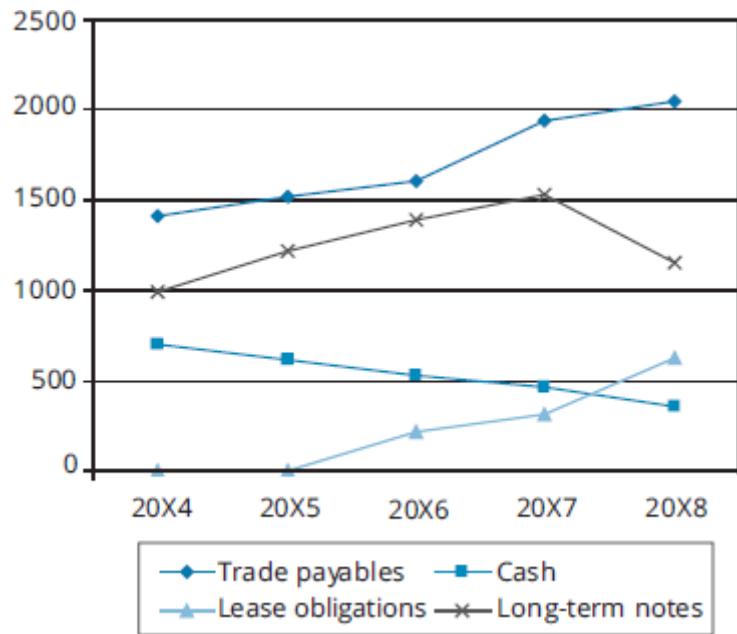
A **stacked column graph** (also called a stacked bar graph) shows the changes in items from year to year in graphical form. Figure 37.3 presents such data for a hypothetical corporation.

Another alternative for graphic presentation of data is a **line graph**. Figure 37.4 presents the same data as Figure 37.3, but as a line graph. The increase in trade payables and the decrease in cash are evident in either format and would alert the analyst to potential liquidity problems that require further investigation and analysis.

**Figure 37.3: Stacked Column (Stacked Bar) Graph**



**Figure 37.4: Line Graph**



## Regression Analysis

Regression analysis can be used to identify relationships between variables. The results are often used for forecasting. For example, an analyst might use the relationship between GDP and sales to prepare a sales forecast.



Video covering this content is available online.

## MODULE 37.2: FINANCIAL RATIOS, PART 1

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### LOS 37.b: Calculate and interpret activity, liquidity, solvency, and profitability ratios.

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Financial ratios can be segregated into different classifications by the type of information about the company they provide. Here are such classifications:

- **Activity ratios.** This category includes several ratios also referred to asset utilization or turnover ratios (e.g., inventory turnover, receivables turnover, and total assets turnover). They often give indications of how well a firm uses various assets, such as inventory and fixed assets.
- **Liquidity ratios.** Liquidity, here, refers to the ability to pay short-term obligations as they come due.
- **Solvency ratios.** Solvency ratios give the analyst information on the firm's financial leverage and ability to meet its longer-term obligations.
- **Profitability ratios.** Profitability ratios provide information on how well the company generates operating profits and net profits from its sales.

It should be noted that these categories are not mutually exclusive. For example, an activity ratio, such as payables turnover, may also provide information about the liquidity of a company. There is no one standard set of ratios for financial analysis. Different analysts use different ratios and different calculation methods for similar ratios. Some ratios are so commonly used that there is very little variation in how they are defined and calculated. We will note some alternative treatments and alternative terms for single ratios as we detail the commonly used ratios in each category.

### Activity Ratios

Activity ratios (also known as asset utilization ratios or operating efficiency ratios) measure how efficiently the firm is managing its assets.

- A measure of accounts receivable turnover is *receivables turnover*:

$$\text{receivables turnover} = \frac{\text{annual sales}}{\text{average receivables}}$$



#### PROFESSOR'S NOTE

In most cases, when a ratio compares a balance sheet account (such as receivables) with an income or cash flow item (such as sales), the balance sheet item will be the average of the account instead of simply the end-of-year balance. Averages are calculated by adding the beginning-of-year account value to the end-of-year account value, then dividing the sum by two. For companies operating in seasonal industries, averages of beginning and ending values may not give an accurate view of the average balance over the period. In these cases, an analyst would want to include more data points, throughout the year, when computing averages.

A high receivables turnover ratio could be the result of doing an excellent job of managing credit terms and collections. On the other hand, it might indicate that a company has stringent credit terms, offers a large discount for early payment, or charges high penalties for late payment. A company that has excessively stringent credit terms will lose sales as a result. Insight into why a company has a high receivables turnover rate can be gained from looking at the company's revenue growth compared to peers. Slower growth could indicate that credit terms may be too stringent, while a high receivables turnover—together with revenue growth at or above the peer group average—could indicate superior credit terms and collections management.

- The inverse of the receivables turnover times 365 is the *average collection period*, or *days of sales outstanding*, which is the average number of days it takes for the company's customers to pay their bills:

$$\text{days of sales outstanding} = \frac{365}{\text{receivables turnover}}$$

- A measure of a firm's efficiency with respect to its processing and inventory management is *inventory turnover*:

$$\text{inventory turnover} = \frac{\text{cost of goods sold}}{\text{average inventory}}$$



#### PROFESSOR'S NOTE

Pay careful attention to the numerator in the turnover ratios. For inventory turnover, be sure to use cost of goods sold, not sales.

Inventory turnover that is high may indicate effective management of inventory, but it could also result from holding inventory levels too low so that sales are lost when orders cannot be filled immediately. A low inventory turnover ratio relative to peers could indicate that some inventory is obsolete and slow-selling. In either case, examining revenue growth relative to peers can provide more insight into whether inventory is well managed or poorly managed.

- The inverse of the inventory turnover times 365 is the *average inventory processing period*, *number of days of inventory*, or *days of inventory on hand*:

$$\text{days of inventory on hand} = \frac{365}{\text{inventory turnover}}$$

- A measure of the use of trade credit by the firm is the *payables turnover* ratio:

$$\text{payables turnover} = \frac{\text{cost of goods sold}}{\text{average trade payables}}$$



#### PROFESSOR'S NOTE

Many analysts calculate payables turnover using purchases in the numerator, rather than COGS. Purchases are not typically a financial statement line item, but we can use the inventory equation to calculate them from the financial statements: Purchases = ending inventory – beginning inventory + cost of goods sold.

- The inverse of the payables turnover ratio multiplied by 365 is the *payables payment period* or *number of days of payables*, which is the average amount of time it takes

the company to pay its bills:

$$\text{number of days of payables} = \frac{365}{\text{payables turnover ratio}}$$



#### PROFESSOR'S NOTE

We have shown the days calculations for payables, receivables, and inventory based on annual turnover and a 365-day year. If turnover ratios are for a quarter rather than a year, the number of days in the quarter should be divided by the quarterly turnover ratios to get the “days” form of these ratios.

A high payables turnover ratio relative to peers may indicate that a company is not fully taking advantage of supplier credit terms, or that the company is paying suppliers early to take advantage of discounts. A payables turnover rate that is low relative to that of peer companies may indicate that a company is having problems with short-term cash flows—or, alternatively, that a company is simply taking advantage of lenient terms negotiated with suppliers. As with inventory turnover, examining other ratios (in this case, liquidity ratios) can provide insight into which interpretation of a relatively high or low payables turnover ratio is more likely.

- The effectiveness of the firm’s use of its total assets to create revenue is measured by its *total asset turnover*:

$$\text{total asset turnover} = \frac{\text{revenue}}{\text{average total assets}}$$

Different types of industries might have considerably different turnover ratios. Manufacturing businesses that are capital intensive might have asset turnover ratios near one, while retail businesses might have turnover ratios near 10. As was the case with the current asset turnover ratios discussed previously, it is desirable for the total asset turnover ratio to be close to the industry norm. Low asset turnover ratios might mean that the company has too much capital tied up in its asset base. A turnover ratio that is too high might imply that the firm has too few assets for potential sales, or that the asset base is outdated.

- The use of fixed assets is measured by the *fixed asset turnover* ratio:

$$\text{fixed asset turnover} = \frac{\text{revenue}}{\text{average net fixed assets}}$$

Low fixed asset turnover might mean that the company has too much capital tied up in its asset base or is using the assets it has inefficiently. A turnover ratio that is too high might imply that the firm has obsolete equipment, or at a minimum, that the firm will probably have to incur capital expenditures in the near future to increase capacity to support growing revenues. Because *net* here refers to net of accumulated depreciation, firms with more recently acquired assets will typically have lower fixed asset turnover ratios.

- How effectively a company is using its working capital is measured by the *working capital turnover* ratio:

$$\text{working capital turnover} = \frac{\text{revenue}}{\text{average working capital}}$$

Working capital (sometimes called net working capital) is current assets minus current liabilities. The working capital turnover ratio gives us information about the use of working capital in terms of dollars of sales per dollar of working capital. Some firms may have very low working capital if the outstanding payables equal or exceed inventory and receivables. In this case, the working capital turnover ratio will be very large, may vary significantly from period to period, and is less informative about changes in the firm's operating efficiency.

## Liquidity Ratios

Liquidity ratios are employed by analysts to determine the firm's ability to pay its short-term liabilities.

- The *current ratio* is the best-known measure of liquidity:

$$\text{current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

The higher the current ratio, the more likely it is that the company will be able to pay its short-term bills. A current ratio of less than one means that the company has negative working capital and is probably facing a liquidity crisis. Working capital equals current assets minus current liabilities.

- The *quick ratio* is a more stringent measure of liquidity because it does not include inventories and other assets that might not be very liquid:

$$\text{quick ratio} = \frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{current liabilities}}$$

The higher the quick ratio, the more likely it is that the company will be able to pay its short-term bills. Marketable securities are short-term debt instruments, typically liquid and of good credit quality.

- The most conservative liquidity measure is the *cash ratio*:

$$\text{cash ratio} = \frac{\text{cash} + \text{marketable securities}}{\text{current liabilities}}$$

The higher the cash ratio, the more likely that the company will be able to pay its short-term bills. The current, quick, and cash ratios differ only in the assumed liquidity of the current assets that the analyst projects will be used to pay off current liabilities.

- The *defensive interval ratio* is another measure of liquidity that indicates the number of days of average cash expenditures the firm could pay with its current liquid assets:

$$\text{defensive interval} = \frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{average daily expenditures}}$$

Expenditures, here, include cash expenses for costs of goods, SG&A, and research and development. If these items are taken from the income statement, noncash charges such as depreciation should be added back just as in the preparation of a statement of cash flows by the indirect method.

- The *cash conversion cycle (net operating cycle)* is the length of time it takes to turn the firm's cash investment in inventory back into cash, in the form of collections from the sales of that inventory. It measures the time between paying suppliers and

receiving cash from customers. The cash conversion cycle is computed from days' sales outstanding, days of inventory on hand, and number of days of payables:

$$\text{cash conversion cycle} = \text{days' sales outstanding} + \text{days of inventory on hand} - \text{number of days of payables}$$

High cash conversion cycles are considered undesirable. A conversion cycle that is too high implies that the company has an excessive amount of capital investment in the sales process. If cash is paid to suppliers before cash is received from customers, the company will require short-term financing to cover the period. For some companies, cash might be received from customers before suppliers are paid, which results in a cash conversion cycle that can be used to finance other parts of the business. Companies in this situation can support a current ratio that is less than one.



Video covering  
this content is  
available online.

## MODULE 37.3: FINANCIAL RATIOS, PART 2

### Solvency Ratios

Solvency ratios measure a firm's financial leverage and ability to meet its long-term obligations. Solvency ratios include various **debt ratios** that are based on the balance sheet and **coverage ratios** that are based on the income statement.

- A measure of the firm's use of fixed-cost financing sources is the *debt-to-equity* ratio:

$$\text{debt-to-equity} = \frac{\text{total debt}}{\text{total shareholders' equity}}$$

Increases and decreases in this ratio suggest a greater or lesser reliance on debt as a source of financing.

Total debt is calculated differently by different analysts and different providers of financial information. Here, we will define it as interest-bearing long-term and short-term debt.

Some analysts include non-interest-bearing current liabilities, such as trade payables. Others may deduct cash, cash equivalents, and marketable securities from debt to compute net debt.



#### PROFESSOR'S NOTE

For the exam, all interest-bearing liabilities should be included in the total debt figure unless otherwise specified. Somewhat surprisingly, the Level I CFA curriculum tells us to exclude leases from total debt calculations, despite the fact that leases are interest bearing. No explanation for excluding them is given. For the exam you should follow this approach when calculating total debt, but be aware that this treatment would result in misleadingly low leverage ratios for industries where using high volumes of leased assets is common, such as airlines.

- Another way of looking at the usage of debt is the *debt-to-capital* ratio:

$$\text{debt-to-capital} = \frac{\text{total debt}}{\text{total debt} + \text{total shareholders' equity}}$$

Capital equals all short-term and long-term debt plus preferred stock and equity. The ratio shows the proportion of debt in the capital structure of the firm. Increases and decreases in this ratio suggest a greater or lesser reliance on debt as a source of financing.

- A slightly different way of analyzing debt use is the *debt-to-assets* ratio:

$$\text{debt-to-assets} = \frac{\text{total debt}}{\text{total assets}}$$

Increases and decreases in this ratio suggest a greater or lesser reliance on debt as a source of financing.

- Another measure that is used as an indicator of a company's use of debt financing is the *financial leverage* ratio (or leverage ratio):

$$\text{financial leverage} = \frac{\text{average total assets}}{\text{average total equity}}$$

Average, here, means the average of the values at the beginning and at the end of the period. A ratio close to 1 indicates that equity is being used to finance assets. If the ratio increases above 1, it is an indication that debt is being used. Greater use of debt financing increases financial leverage and, typically, risk to equity holders and bondholders alike.

- The remaining risk ratios help determine the firm's ability to repay its debt obligations. The first of these is the *interest coverage ratio*:

$$\text{interest coverage} = \frac{\text{earnings before interest and taxes}}{\text{interest payments}}$$

The lower this ratio, the more likely it is that the firm will have difficulty meeting its debt payments. Because depreciation and amortization are not cash expenses, another ratio that reflects a firm's ability to meet its debt obligations is the debt-to-EBITDA ratio. The ratio indicates how long it would take to repay current total debt from an approximation of operating cash flow:

$$\text{debt-to-EBITDA} = \frac{\text{total debt}}{\text{EBITDA}}$$

- Another indicator of a company's ability to meet its obligations is the *fixed charge coverage* ratio:

$$\text{fixed charge coverage} = \frac{\text{earnings before interest and taxes} + \text{lease payments}}{\text{interest payments} + \text{lease payments}}$$

Here, lease payments are added back to operating earnings in the numerator. They are also added to interest payments in the denominator. Significant lease obligations will reduce this ratio significantly compared to the interest coverage ratio. Fixed charge coverage is the more meaningful measure for companies that lease a large portion of their assets, such as some airlines. The measure is also useful for U.S. GAAP-based companies with operating leases as currently, unlike finance leases, no interest is recorded in the income statement.



#### PROFESSOR'S NOTE

With all solvency ratios, the analyst must consider the variability of a firm's cash flows when determining the reasonableness of the ratios. Firms with stable cash flows are usually able to carry more debt.

## Profitability Ratios

Profitability ratios measure the overall performance of the firm relative to revenues, assets, equity, and capital.

- The *net profit margin* is the ratio of net income to revenue:

$$\text{net profit margin} = \frac{\text{net income}}{\text{revenue}}$$

Analysts should be concerned if this ratio is too low. The net profit margin should be based on net income from continuing operations, because analysts should be

primarily concerned about future expectations. Below-the-line items, such as discontinued operations, will not affect the company in the future.

*Operating profitability ratios* look at how good management is at turning their efforts into profits. Operating ratios compare the top of the income statement (sales) to profits. The different ratios are designed to isolate specific costs.

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

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

An analyst should be concerned if this ratio is too low. Gross profit can be increased by raising prices or reducing costs. However, the ability to raise prices may be limited by competition.

- The *operating profit margin* is the ratio of operating profit (gross profit less selling, general, and administrative expenses) to sales. Operating profit is often approximated as earnings before interest and taxes (EBIT):

$$\text{operating profit margin} = \frac{\text{operating income}}{\text{revenue}} \text{ or } \frac{\text{EBIT}}{\text{revenue}}$$

Strictly speaking, EBIT includes some nonoperating items, such as gains on investment. The analyst, as with other ratios with various formulations, must be consistent in his calculation method and know how published ratios are calculated. Analysts should be concerned if this ratio is too low. Some analysts prefer to calculate the operating profit margin by adding back depreciation and any amortization expense to arrive at earnings before interest, taxes, depreciation, and amortization (EBITDA).

- Sometimes, profitability is measured using earnings before tax (EBT), which can be calculated by subtracting interest from EBIT or from operating earnings. The *pretax margin* is calculated as follows:

$$\text{pretax margin} = \frac{\text{EBT}}{\text{revenue}}$$

- Another set of profitability ratios measures profitability relative to funds invested in the company by common stockholders, preferred stockholders, and suppliers of debt financing. The first of these measures is the return on assets (ROA). Typically, ROA is calculated using net income:

$$\text{ROA} = \frac{\text{net income}}{\text{average total assets}}$$

This measure is a bit misleading, however, because interest is excluded from net income, but total assets include debt as well as equity. Adding interest adjusted for tax back to net income puts the returns to both equity holders and debtholders in the numerator. The interest expense that should be added back is gross interest expense, not net interest expense (which is gross interest expense less interest income). This results in an alternative calculation for ROA:

$$\text{ROA} = \frac{\text{net income} + \text{interest expense} (1 - \text{tax rate})}{\text{average total assets}}$$

- A measure of ROA that includes both taxes and interest in the numerator is the *operating ROA*:

$$\text{operating ROA} = \frac{\text{operating income}}{\text{average total assets}} \text{ or } \frac{\text{EBIT}}{\text{average total assets}}$$

- Return on invested capital (ROIC)*, which we described in the Corporate Issuers topic area, is the ratio of after-tax operating profit to average long-term capital:

$$\text{return on invested capital} = \frac{\text{after-tax operating profit}}{\text{average long-term capital}}$$

Long-term capital includes long-term debt, preferred equity, and common equity, but excludes working capital. Analysts should be concerned if this ratio is too low.

- The *return on equity (ROE)*, sometimes called *return on total equity*, is the ratio of net income to average total equity (including preferred stock):

$$\text{ROE} = \frac{\text{net income}}{\text{average total equity}}$$

Analysts should be concerned if this ratio is too low.

- A similar ratio to the ROE is the *return on common equity*:

$$\begin{aligned}\text{return on common equity} &= \frac{\text{net income} - \text{preferred dividends}}{\text{average common equity}} \\ &= \frac{\text{net income available to common}}{\text{average common equity}}\end{aligned}$$

This ratio differs from the return on total equity in that it only measures the accounting profits available to, and the capital invested by, common stockholders, instead of common and preferred stockholders. That is why preferred dividends are deducted from net income in the numerator. Analysts should be concerned if this ratio is too low.

The return on common equity is often more thoroughly analyzed using the DuPont decomposition, which is described later in this reading.

### EXAMPLE: Calculating ratios

A balance sheet and income statement for Sedgwick Company are shown in the following tables for this year and the previous year.

Using the company information provided, calculate the following ratios for the current year: current ratio, total asset turnover, net profit margin, return on common equity, and total debt to equity.

#### Sedgwick Company Balance Sheet

|   | Current Year   | Previous Year  |
|---|----------------|----------------|
| <b>Assets</b>                             |                |                |
| Cash and marketable securities            | \$105          | \$95           |
| Receivables                               | 205            | 195            |
| Inventories                               | 310            | 290            |
| <b>Total current assets</b>               | <b>620</b>     | <b>580</b>     |
| Gross property, plant, and equipment      | 1,800          | 1,700          |
| Accumulated depreciation                  | 360            | 340            |
| <b>Net property, plant, and equipment</b> | <b>1,440</b>   | <b>1,360</b>   |
| <b>Total assets</b>                       | <b>\$2,060</b> | <b>\$1,940</b> |
| <b>Liabilities</b>                        |                |                |
| Payables                                  | \$110          | \$90           |
| Short-term debt                           | 160            | 140            |
| Current portion of long-term debt         | 55             | 45             |
| <b>Current liabilities</b>                | <b>325</b>     | <b>275</b>     |
| Long-term debt                            | 610            | 690            |
| Deferred taxes                            | 105            | 95             |
| Common stock at par                       | 300            | 300            |
| Additional paid in capital                | 400            | 400            |
| Retained earnings                         | 320            | 180            |
| Common shareholders' equity               | 1,020          | 880            |
| <b>Total liabilities and equity</b>       | <b>\$2,060</b> | <b>\$1,940</b> |

## Sedgwick Company Income Statement

|                       | Current Year |
|-----------------------|--------------|
| Sales                 | \$4,000      |
| Cost of goods sold    | <u>3,000</u> |
| Gross profit          | 1,000        |
| Operating expenses    | <u>650</u>   |
| Operating profit      | 350          |
| Interest expense      | <u>50</u>    |
| Earnings before taxes | 300          |
| Taxes                 | <u>100</u>   |
| Net income            | <u>200</u>   |
| Common dividends      | <u>60</u>    |

**Answer:**

■ current ratio =  $\frac{\text{current assets}}{\text{current liabilities}}$

$$\text{current ratio} = \frac{620}{325} = 1.9$$

■ total asset turnover =  $\frac{\text{revenue}}{\text{average assets}}$

$$\text{total asset turnover} = \frac{4,000}{(2,060 + 1,940) / 2} = 2.0$$

■ net profit margin =  $\frac{\text{net income}}{\text{revenue}}$

$$\text{net profit margin} = \frac{200}{4,000} = 5.0\%$$

■ return on common equity =  $\frac{\text{net income} - \text{preferred dividends}}{\text{average common equity}}$

$$\text{return on common equity} = \frac{200}{(1,020 + 880) / 2} = 21.1\%$$

■ debt-to-equity ratio =  $\frac{\text{total debt}}{\text{total equity}}$

$$\text{debt-to-equity ratio} = \frac{610 + 160 + 55}{1,020} = 80.9\%$$

Note that preferred equity would be included in the denominator if there were any, and that we have included short-term debt and the current portion of long-term debt in calculating total (interest-bearing) debt.

**唯一微信: xuebjun888s**

### LOS 37.c: Describe relationships among ratios and evaluate a company using ratio analysis.

#### EXAMPLE: Relationships among ratios

An analyst calculates the following activity and liquidity ratios for a company over the last three years:

|                         | 20X8 | 20X7 | 20X6 |
|-------------------------|------|------|------|
| Current ratio           | 2.0  | 1.5  | 1.2  |
| Quick ratio             | 0.5  | 0.8  | 1.0  |
| Days of inventory       | 60   | 50   | 30   |
| Days' sales outstanding | 20   | 30   | 40   |

Determine what the analyst should infer from these ratios taken together.

**Answer:**

The current ratio has increased over this period, while the quick ratio has decreased. This could result from inventories increasing or from current assets other than inventories decreasing. The increase in days of inventory on hand suggests increasing inventories explain the opposing trends in the current and quick ratios.

The decrease in days' sales outstanding indicates that the company has been collecting cash from customers sooner than it had been in the past. Taken together,

these ratios suggest the company may be accelerating its collections to make up for a drain on cash from poor inventory management.

### EXAMPLE: Using ratios to evaluate a company

An analyst is comparing the values of several ratios for the current year to their prior-year values, the current industry average values, and industry average ratios for Sedgwick Company. These selected ratio values are shown in the following table.

|                         | Current Year | Previous Year | Industry Average |
|-------------------------|--------------|---------------|------------------|
| Current ratio           | 1.9          | 2.1           | 1.5              |
| Total asset turnover    | 2.0          | 2.3           | 2.4              |
| Net profit margin       | 5.0%         | 5.8%          | 6.5%             |
| Return on common equity | 21.1%        | 24.1%         | 19.8%            |
| Debt-to-equity          | 80.9%        | 99.4%         | 35.7%            |

Discuss how these ratios compare with the company's performance last year and with the industry performance.

#### Answer:

Although the firm's liquidity (as measured by the current ratio) has decreased over the past year, it remains above the industry average.

Total asset turnover has declined over the past year and now appears to be significantly lower than the industry average.

Net profit margin is lower than last year and is much lower than the industry average.

ROE is lower than last year but still higher than the industry average. Given the decline in net profit margin and total asset turnover, it is likely that higher-than-average financial leverage is the reason for this ROE outperformance.

Our supposition about the firm's financial leverage is confirmed by its debt-to-equity ratios. While the current year's ratio is lower than last year's, it is still more than twice the industry average ratio. The significant decrease in the company's debt-to-equity ratio over the past year suggests the company is trying to get its debt level more in line with the industry average.



#### MODULE QUIZ 37.1, 37.2, 37.3

1. To study trends in a firm's cost of goods sold (COGS), the analyst should standardize the COGS numbers to a common-sized basis by dividing COGS by:
  - A. assets.
  - B. sales.
  - C. net income.
2. Which of the following is *least likely* a limitation of financial ratios?
  - A. Data on comparable firms are difficult to acquire.

- B. Determining the target or comparison value for a ratio requires judgment.
- C. Different accounting treatments require the analyst to adjust the data before comparing ratios.
3. RGB, Inc.'s purchases during the year were \$100,000. The balance sheet shows an average accounts payable balance of \$12,000. RGB's payables payment period is *closest* to:
- 37 days.
  - 44 days.
  - 52 days.
4. RGB, Inc., has a gross profit of \$45,000 on sales of \$150,000. The balance sheet shows average total assets of \$75,000 with an average inventory balance of \$15,000. RGB's inventory turnover and total asset turnover are *closest* to:
- | <u>Inventory turnover</u> | <u>Total asset turnover</u> |
|---------------------------|-----------------------------|
| A. 2.00 times             | 7.00 times                  |
| B. 7.00 times             | 2.00 times                  |
| C. 0.33 times             | 0.50 times                  |
5. If RGB, Inc., has annual sales of \$100,000, average accounts payable of \$30,000, and average accounts receivable of \$25,000, RGB's receivables turnover and average collection period are *closest* to:
- | <u>Receivables turnover</u> | <u>Average collection period</u> |
|-----------------------------|----------------------------------|
| A. 2.1 times                | 174 days                         |
| B. 3.3 times                | 111 days                         |
| C. 4.0 times                | 91 days                          |
6. A company's current ratio is 1.9. If some of the accounts payable are paid off from the cash account, then the:
- numerator would decrease by a greater percentage than the denominator, resulting in a lower current ratio.
  - denominator would decrease by a greater percentage than the numerator, resulting in a higher current ratio.
  - numerator and denominator would decrease proportionally, leaving the current ratio unchanged.
7. A company's quick ratio is 1.2. If inventory were purchased for cash, then the:
- numerator would decrease more than the denominator, resulting in a lower quick ratio.
  - denominator would decrease more than the numerator, resulting in a higher quick ratio.
  - numerator and denominator would decrease proportionally, leaving the quick ratio unchanged.
8. All other things held constant, which of the following transactions will increase a firm's current ratio if the ratio is greater than 1?
- Accounts receivable are collected, and the funds received are deposited in the firm's cash account.
  - Fixed assets are purchased from the cash account.
  - Accounts payable are paid with funds from the cash account.
9. RGB, Inc.'s receivable turnover is 10 times, the inventory turnover is 5 times, and the payables turnover is 9 times. RGB's cash conversion cycle is *closest* to:
- 69 days.
  - 104 days.

- C. 150 days.
10. An analyst who is interested in a company's long-term solvency would *most likely* examine the:
- return on total capital.
  - defensive interval ratio.
  - fixed charge coverage ratio.
11. RGB, Inc.'s income statement shows sales of \$1,000, cost of goods sold of \$400, pre-interest operating expense of \$300, and interest expense of \$100. RGB's interest coverage ratio is *closest* to:
- 2 times.
  - 3 times.
  - 4 times.

## MODULE 37.4: DUPONT ANALYSIS



Video covering this content is available online.

### LOS 37.d: Demonstrate the application of DuPont analysis of return on equity and calculate and interpret effects of changes in its components.

The **DuPont system of analysis** is an approach that can be used to analyze return on equity (ROE). It uses basic algebra to break down ROE into a function of different ratios, so an analyst can see the impact of leverage, profit margins, and turnover on shareholder returns. There are two variants of the DuPont system: the original three-part approach and the extended five-part system.

For the original approach, start with ROE defined as follows:

$$\text{ROE} = \frac{\text{net income}}{\text{average equity}}$$

Average or year-end values for equity can be used. Multiplying ROE by (average total assets / average total assets) and rearranging terms produces the following:

$$\text{ROE} = \left( \frac{\text{net income}}{\text{average total assets}} \right) \left( \frac{\text{average total assets}}{\text{average stockholders' equity}} \right)$$

The first term is the ROA, and the second term is a financial leverage ratio that will increase as the use of debt financing increases:

$$\text{ROE} = \text{ROA} \times \text{financial leverage}$$

We can expand this further by multiplying these terms by (revenue / revenue), and rearranging terms:

$$\text{ROE} = \left( \frac{\text{net income}}{\text{revenue}} \right) \left( \frac{\text{revenue}}{\text{average total assets}} \right) \left( \frac{\text{average total assets}}{\text{average stockholders' equity}} \right)$$

The first term becomes net profit margin, the second term is now total asset turnover, and the third term is still financial leverage:

$$\text{ROE} = \text{net profit margin} \times \text{total asset turnover} \times \text{financial leverage}$$



## PROFESSOR'S NOTE

The leverage ratio is sometimes called the equity multiplier.

This is the original DuPont equation. It is arguably the most important equation in ratio analysis because it breaks down a very important ratio (ROE) into three key components. If ROE is relatively low, it must be that at least one of the following is true: the company has a poor profit margin, the company has poor asset turnover, or the firm has too little leverage.



## PROFESSOR'S NOTE

Often, candidates get confused and think the DuPont method is a way to *calculate* ROE. While you can calculate ROE given the components of either the original or extended DuPont equations, this isn't necessary if you have the financial statements. If you have net income and equity, you can calculate ROE. The DuPont method is a way to *decompose* ROE, to better see what is driving the changes in ROE.

### EXAMPLE: Decomposition of ROE with original DuPont

Staret, Inc., has maintained a stable and relatively high ROE of approximately 18% over the last three years. Use traditional DuPont analysis to decompose this ROE into its three components and comment on trends in company performance.

### Staret, Inc., Selected Balance Sheet and Income Statement Items (Millions)

| Year           | 20X3 | 20X4 | 20X5 |
|----------------|------|------|------|
| Net income     | 21.5 | 22.3 | 21.9 |
| Revenue        | 305  | 350  | 410  |
| Average equity | 119  | 124  | 126  |
| Average assets | 230  | 290  | 350  |

#### Answer:

ROE:

$$20X3: 21.5 / 119 = 18.1\%$$

$$20X4: 22.3 / 124 = 18.0\%$$

$$20X5: 21.9 / 126 = 17.4\%$$

DuPont:

$$20X3: 7.0\% \times 1.33 \times 1.93$$

$$20X4: 6.4\% \times 1.21 \times 2.34$$

$$20X5: 5.3\% \times 1.17 \times 2.78$$

Note that values were rounded in these calculations.

While ROE has dropped only slightly, both total asset turnover and net profit margin have declined. The effects of declining net margins and turnover on ROE have been offset by a significant increase in leverage. The analyst should be concerned about the decrease in net margin and determine the combination of pricing pressure and

increasing expenses that caused this situation. The company has become more risky due to increased debt financing.

The **extended (5-way) DuPont equation** takes the net profit margin and breaks it down further:

$$\text{ROE} = \left( \frac{\text{net income}}{\text{EBT}} \right) \left( \frac{\text{EBT}}{\text{EBIT}} \right) \left( \frac{\text{EBIT}}{\text{revenue}} \right) \left( \frac{\text{revenue}}{\text{average assets}} \right) \left( \frac{\text{average assets}}{\text{average equity}} \right)$$

The first term in the 3-part DuPont equation, net profit margin, has been decomposed into three terms:

$\frac{\text{net income}}{\text{EBT}}$  is called the **tax burden** and is equal to  $(1 - \text{tax rate})$

$\frac{\text{EBT}}{\text{EBIT}}$  is called the **interest burden**

$\frac{\text{EBIT}}{\text{revenue}}$  is called the **EBIT margin**

We then have the following:

$$\text{ROE} = \left( \frac{\text{tax burden}}{\text{burden}} \right) \left( \frac{\text{interest burden}}{\text{burden}} \right) \left( \frac{\text{EBIT margin}}{\text{margin}} \right) \left( \frac{\text{total asset turnover}}{\text{turnover}} \right) \left( \frac{\text{financial leverage}}{\text{leverage}} \right)$$

An increase in interest expense as proportion of EBIT will increase the interest burden (i.e., decrease the interest burden ratio). Increases in either the tax burden or the interest burden (i.e., decreases in the ratios) will tend to decrease ROE.

EBIT in the second two expressions can be replaced by operating earnings. In this case, we have the operating margin rather than the EBIT margin. The interest burden term would then show the effects of nonoperating income as well as the effect of interest expense.

Note that in general, high profit margins, leverage, and asset turnover will lead to high levels of ROE. However, this version of the formula shows that more leverage *does not always* lead to higher ROE. As leverage rises, so does the interest burden. Hence, the positive effects of leverage can be offset by the higher interest payments that accompany more debt. Note that higher taxes will always lead to lower levels of ROE.

### EXAMPLE: Extended DuPont analysis

An analyst has gathered data from two companies in the same industry. Use the extended DuPont analysis to explain the critical factors that account for the differences between the two companies' ROEs.

### Selected Income and Balance Sheet Data

|                  | Company A | Company B |
|------------------|-----------|-----------|
| Revenues         | \$500     | \$900     |
| EBIT             | 35        | 100       |
| Interest expense | 5         | 0         |
| EBT              | 30        | 100       |
| Taxes            | <u>10</u> | <u>40</u> |
| Net income       | 20        | 60        |
| Average assets   | 250       | 300       |
| Total debt       | 100       | 50        |
| Average equity   | \$150     | \$250     |

**Answer:**

return on equity = net income / average equity

$$\text{Company A: } 20 / 150 = 13.3\%$$

$$\text{Company B: } 60 / 250 = 24.0\%$$

EBIT margin = EBIT / revenue

$$\text{Company A: } 35 / 500 = 7.0\%$$

$$\text{Company B: } 100 / 900 = 11.1\%$$

total asset turnover = revenue / average assets

$$\text{Company A: } 500 / 250 = 2.0$$

$$\text{Company B: } 900 / 300 = 3.0$$

interest burden = EBT / EBIT

$$\text{Company A: } 30 / 35 = 85.7\%$$

$$\text{Company B: } 100 / 100 = 1$$

financial leverage = average assets / average equity

$$\text{Company A: } 250 / 150 = 1.67$$

$$\text{Company B: } 300 / 250 = 1.2$$

tax burden = net income / EBT

$$\text{Company A: } 20 / 30 = 66.7\%$$

$$\text{Company B: } 60 / 100 = 60.0\%$$

Company B has a higher tax burden but a lower interest burden (a lower ratio indicates a higher burden). Company B has better EBIT margins and better asset use (perhaps management of inventory, receivables, or payables, or a lower cost basis in its fixed assets due to their age), and less leverage. Company B's higher EBIT margins

and asset turnover are the main factors leading to its significantly higher ROE, which it achieves with less leverage than Company A.

## MODULE 37.5: INDUSTRY-SPECIFIC FINANCIAL RATIOS



Video covering this content is available online.

### LOS 37.e: Describe the uses of industry-specific ratios used in financial analysis.

As no two industries are the same, the importance of each individual ratio will vary depending on the key performance indicators of an industry. For some industries, analysts calculate ratios to evaluate metrics that might not be relevant for other industries. For example:

- *Net income per employee* and *sales per employee* are used in the analysis and valuation of service and consulting companies.
- *Growth in same-store sales* is used in the restaurant and retail industries to indicate growth without the effects of new locations that have been opened. It is a measure of how well the firm is doing at attracting and keeping existing customers. In the case of locations with overlapping markets, decreases in same-store sales growth may indicate that new locations are taking customers from existing ones. *Sales per square foot* is another metric commonly used in the retail industry.
- In the hotel industry, *average daily rate*, or room revenue divided by number of rooms sold, is a key indicator of profitability. *Occupancy rates*, used to analyze the total number of rooms sold relative to the total number available, are a key activity ratio.
- For subscription services such as streaming providers, *average revenue per user* is often a key metric.

Banks, insurance companies, and other financial firms carry their own challenges for analysts. Financial firms often have to maintain minimums or maximums of certain ratios to comply with regulations. Part of the challenge is to understand the commonly used terms and the ratios they represent.

- *Capital adequacy* typically refers to some monetary measure of a firm's risk, both operational and financial, as a percentage of its equity capital. Regulators monitor capital adequacy ratios to ensure that a financial firm has a buffer to absorb losses. A common measure of capital risk is *value at risk*, which is an estimate of the money size of the loss that a firm will exceed only some specific percentage of the time, over a specific period of time.
- Banks are subject to minimum *reserve requirements*. Their ratios of various liabilities to their central bank reserves must be above the minimums. The ratio of a bank's liquid assets to certain liabilities is called its *liquid asset requirement*.
- The performance of financial companies that lend funds is often summarized as the *net interest margin*, which is simply interest income divided by the firm's interest-

earning assets.



### PROFESSOR'S NOTE

A more thorough discussion of ratios relating to banking and insurance institutions is included at Level II. The focus on financial institutions' capital adequacy intensified due to the 2007–2008 global financial crisis. Contagion is always a risk due to the interconnected nature of banking. Many of the regulations introduced have been directed at reducing this risk. In 2024, the United States and Switzerland experienced events that tested both the effectiveness of the rules and the responsiveness of regulators.

## Business Risk

The standard deviation of revenue, standard deviation of operating income, and standard deviation of net income are all indicators of the variation in and the uncertainty about a firm's performance. Because they all depend on the size of the firm to a great extent, analysts employ a size-adjusted measure of variation. The **coefficient of variation** for a variable is its standard deviation divided by its expected value.

Certainly, different industries have different levels of uncertainty about revenues, expenses, taxes, and nonoperating items. Comparing coefficients of variation for a firm across time, or among a firm and its peers, can aid the analyst in assessing both the relative and absolute degree of risk a firm faces in generating income for its investors.

$$CV_{sales} = \frac{\text{standard deviation of sales}}{\text{mean sales}}$$

$$CV_{operating\ income} = \frac{\text{standard deviation of operating income}}{\text{mean operating income}}$$

$$CV_{net\ income} = \frac{\text{standard deviation of net income}}{\text{mean net income}}$$

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### LOS 37.f: Describe how ratio analysis and other techniques can be used to model and forecast earnings.

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Ratio analysis can be used in preparing **pro forma financial statements** that provide estimates of financial statement items for one or more future periods. The preparation of pro forma financial statements and related forecasts is covered in more detail in the Equity Investments topic area. Here, some examples will suffice.

A forecast of financial results begins with an estimate of a firm's next-period revenues. If the analyst has no reason to believe that COGS in relation to sales will change for the next period, the COGS percentage from a common-size income statement can be used in constructing a pro forma income statement for the next period based on the estimate of sales.

Similarly, the analyst may believe that certain ratios will remain the same, or change in one direction or the other for the next period. In the absence of any information indicating a change, an analyst may choose to incorporate the operating profit margin from the prior period into a pro forma income statement for the next period. Beginning

with an estimate of next-period sales, the estimated operating profit margin can be used to forecast operating profits for the next period.

Rather than point estimates of sales and net and operating margins, the analyst may examine possible changes to create a range of possible values for key financial variables.

Three methods of examining the variability of financial outcomes around point estimates are *sensitivity analysis*, *scenario analysis*, and *simulation*. Sensitivity analysis is based on “what if” questions such as, “What will be the effect on net income if sales increase by 3% rather than the estimated 5%?” Scenario analysis is based on specific scenarios (a specific set of outcomes for key variables) and will also yield a range of values for financial statement items. Simulation is a technique in which probability distributions for key variables are selected, and a computer is used to generate a distribution of values for outcomes based on a repeated random selection of values for the key variables.



### MODULE QUIZ 37.4, 37.5

1. Return on equity using the traditional DuPont formula equals:
  - A. (net profit margin) (interest component) (solvency ratio).
  - B. (net profit margin) (total asset turnover) (tax retention rate).
  - C. (net profit margin) (total asset turnover) (financial leverage multiplier).
2. Which of the following equations *least accurately* represents return on equity?
  - A. (net profit margin)(equity turnover).
  - B. (net profit margin)(total asset turnover)(assets / equity).
  - C. (ROA)(interest burden)(tax retention rate).
3. Which of the following statements about coefficient of variation is *least accurate*?
  - A. A coefficient of variation for an income statement measure represents variation per monetary unit.
  - B. The coefficient of variation is calculated by dividing a mean value by its standard deviation.
  - C. The coefficient of variation is a size-adjusted measure of variation.
4. An analyst who needs to model and forecast a company’s earnings for the next three years would be *least likely* to:
  - A. assume that key financial ratios will remain unchanged for the forecast period.
  - B. use common-size financial statements to estimate expenses as a percentage of net income.
  - C. examine the variability of the predicted outcomes by performing a sensitivity or scenario analysis.

### KEY CONCEPTS

#### LOS 37.a

Ratios can be used to project earnings and future cash flow, evaluate a firm’s flexibility, assess management’s performance, evaluate changes in the firm and industry over time, and compare the firm with industry competitors.

Vertical common-size data are stated as a percentage of sales for income statements, or as a percentage of total assets for balance sheets. Horizontal common-size data present each item as a percentage of its value in a base year.

Ratio analysis has limitations. Ratios are not useful when viewed in isolation and require adjustments when different companies use different accounting treatments. Comparable ratios may be hard to find for companies that operate in multiple industries. Ratios must be analyzed relative to one another, and determining the range of acceptable values for a ratio can be difficult.

#### LOS 37.b

*Activity ratios* indicate how well a firm uses its assets. They include receivables turnover, days of sales outstanding, inventory turnover, days of inventory on hand, payables turnover, payables payment period, and turnover ratios for total assets, fixed assets, and working capital.

*Liquidity ratios* indicate a firm's ability to meet its short-term obligations. They include the current, quick, and cash ratios; the defensive interval; and the cash conversion cycle.

*Solvency ratios* indicate a firm's ability to meet its long-term obligations. They include the debt-to-equity, debt-to-capital, debt-to-assets, financial leverage, interest coverage, and fixed charge coverage ratios.

*Profitability ratios* indicate how well a firm generates operating income and net income. They include net, gross, and operating profit margins; pretax margin; return on assets; operating return on assets; return on total capital; return on total equity; and return on common equity.

#### LOS 37.c

An analyst should use an appropriate combination of different ratios to evaluate a company over time and relative to comparable companies. The interpretation of an increase in ROE, for example, may be quite different for a firm that has significantly increased its financial leverage compared to one that has maintained or decreased its financial leverage.

#### LOS 37.d

2-stage decomposition of ROE:

$$\text{ROE} = \left( \frac{\text{net income}}{\text{average total assets}} \right) \left( \frac{\text{average total assets}}{\text{average stockholders' equity}} \right)$$

$$\text{ROE} = \text{ROA} \times \text{leverage}$$

Original DuPont equation (3-stage decomposition):

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

$$\text{ROE} = \text{net profit margin} \times \text{asset turnover} \times \text{leverage}$$

Extended DuPont equation (5-stage decomposition):

$$ROE = \left( \frac{\text{net income}}{\text{EBT}} \right) \left( \frac{\text{EBT}}{\text{EBIT}} \right) \left( \frac{\text{EBIT}}{\text{revenue}} \right) \left( \frac{\text{revenue}}{\text{total assets}} \right) \left( \frac{\text{total assets}}{\text{total equity}} \right)$$

$$\begin{aligned} ROE = & \text{ tax burden} \times \text{interest burden} \times \text{EBIT margin} \times \text{asset turnover} \\ & \times \text{leverage} \end{aligned}$$

### LOS 37.e

The skill of an analyst involves identifying ratios that relate to the industry being analyzed and the performance, position, and flexibility of the firm, both currently and in the future.

Financial institutions have to comply with capital adequacy directives designed to prevent insolvency and contagion.

### LOS 37.f

Ratio analysis, in conjunction with other techniques, can be used to construct pro forma financial statements based on a forecast of sales growth and assumptions about the relation of changes in key income statement and balance sheet items to growth of sales.

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 37.1, 37.2, 37.3

1. **B** With a vertical common-size income statement, all income statement accounts are divided by sales. (Module 37.1, LOS 37.a)
2. **A** Company and industry data are widely available from numerous private and public sources. The other statements describe limitations of financial ratios. (Module 37.1, LOS 37.a)
3. **B** payables turnover = (purchases / avg. AP) = 100 / 12 = 8.33  
payables payment period = 365 / 8.33 = 43.8 days  
(Module 37.2, LOS 37.b)
4. **B** total asset turnover = (sales / total assets) = 150 / 75 = 2 times  
inventory turnover = (COGS / avg. inventory) = (150 - 45) / 15 = 7 times  
(Module 37.2, LOS 37.b)
5. **C** receivables turnover = (sales / avg. AR) = 100 / 25 = 4  
average collection period = 365 / 4 = 91.25 days  
(Module 37.2, LOS 37.b)
6. **B** Current ratio = current assets / current liabilities. If cash (a current asset) and AP (a current liability) decrease by the same amount and the current ratio is greater than 1, then the numerator decreases less in percentage terms than the denominator, and the current ratio increases. (Module 37.2, LOS 37.b)

7. **A** Quick ratio = (cash + marketable securities + AR) / current liabilities. If cash decreases, the quick ratio will also decrease. The denominator is unchanged. (Module 37.2, LOS 37.b)
8. **C** Current ratio = current assets / current liabilities. If CR is > 1, then if CA and CL both fall, the overall ratio will increase. (Module 37.2, LOS 37.b)
9. **A**  $(365 / 10 + 365 / 5 - 365 / 9) = 69 \text{ days}$   
(Module 37.2, LOS 37.b)
10. **C** Fixed charge coverage is a solvency ratio. Return on total capital is a measure of profitability, and the defensive interval ratio is a liquidity measure. (Module 37.3, LOS 37.b)
11. **B** interest coverage ratio = EBIT / interest =  $(1,000 - 400 - 300) / 100 = 3 \text{ times}$   
(Module 37.3, LOS 37.b)

### Module Quiz 37.4, 37.5

1. **C** This is the correct formula for the three-ratio DuPont model for ROE. (Module 37.4, LOS 37.d)
2. **C**  $(\text{ROA})(\text{interest burden})(\text{tax retention rate})$  is not one of the DuPont models for calculating ROE. (Module 37.4, LOS 37.d)
3. **B** Coefficient of variation is computed by dividing standard deviation by mean; therefore, it can be interpreted as risk per monetary unit for the income statement variable considered. Variation in income statement items such as sales, operating profit, and net income is related to the size of a company. By dividing the standard deviation by the mean value of the variable, size is adjusted for, giving risk per unit of the variable. (Module 37.5, LOS 37.e)
4. **B** An earnings forecast model would typically estimate expenses as a percentage of sales. (Module 37.5, LOS 37.f)

## READING 38

# INTRODUCTION TO FINANCIAL STATEMENT MODELING

## MODULE 38.1: FINANCIAL STATEMENT MODELING

### LOS 38.a: Demonstrate the development of a sales-based pro forma company model.

A sales-based pro forma company model consists of projected future financial statements, based on an analyst's estimate of a company's future revenues. We summarize the steps in creating such a model here. In our Equity Investments reading on Company Analysis: Forecasting, we will describe some of these steps in more detail.

*Step 1:* Estimate revenue growth and future revenue, based on market growth and market share, a trend growth rate, or growth relative to GDP.

*Step 2:* Estimate COGS based on a percentage of sales, or on a more detailed method based on business strategy or competitive environment.

*Step 3:* Estimate SG&A as either fixed, growing with revenue, or using some other estimation technique.

*Step 4:* Estimate financing costs using interest rates, debt levels, and the effects of any large anticipated increases or decreases in capital expenditures or anticipated changes in financial structure.

*Step 5:* Estimate income tax expense and cash taxes using historical effective rates and trends, segment information for different tax jurisdictions, and anticipated growth in high- and low-tax segments, taking into account changes in deferred tax items.

*Step 6:* Model the balance sheet based on items that flow from the income statement (working capital accounts).

*Step 7:* Use depreciation and capital expenditures (for maintenance and for growth) to estimate capital expenditures and net PP&E for the balance sheet.

*Step 8:* Use the completed pro forma income statement and balance sheet to construct a pro forma cash flow statement.



Video covering this content is available online.

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**LOS 38.b: Explain how behavioral factors affect analyst forecasts and recommend remedial actions for analyst biases.**

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Like everyone, those in the financial industry are prone to behavioral biases. For analysts, these biases can result in inaccurate forecasts.

1. **Overconfidence bias.** This is having too much faith in one's own work. Analysts may underestimate their forecasting errors; hence, they have a narrower confidence interval for their forecasts than warranted. Research has shown that analysts who "go against the grain" (i.e., forecasting what others are not) are more likely to suffer from overconfidence bias. This bias may be mitigated by sharing forecasts and soliciting critique. Analysts should evaluate their past forecasts and learn from their own forecasting errors, which should lead to a widening of their confidence intervals. Using scenario analysis to produce a range of forecasts may help to identify any shortcomings.
2. **Illusion of control bias.** This is related to overconfidence, but refers specifically to overestimating what an analyst can control and trying to control things an analyst cannot control. This bias is manifested in two primary ways: seeking "expert" opinions to justify a forecast, and making a model more complex (e.g., by including more independent variables). Overfitted models perform poorly out of sample and can also conceal assumptions that need to be updated based on new information. Illusion of control can be mitigated by focusing only on variables with known explanatory power, and by seeking outside opinions only from those who have a relevant perspective.
3. **Conservatism bias.** This is also called *anchoring*, where the analyst makes only small adjustments to their prior forecasts when new information becomes available. Usually, conservatism results in reluctance to incorporate new negative information; however, it could also lead to lags in incorporating positive news. Mitigating this bias requires periodic evaluation of forecasting errors, and using simpler models that are easier to adjust for new or changed assumptions.
4. **Representativeness bias.** This bias occurs due to a tendency to rely on known classifications. Sometimes, new information may only be superficially similar to a known classification but may be better viewed from a fresh perspective. One common form of representativeness bias is **base-rate neglect**, where an observation's membership (its base rate, or rate of incidence in a larger population) is neglected in favor of situation or member-specific information. Fixating on a firm's company-specific factors is known as the *inside view*, while viewing the company as a member of a particular industry (focusing on the base rate) is sometimes known as the *outside view*. Analysts should consider both inside and outside views to generate forecasts.
5. **Confirmation bias.** Confirmation bias causes an analyst to seek out (or pay attention to) data that affirms their earlier convictions, and to disregard or underestimate information that calls those opinions into question. For example, an analyst who has a positive view of a particular company may choose to discuss the firm with colleagues who share the same point of view. Two ways to reduce confirmation bias are to keep abreast of research from analysts who have an

opposite view, and to seek out the points of view of colleagues who have no emotional investment in the opinion. Analysts should also be aware of their own confirmation bias when they evaluate a company management's representations. Managements tend to portray their companies in a positive way, and analysts who have (or want to have) positive outlooks on companies must be careful not to simply take management's comments at face value.



#### PROFESSOR'S NOTE

The focus here is on how behavioral biases affect analysts. We will revisit these biases in the context of investors' behavior in the Portfolio Management topic area.

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#### LOS 38.c: Explain how the competitive position of a company based on a Porter's five forces analysis affects prices and costs.

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The competitive environment that a firm operates in and how successful it is in that environment are key in determining the firm's future financial results. There are no formulas for, or clear rules about, how a firm's competitive environment affects its future revenue and costs, but a firm's future competitive success is possibly the most important factor in its future revenue and profitability.

**Porter's five forces** are a framework analysts commonly use to evaluate a company's competitive position. We will introduce them here and describe them further in our Equity Investments reading on Industry and Competitive Analysis.

1. Companies have more pricing power when the **threat of substitute products** is low and switching costs are high. They have less pricing power when good substitutes are or may become available, and when it is less costly for customers to switch to those products.
2. Companies have more pricing power when the **intensity of industry rivalry** is low, and less pricing power when competitive intensity is high. Industry rivalry tends to be more intense when an industry has many competitors (is less concentrated), when fixed costs and exit barriers are high, when industry growth is slow or negative, and when products are not differentiated significantly.
3. Pressure on a company's costs may be higher, and its prospects for earnings growth lower, when the **bargaining power of suppliers** is high. If suppliers are few, they may be able to extract a larger portion of any value added.
4. Companies have less pricing power when the **bargaining power of customers** is higher, especially if a small number of customers are responsible for a large proportion of a firm's sales, or if switching costs are low.
5. Companies have more pricing power and better prospects for earnings growth when the **threat of new entrants** is low. Significant barriers to entry into an industry make it possible for existing companies to sustain economic profits over time.

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**LOS 38.d: Explain how to forecast industry and company sales and costs when they are subject to price inflation or deflation.**

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Input costs can be significant in many industries. The cost of jet fuel in the airline industry, the cost of grains to cereal and baking companies, and the cost of coffee beans to coffee shops are all variable. Changes in these costs can significantly affect earnings.

Companies with commodity-type inputs can hedge their exposure to changes in input prices through derivatives, or more simply through fixed-price contracts for future delivery. Such hedging will reduce the effect of short-term changes in input prices and increase the time until longer-term price changes affect costs and earnings. Companies that are vertically integrated (in effect, their own suppliers) are relatively less exposed to input cost risk.

For a company that neither hedges input price exposure nor is vertically integrated, the issue for an analyst is to determine how rapidly, and to what extent, an increase in costs can be passed on to customers, as well as the expected effect of price increases on sales volume and sales revenue.

An analyst should monitor a company's production costs by product category and geographic location, with a focus on the significant factors that affect input prices, such as weather, government regulation and taxation, tariffs, and the characteristics of input markets. It may be that a firm can reduce the impact of an increase in an input price by switching to a substitute input; for example, rising oil prices may lead power generation firms to switch from oil to natural gas.

When estimating the effects of an increase in input prices, an analyst must make assumptions about the company's pricing strategy and the effects of price increases on unit sales. When increases in input costs are thought to be temporary, a company may cut other costs (e.g., advertising expenses) to preserve operating margins. This strategy is, however, not appropriate for long-term increases in input costs.

The effects of raising a product's price depend on its elasticity of demand. For most firms, product demand is relatively elastic. With elastic demand, the percentage reduction in unit sales is greater than the percentage increase in price, and a price increase will decrease total sales revenue.

Elasticity of demand is most affected by the availability of substitute products. In a competitive industry, the pricing decisions of other firms in the industry can affect the market shares of its competitors. A company that is the first to increase prices in response to increased costs will experience a greater decrease in unit sales than a company that increases prices after other firms have already done so. A firm may decide to delay increasing prices to gain market share when other firms increase prices in response to increased costs. Firms that are too quick to increase prices will experience declining sales volumes, while firms that are slow to increase prices will experience declining gross margins.

If the money amount of the increase in cost per unit is added to product price and unit sales do not decrease (this is unlikely), the amount of operating profit is unchanged, but gross margins, operating margins, and net margins will decrease.

## **EXAMPLE: Effect of price inflation on gross profits, gross margins, and operating margins**

Alfredo, Inc., sells a specialized network component. The firm's income statement for the past year follows.

### **Alfredo, Inc., Income Statement for the Year Ended 20X1**

|                         |               |                        |
|-------------------------|---------------|------------------------|
| Revenues                | 1,000 @ \$100 | \$100,000              |
| COGS                    | 1,000 @ \$40  | <u>\$40,000</u>        |
| Gross profit            |               | \$60,000               |
| SG&A                    |               | <u>\$30,000</u>        |
| <b>Operating profit</b> |               | <b><u>\$30,000</u></b> |

For 20X2, the input costs (COGS) will increase by \$5 per unit.

1. Calculate the gross margin and operating margin for Alfredo, Inc., for 20X1.
2. Calculate the 20X2 gross margin and operating margin assuming the following:
  - a. The entire increase in input cost is passed on to the customers through an equal increase in selling price. The number of units sold is not affected.
  - b. The selling price is increased by 5% and the number of units sold decreases by 5%.
  - c. The selling price is increased by 5% and the number of units sold decreases by 10%.

#### **Answer:**

1. gross margin = gross profit / sales =  $\$60,000 / \$100,000 = 60\%$   
operating margin = operating profit / sales =  $\$30,000 / \$100,000 = 30\%$

2. a. 20X2, given an increase in unit price by \$5 and no change in units sold:

|                  |                     |                 |
|------------------|---------------------|-----------------|
| Revenues         | 1,000 units @ \$105 | \$105,000       |
| COGS             | 1,000 units @ \$45  | <u>\$45,000</u> |
| Gross profit     |                     | \$60,000        |
| SG&A             |                     | <u>\$30,000</u> |
| Operating profit |                     | <u>\$30,000</u> |
| Gross margin     |                     | 57%             |
| Operating margin |                     | 29%             |

$$\text{gross margin} = \text{gross profit} / \text{sales} = \$60,000 / \$105,000 = 57\%$$

$$\text{operating margin} = \text{operating profit} / \text{sales} = \$30,000 / \$105,000 = 29\%$$

2. b. 20X2, given an increase in unit price by \$5 and a decrease of 50 in units sold:

|                  |                   |                 |
|------------------|-------------------|-----------------|
| Revenues         | 950 units @ \$105 | \$99,750        |
| COGS             | 950 units @ \$45  | <u>\$42,750</u> |
| Gross profit     |                   | \$57,000        |
| SG&A             |                   | <u>\$30,000</u> |
| Operating profit |                   | <u>\$27,000</u> |
| Gross margin     |                   | \$57%           |
| Operating margin |                   | 27%             |

gross margin = gross profit / sales =  $\$57,000 / \$99,750 = 57\%$   
 operating margin = operating profit / sales =  $\$27,000 / \$99,750 = 27\%$

c. 20X2, given an increase in unit price by \$5 and a decrease of 100 in units sold:

|                  |                   |                 |
|------------------|-------------------|-----------------|
| Revenues         | 900 units @ \$105 | \$94,500        |
| COGS             | 900 units @ \$45  | <u>\$40,500</u> |
| Gross profit     |                   | \$54,000        |
| SG&A             |                   | <u>\$30,000</u> |
| Operating profit |                   | <u>\$24,000</u> |
| Gross margin     |                   | \$57%           |
| Operating margin |                   | 25%             |

gross margin = gross profit / sales =  $\$54,000 / \$94,500 = 57\%$   
 operating margin = operating profit / sales =  $\$24,000 / \$94,500 = 25\%$

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### LOS 38.e: Explain considerations in the choice of an explicit forecast horizon and an analyst's choices in developing projections beyond the short-term forecast horizon.

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For a buy-side analyst, the appropriate forecast horizon may simply be the expected holding period for a stock. For example, a portfolio with a 25% annual turnover has an average holding period of four years, so four years may be the most appropriate forecast horizon.

Highly cyclical companies present difficulties when choosing a forecast horizon. The horizon should be long enough that the effects of the current phase of the economic cycle are not driving above-trend or below-trend earnings effects. The forecast horizon should be long enough to include the middle of a business cycle so the analyst's forecast includes a midcycle level of sales and profits. **Normalized earnings** are expected midcycle earnings or, alternatively, expected earnings when the current (temporary) effects of events or cyclicalities are no longer affecting earnings.

Events such as acquisitions, mergers, or restructurings should be considered temporary. The forecast horizon should be long enough that the perceived benefits of such events can be realized (or not).

It may also be the case that the forecast horizon is dictated by an analyst's manager.

For earnings projections beyond the short term, one method of forecasting future financial results is to assume that a trend growth rate of revenue over the previous cycle will continue. An analyst can estimate pro forma financial results based on the projection of each future period's revenue.

An analyst will typically value a stock using earnings or some measure of cash flow over a forecast period, along with the stock's terminal value at the end of the forecast horizon. This terminal value is usually estimated using either a relative valuation (i.e., price multiple) approach or a discounted cash flow approach.



### PROFESSOR'S NOTE

We will describe these approaches to estimating stock values in our Equity Investments reading on *Equity Valuation: Concepts and Basic Tools*.

When using a multiples approach, an analyst must ensure that the multiple used is consistent with the estimate of the company's growth rate and required rate of return. Using the average P/E ratio for the company over the last 10 years, for example, presupposes that the growth in earnings and required rate of return of the stock will be, on average, the same in the future as it was over the previous 10 years.

When using a discounted cash flow approach to estimate the terminal value, two key inputs are a cash flow or earnings measure and an expected future growth rate. The expected earnings or cash flow should be normalized to a midcycle value that is not affected by temporary events. Because the terminal value is calculated as the present value of a perpetuity, small changes in the estimated (perpetual) growth rate of future earnings or cash flows can have large effects on estimated terminal values—and, hence, the current stock value.

Assuming that growth in future profitability will be the same as average profitability growth in the past may not be justified. A difficult part of an analyst's job is recognizing **inflection points**, those instances when the future will not be like the past. Examples of inflection points include changes in the economic environment or business cycle stage, government regulations, or technology.



### MODULE QUIZ 38.1

1. An analyst continues to add independent variables to a forecasting model, even when doing so does not improve its accuracy significantly. The analyst *most likely* exhibits:
  - A. confirmation bias.
  - B. illusion of control bias.
  - C. representativeness bias.
2. Which of Porter's five forces should an analyst focus on when evaluating risks to a company's input costs?
  - A. Threat of new entrants.
  - B. Intensity of industry rivalry.
  - C. Bargaining power of suppliers.
3. When analyzing a cyclical company, the forecast horizon should include:
  - A. a full business cycle.
  - B. the midpoint of a business cycle.

C. the next change in phase of a business cycle.

## KEY CONCEPTS

### LOS 38.a

Developing sales-based pro forma financial statements includes the following steps:

*Step 1:* Estimate revenue growth and future expected revenue.

*Step 2:* Estimate COGS.

*Step 3:* Estimate SG&A.

*Step 4:* Estimate financing costs.

*Step 5:* Estimate income tax expense and cash taxes, taking into account changes in deferred tax items.

*Step 6:* Model the balance sheet based on items that flow from the income statement and estimates for important working capital accounts.

*Step 7:* Use historical depreciation and capital expenditures to estimate future capital expenditures and net PP&E for the balance sheet.

*Step 8:* Use the completed pro forma income statement and balance sheet to construct a pro forma cash flow statement.

### LOS 38.b

Behavioral factors may affect analyst's forecasts:

1. Overconfidence bias
2. Illusion of control bias
3. Conservatism bias or anchoring
4. Representativeness bias
5. Confirmation bias

### LOS 38.c

Expectations of a firm's future competitive success are important factors in forecasting future revenue and financial statements. An analyst can evaluate the competitive position of a company based on Porter's five forces:

1. Companies have less (more) pricing power when the threat of substitute products is high (low) and switching costs are low (high).
2. Companies have less (more) pricing power when the intensity of industry rivalry is high (low).
3. Pressure on input costs is higher when the bargaining power of suppliers is high.
4. Companies have less pricing power when the bargaining power of customers is high.
5. Companies have more pricing power when the threat of new entrants is low.

#### **LOS 38.d**

Increases in input costs will increase COGS unless the company has hedged the risk of input price increases with derivatives or contracts for future delivery. Vertically integrated companies are likely to be less affected by increasing input costs. The effect on sales of increasing product prices to reflect higher COGS will depend on the elasticity of demand for the products and on the timing and amount of competitors' price increases.

#### **LOS 38.e**

For a buy-side analyst, the appropriate forecast horizon to use may be the expected holding period for a stock.

For highly cyclical companies, the forecast horizon should include the middle of a cycle so that the analyst can forecast normalized earnings.

Events such as acquisitions, mergers, or restructurings, should be considered temporary. The forecast horizon should be long enough that the perceived benefits of such events can be realized.

Earnings projections over a forecast period beyond the short term are often based on the historical average growth rate of revenue over the previous economic cycle.

An analyst will typically estimate a terminal value for a stock at the end of the forecast horizon, using either a price multiple or a discounted cash flow approach. Small changes in the estimated growth rate of future profits or cash flows can have large effects on the estimated stock value.

### **ANSWER KEY FOR MODULE QUIZ**

#### **Module Quiz 38.1**

1. **B** Making a forecasting model overly complex, even when doing so brings no significant improvement, most likely reflects illusion of control bias. (LOS 38.b)
2. **C** Of Porter's five forces, bargaining power of suppliers has the most direct influence on a company's input costs. The other four forces more directly affect a company's pricing power. (LOS 38.c)
3. **B** The forecast horizon for a cyclical company should include the midpoint of a business cycle, at which the company is expected to produce normalized earnings. (LOS 38.e)

## TOPIC QUIZ: FINANCIAL STATEMENT ANALYSIS

You have now finished the Financial Statement Analysis topic section. Please log into your Schweser online dashboard and take the Topic Quiz on this section. The Topic Quiz provides immediate feedback on how effective your study has been for this material. Questions are more exam-like than typical Module Quiz or QBank questions; a score of less than 70% indicates that your study likely needs improvement. These tests are best taken timed; allow 1.5 minutes per question.

唯一微信: xuebjun888s

## READING 39

# MARKET ORGANIZATION AND STRUCTURE

## MODULE 39.1: MARKETS, ASSETS, AND INTERMEDIARIES



Video covering this content is available online.

### LOS 39.a: Explain the main functions of the financial system.

The three main functions of the financial system are to:

1. Allow entities to save and borrow money, raise equity capital, manage risks, trade assets currently or in the future, and trade based on their estimates of asset values.
2. Determine the returns (i.e., interest rates) that equate the total supply of savings with the total demand for borrowing.
3. Allocate capital to its most efficient uses.

The financial system allows the transfer of assets and risks from one entity to another as well as across time. Entities who utilize the financial system include individuals, firms, governments, charities, and others.

### Achievement of Purposes in the Financial System

The financial system allows entities to save, borrow, issue equity capital, manage risks, exchange assets, and to utilize information. The financial system is best at fulfilling these roles when the markets are liquid, transactions costs are low, information is readily available, and when regulation ensures the execution of contracts.

*Savings.* Individuals will save (e.g., for retirement) and expect a return that compensates them for risk and the use of their money. Firms save a portion of their sales to fund future expenditures. Vehicles used for saving include stocks, bonds, certificates of deposit, real assets, and other assets.

*Borrowing.* Individuals may borrow in order to buy a house, fund a college education, or for other purposes. A firm may borrow in order to finance capital expenditures and for other activities. Governments may issue debt to fund their expenditures. Lenders can require collateral to protect them in the event of borrower defaults, take an equity position, or investigate the credit risk of the borrower.

*Issuing equity.* Another method of raising capital is to issue equity, where the capital providers will share in any future profits. Investment banks help with issuance, analysts value the equity, and regulators and accountants encourage the dissemination of information.

*Risk management.* Entities face risks from changing interest rates, currency values, commodities values, and defaults on debt, among other things. For example, a firm that owes a foreign currency in 90 days can lock in the price of this foreign currency in domestic currency units by entering into a forward contract. Future delivery of the foreign currency is guaranteed at a domestic-currency price set at inception of the contract. In this transaction, the firm would be referred to as a *hedger*. This hedging allows the firm to enter a market that it would otherwise be reluctant to enter by reducing the risk of the transaction. Hedging instruments are available from exchanges, investment banks, insurance firms, and other institutions.

*Exchanging assets.* The financial system also allows entities to exchange assets. For example, Proctor and Gamble may sell soap in Europe but have costs denominated in U.S. dollars. Proctor and Gamble can exchange their euros from soap sales for dollars in the currency markets.

*Utilizing information.* Investors with information expect to earn a return on that information in addition to their usual return. Investors who can identify assets that are currently undervalued or overvalued in the market can earn extra returns from investing based on their information (when their analysis is correct).

## Return Determination

The financial system also provides a mechanism to determine the rate of return that equates the amount of borrowing with the amount of lending (saving) in an economy. Low rates of return increase borrowing but reduce saving (increase current consumption). High rates of return increase saving but reduce borrowing. The **equilibrium interest rate** is the rate at which the amount individuals, businesses, and governments desire to borrow is equal to the amount that individuals, businesses, and governments desire to lend. Equilibrium rates for different types of borrowing and lending will differ due to differences in risk, liquidity, and maturity.

## Allocation of Capital

With limited availability of capital, one of the most important functions of a financial system is to allocate capital to its most efficient uses. Investors weigh the expected risks and returns of different investments to determine their most preferred investments. As long as investors are well informed regarding risk and return and markets function well, this results in an allocation to capital to its most valuable uses.

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### LOS 39.b: Describe classifications of assets and markets.

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**Financial assets** include securities (stocks and bonds), derivative contracts, and currencies. **Real assets** include real estate, equipment, commodities, and other

physical assets.

Financial securities can be classified as debt or equity. **Debt securities** are promises to repay borrowed funds. **Equity securities** represent ownership positions.

**Public (publicly traded) securities** are traded on exchanges or through securities dealers and are subject to regulatory oversight. Securities that are not traded in public markets are referred to as **private securities**. Private securities are often illiquid and not subject to regulation.

**Derivative contracts** have values that depend on (are derived from) the values of other assets. **Financial derivative contracts** are based on equities, equity indexes, debt, debt indexes, or other financial contracts. **Physical derivative contracts** derive their values from the values of physical assets such as gold, oil, and wheat.

Markets for immediate delivery are referred to as **spot markets**. Contracts for the future delivery of physical and financial assets include forwards, futures, and options. Options provide the buyer the right, but not the obligation, to purchase (or sell) assets over some period or at some future date at predetermined prices.

The **primary market** is the market for newly issued securities. Subsequent sales of securities are said to occur in the **secondary market**.

**Money markets** refer to markets for debt securities with maturities of one year or less. **Capital markets** refer to markets for longer-term debt securities and equity securities that have no specific maturity date.

**Traditional investment markets** refer to those for debt and equity. **Alternative markets** refer to those for hedge funds, commodities, real estate, collectibles, gemstones, leases, and equipment. Alternative assets are often more difficult to value, illiquid, require investor due diligence, and therefore often sell at a discount.

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**LOS 39.c: Describe the major types of securities, currencies, contracts, commodities, and real assets that trade in organized markets, including their distinguishing characteristics and major subtypes.**

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Assets can be classified as securities, currencies, contracts, commodities, and real assets. Their characteristics and subtypes are as follows.

**Securities** 唯一微信：xuebjun88s

Securities can be classified as fixed-income or equity securities, and individual securities can be combined in pooled investment vehicles. Corporations and governments are the most common issuers of individual securities. The initial sale of a security is called an **issue** when the security is sold to the public.

**Fixed-income securities** typically refer to debt securities that are promises to repay borrowed money in the future. Short-term fixed-income securities generally have a maturity of less than one or two years; long-term term maturities are longer than five to ten years, and intermediate term maturities fall in the middle of the maturity range.

Although the terms are used loosely, *bonds* are generally long term, whereas *notes* are intermediate term. *Commercial paper* refers to short-term debt issued by firms. Governments issue *bills* and banks issue *certificates of deposit*. In *repurchase agreements*, the borrower sells a high-quality asset and has both the right and obligation to repurchase it (at a higher price) in the future. Repurchase agreements can be for terms as short as one day.

*Convertible debt* is debt that an investor can exchange for a specified number of equity shares of the issuing firm.

**Equity securities** represent ownership in a firm and include common stock, preferred stock, and warrants.

- **Common stock** is a residual claim on a firm's assets. Common stock dividends are paid only after interest is paid to debtholders and dividends are paid to preferred stockholders. Furthermore, in the event of firm liquidation, debtholders and preferred stockholders have priority over common stockholders and are usually paid in full before common stockholders receive any payment.
- **Preferred stock** is an equity security with scheduled dividends that typically do not change over the security's life and must be paid before any dividends on common stock may be paid.
- **Warrants** are similar to options in that they give the holder the right to buy a firm's equity shares (usually common stock) at a fixed exercise price prior to the warrant's expiration.

**Pooled investment vehicles** include mutual funds, depositories, and hedge funds. The term refers to structures that combine the funds of many investors in a portfolio of investments. The investor's ownership interests are referred to as *shares, units, depository receipts, or limited partnership interests*.

- **Mutual funds** are pooled investment vehicles in which investors can purchase shares, either from the fund itself (open-end funds) or in the secondary market (closed-end funds).
- **Exchange-traded funds (ETFs) and exchange-traded notes (ETNs)** trade like closed-end funds but have special provisions allowing conversion into individual portfolio securities, or exchange of portfolio shares for ETF shares, that keep their market prices close to the value of their proportional interest in the overall portfolio. These funds are sometimes referred to as *depositories*, with their shares referred to as *depository receipts*.
- **Asset-backed securities** represent a claim to a portion of a pool of financial assets such as mortgages, car loans, or credit card debt. The return from the assets is passed through to investors, with different classes of claims (referred to as *tranches*) having different levels of risk.
- **Hedge funds** are organized as limited partnerships, with the investors as the limited partners and the fund manager as the general partner. Hedge funds utilize various strategies and purchase is usually restricted to investors of substantial wealth and investment knowledge. Hedge funds often use leverage. Hedge fund managers are

compensated based on the amount of assets under management as well as on their investment results.



#### PROFESSOR'S NOTE

Asset-backed securities are described in more detail in Fixed Income. Mutual funds and ETFs are discussed in Portfolio Management. Hedge funds are discussed in Alternative Investments.

## Currencies

**Currencies** are issued by a government's central bank. Some are referred to as **reserve currencies**, which are those held by governments and central banks worldwide. These include the dollar and euro and, secondarily, the British pound, Japanese yen, and Swiss franc. In spot currency markets, currencies are traded for immediate delivery.

## Contracts

**Contracts** are agreements between two parties that require some action in the future, such as exchanging an asset for cash. Financial contracts are often based on securities, currencies, commodities, or security indexes (portfolios). They include futures, forwards, options, swaps, and insurance contracts.

A **forward contract** is an agreement to buy or sell an asset in the future at a price specified in the contract at its inception. An agreement to purchase 100 ounces of gold 90 days from now for \$2,000 per ounce is a forward contract. Forward contracts are not traded on exchanges or in dealer markets.

**Futures contracts** are similar to forward contracts except that they are standardized as to amount, asset characteristics, and delivery time and are traded on an exchange (in a secondary market) so that they are liquid investments.

In a **swap contract**, two parties make payments that are equivalent to one asset being traded (swapped) for another. In a simple *interest rate swap*, floating rate interest payments are exchanged for fixed-rate payments over multiple settlement dates. A *currency swap* involves a loan in one currency for the loan of another currency for a period of time. An *equity swap* involves the exchange of the return on an equity index or portfolio for the interest payment on a debt instrument.

An **option contract** gives its owner the right to buy or sell an asset at a specific exercise price at some specified time in the future. A **call option** gives the option buyer the right (but not the obligation) to buy an asset. A **put option** gives the option buyer the right (but not the obligation) to sell an asset.

Sellers, or writers, of call (put) options receive a payment, referred to as the *option premium*, when they sell the options but incur the obligation to sell (buy) the asset at the specified price if the option owner chooses to exercise it.

Options on currencies, stocks, stock indexes, futures, swaps, and precious metals are traded on exchanges. Customized options contracts are also sold by dealers in the over-the-counter market.

An **insurance contract** pays a cash amount if a future event occurs. They are used to hedge against unfavorable, unexpected events. Examples include life, liability, and automobile insurance contracts. Insurance contracts can sometimes be traded to other parties and often have tax-advantaged payouts.

**Credit default swaps** are a form of insurance that makes a payment if an issuer defaults on its bonds. They can be used by bond investors to hedge default risk. They can also be used by parties that will experience losses if an issuer experiences financial distress and by others who are speculating that the issuer will experience more or less financial trouble than is currently expected.

## Commodities

**Commodities** trade in spot, forward, and futures markets. They include precious metals, industrial metals, agricultural products, energy products, and credits for carbon reduction.

Futures and forwards allow both hedgers and speculators to participate in commodity markets without having to deliver or store the physical commodities.

## Real Assets

Examples of **real assets** are real estate, equipment, and machinery. Although they have been traditionally held by firms for their use in production, real assets are increasingly held by institutional investors both directly and indirectly.

Buying real assets directly often provides income, tax advantages, and diversification benefits. However, they often entail substantial management costs. Furthermore, because of their heterogeneity, they usually require the investor to do substantial due diligence before investing. They are illiquid because their specialization may result in a limited pool of investors for a particular real asset.

Rather than buying real assets directly, an investor may choose to buy them indirectly through an investment such as a *real estate investment trust (REIT)* or *master limited partnership (MLP)*. The investor owns an interest in these vehicles, which hold the assets directly. Indirect ownership interests are typically more liquid than ownership of the assets themselves. Another indirect ownership method is to buy the stock of firms that have large ownership of real assets.

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### LOS 39.d: Describe types of financial intermediaries and services that they provide.

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**Financial intermediaries** stand between buyers and sellers, facilitating the exchange of assets, capital, and risk. Their services allow for greater efficiency and are vital to a well-functioning economy. Financial intermediaries include brokers and exchanges, dealers, securitizers, depository institutions, insurance companies, arbitrageurs, and clearinghouses.

## Brokers, Dealers, and Exchanges

**Brokers** help their clients buy and sell securities by finding counterparties to trades in a cost efficient manner. They may work for large brokerage firms, for banks, or at exchanges.

**Block brokers** help with the placement of large trades. Typically, large trades are difficult to place without moving the market. For example, a large sell order might cause a security's price to decrease before the order can be fully executed. Block brokers help conceal their clients' intentions so that the market does not move against them.

**Investment banks** help corporations sell common stock, preferred stock, and debt securities to investors. They also provide advice to firms, notably about mergers, acquisitions, and raising capital.

**Exchanges** provide a venue where traders can meet. Exchanges sometimes act as brokers by providing electronic order matching. Exchanges regulate their members and require firms that list on the exchange to provide timely financial disclosures and to promote shareholder democratization. Exchanges acquire their regulatory power through member agreement or from their governments.

**Alternative trading systems (ATS)**, which serve the same trading function as exchanges but have no regulatory function, are also known as **electronic communication networks (ECNs)** or **multilateral trading facilities (MTFs)**. ATS that do not reveal current client orders are known as *dark pools*.

**Dealers** facilitate trading by buying for or selling from their own inventory. Dealers provide liquidity in the market and profit primarily from the spread (difference) between the price at which they will buy (bid price) and the price at which they will sell (ask price) the security or other asset.

Some dealers also act as brokers. **Broker-dealers** have an inherent conflict of interest. As brokers, they should seek the best prices for their clients, but as dealers, their goal is to profit through prices or spreads. As a result, traders typically place limits on how their orders are filled when they transact with broker-dealers.

Dealers that trade with central banks when the banks buy or sell government securities in order to affect the money supply are referred to as **primary dealers**.

## Securitizers

**Securitizers** pool large amounts of securities or other assets and then sell interests in the pool to other investors. The returns from the pool, net of the securitizer's fees, are passed through to the investors. By securitizing the assets, the securitizer creates a diversified pool of assets with more predictable cash flows than the individual assets in the pool. This creates liquidity in the assets because the ownership interests are more easily valued and traded. There are also economies of scale in the management costs of large pools of assets and potential benefits from the manager's selection of assets.

Assets that are often securitized include mortgages, car loans, credit card receivables, bank loans, and equipment leases. The primary benefit of securitization is to decrease the funding costs for the assets in the pool. A firm may set up a *special purpose vehicle (SPV)* or *special purpose entity (SPE)* to buy firm assets, which removes them from the firm's balance sheet and may increase their value by removing the risk that financial trouble at the firm will give other investors a claim to the assets' cash flows.

The cash flows from securitized assets can be segregated by risk. The different risk categories are called *tranches*. The senior tranches provide the most certain cash flows, while the junior tranches have greater risk.

## Depository Institutions

Examples of **depository institutions** include banks, credit unions, and savings and loans. They pay interest on customer deposits and provide transaction services such as checking accounts. These financial intermediaries then make loans with the funds, which offer diversification benefits. The intermediaries have expertise in evaluating credit quality and managing the risk of a portfolio of loans of various types.

Other intermediaries, such as payday lenders and factoring companies, lend money to firms and individuals on the basis of their wages, accounts receivable, and other future cash flows. These intermediaries often finance the loans by issuing commercial paper or other debt securities.

Securities brokers provide loans to investors who purchase securities on margin. When this margin lending is to hedge funds and other institutions, the brokers are referred to as *prime brokers*.

The equity owners (stockholders) of banks, brokers, and other intermediaries absorb any loan losses before depositors and other lenders. The more equity capital an intermediary has, the less risk for depositors. Poorly capitalized intermediaries (those with less equity) have less incentive to reduce the risk of their loan portfolios because they have less capital at risk.

## Insurance Companies

**Insurance companies** are intermediaries, in that they collect insurance premiums in return for providing risk reduction to the insured. The insurance firm can do this efficiently because it provides protection to a diversified pool of policyholders, whose risks of loss are typically uncorrelated. This provides more predictable losses and cash flows compared to a single insurance contract, in the same way that a bank's diversified portfolio of loans diversifies the risk of loan defaults.

Insurance firms also provide a benefit to investors by managing the risks inherent in insurance: moral hazard, adverse selection, and fraud. **Moral hazard** occurs because the insured may take more risks once he is protected against losses. **Adverse selection** occurs when those most likely to experience losses are the predominant buyers of insurance. In **fraud**, the insured purposely causes damage or claims fictitious losses so he can collect on his insurance policy.

## Arbitrageurs

In its pure (riskless) form, **arbitrage** refers to buying an asset in one market and reselling it in another at a higher price. By doing so, arbitrageurs act as intermediaries, providing liquidity to participants in the market where the asset is purchased and transferring the asset to the market where it is sold.

In markets with good information, pure arbitrage is rare because traders will favor the markets with the best prices. More commonly, arbitrageurs try to exploit pricing differences for similar instruments. For example, a dealer who sells a call option will often also buy the stock because the call and stock price are highly correlated.

Likewise, arbitrageurs will attempt to exploit discrepancies in the pricing of the call and stock. Many (risk) arbitrageurs use complex models for valuation of related securities and for risk control. Creating similar positions using different assets is referred to as *replication*. This is also a form of intermediation because similar risks are traded in different forms and in different markets.

## Clearinghouses and Custodians

**Clearinghouses** act as intermediaries between buyers and sellers in financial markets and provide:

- Escrow services (transferring cash and assets to the respective parties).
- Guarantees of contract completion.
- Assurance that margin traders have adequate capital.
- Limits on the aggregate net order quantity (buy orders minus sell orders) of members.

Through these activities, clearinghouses limit **counterparty risk**, the risk that the other party to a transaction will not fulfill its obligation. In some markets, the clearinghouse ensures only the trades of its member brokers and dealers, who, in turn, ensure the trades of their retail customers.

**Custodians** also improve market integrity by holding client securities and preventing their loss due to fraud or other events that affect the broker or investment manager.

## MODULE 39.2: POSITIONS AND LEVERAGE



Video covering  
this content is  
available online.

### LOS 39.e: Compare positions an investor can take in an asset.

An investor who owns an asset, or has the right or obligation under a contract to purchase an asset, is said to have a **long position**. A **short position** can result from borrowing an asset and selling it, with the obligation to replace the asset in the future (a short sale). The party to a contract who must sell or deliver an asset in the future is also said to have a short position. In general, investors who are long benefit from an increase in the price of an asset and those who are short benefit when the asset price declines.

**Hedgers** use short positions in one asset to hedge an existing risk from a long position in another asset that has returns that are strongly correlated with the returns of the asset shorted. For example, wheat farmers may take a short position in (i.e., sell) wheat futures contracts. If wheat prices fall, the resulting increase in the value of the short futures position offsets, partially or fully, the loss in the value of the farmer's crop.



#### PROFESSOR'S NOTE

As a rule of thumb, hedgers must “do in the futures market what they must do in the future.” Thus, the farmer who must sell wheat in the future can reduce the risk from wheat price fluctuations by selling wheat futures.

The buyer of an option contract is said to be long the option. The seller is short the option and is said to have written the option. Note that an investor who is long (buys) a call option on an asset profits when the value of the underlying asset increases in value, while the party short the option has losses. A long position in a put option on an asset has the right to sell the asset at a specified price and profits when the price of the underlying asset falls, while the party short the option has losses.

In swaps, each party is long one asset and short the other, so the designation of the long and short side is often arbitrary. Usually, however, the side that benefits from an increase in the quoted price or rate is referred to as the long side.

In a currency contract, each party is long one currency and short the other. For example, the buyer of a euro futures contract priced in dollars is long the euro and short the dollar.

## Short Sales and Positions

In a **short sale**, the short seller (1) simultaneously borrows and sells securities through a broker, (2) must return the securities at the request of the lender or when the short sale is closed out, and (3) must keep a portion of the proceeds of the short sale on deposit with the broker. Short sellers hope to profit from a fall in the price of the security or asset sold short, buying at a lower price in the future in order to repay the loan of the asset originally sold at a higher price. The repayment of the borrowed security or other asset is referred to as “covering the short position.”

In a short sale, the short seller must pay all dividends or interest that the lender would have received from the security that has been loaned to the short seller. These payments are called **payments-in-lieu** of dividends or interest. The short seller must also deposit the proceeds of the short sale as collateral to guarantee the eventual repurchase of the security. The broker then earns interest on these funds and may return a portion of this interest to the short seller at a rate referred to as the **short rebate rate**. The short rebate rate is usually only provided to institutional investors and is typically 0.1% less than overnight interest rates. If the security is difficult to borrow, the short rebate rate may be lower or negative. The difference between the interest earned on the proceeds from the short sale and the short rebate paid is the return to the lender of the securities. A short sale may also require the short seller to deposit additional margin in the form of cash or short-term riskless securities.

## Leveraged Positions

The use of borrowed funds to purchase an asset results in a **leveraged position** and the investor is said to be using leverage. Investors who use leverage to buy securities by borrowing from their brokers are said to buy on **margin** and the borrowed funds are referred to as a **margin loan**. The interest rate paid on the funds is the **call money rate**, which is generally higher than the government bill rate. The call money rate is lower for larger investors with better collateral.

At the time of a new margin purchase, investors are required to provide a minimum amount of equity, referred to as the **initial margin requirement**. This requirement may be set by the government, exchange, clearinghouse, or broker. Lower risk in an investor's portfolio will often result in the broker lending more funds.

The use of leverage magnifies both the gains and losses from changes in the value of the underlying asset. The additional risk from the use of borrowed funds is referred to as risk from **financial leverage**.

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**LOS 39.f: Calculate and interpret the leverage ratio, the rate of return on a margin transaction, and the security price at which the investor would receive a margin call.**

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The **leverage ratio** of a margin investment is the value of the asset divided by the value of the equity position. For example, an investor who satisfies an initial margin requirement of 50% equity has a 2-to-1 leverage ratio so that a 10% increase (decrease) in the price of the asset results in a 20% increase (decrease) in the investor's equity amount.

### EXAMPLE: Margin transaction

Given the following information:

|                            |        |
|----------------------------|--------|
| Shares purchased           | 1,000  |
| Purchase price per share   | \$100  |
| Annual dividend per share  | \$2.00 |
| Initial margin requirement | 40%    |
| Call money rate            | 4%     |
| Commission per share       | \$0.05 |
| Stock price after one year | \$110  |

Calculate (1) the leverage ratio and (2) the investor's return on the margin transaction (return on equity) if the stock is sold at the end of one year.

### Answer:

1. The leverage ratio =  $1 / 0.40 = 2.5$ .
2. The total purchase price is  $1,000 \times \$100 = \$100,000$ . The investor must post initial margin of  $40\% \times \$100,000 = \$40,000$ . The remaining  $\$60,000$  is borrowed. The

commission on the purchase is  $1,000 \times \$0.05 = \$50$ . Thus, the total initial equity investment is \$40,050.

At the end of one year, the stock value is  $1,000 \times \$110 = \$110,000$ , for a gain of \$9,950. Dividends received are  $1,000 \times \$2.00 = \$2,000$ . Interest paid is  $\$60,000 \times 4\% = \$2,400$ . The commission on the sale is  $1,000 \times \$0.05 = \$50$ .

The gain on the transaction in one year is  $\$9,950 + \$2,000 - \$2,400 - \$50 = \$9,500$ . The return on the equity investment is  $\$9,500 / \$40,050 = 23.72\%$ . The investor's net return is less than the asset total return (10% price appreciation + 2% dividend = 12%) multiplied by the leverage ratio ( $12\% \times 2.5 = 30\%$ ) because of the loan interest and commissions.

We can also solve for the return on the margin transaction with the cash flow functions on a financial calculator. The initial cash outflow is the \$40,000 initial margin + \$50 purchase commission = \$40,050. The inflow after one year is the \$110,000 stock value + \$2,000 dividends - \$60,000 margin repayment - \$2,400 margin interest - \$50 sale commission = \$49,550. Using the cash flow functions:  $CF_0 = -40,050$ ;  $CF_1 = 49,550$ ; CPT IRR = 23.72%.

To ensure that the loan is covered by the value of the asset, an investor must maintain a minimum equity percentage, called the **maintenance margin requirement**, in the account. This minimum is typically 25% of the current position value, but brokers may require a greater minimum equity percentage for volatile stocks.

If the percentage of equity in a margin account falls below the maintenance margin requirement, the investor will receive a **margin call**, a request to bring the equity percentage in the account back up to the maintenance margin percentage. An investor can satisfy this request by depositing additional funds or depositing other unmargined securities that will bring the equity percentage up to the minimum requirement. If the investor does not meet the margin call, the broker must sell the position.

The stock price which results in a margin call can be calculated by using the following formula:

$$\text{margin call price} = P_0 \left( \frac{1 - \text{initial margin}}{1 - \text{maintenance margin}} \right)$$

where:

$P_0$  = initial purchase price

### EXAMPLE: Margin call price

If an investor purchases a stock for \$40 per share with an initial margin requirement of 50% and the maintenance margin requirement is 25%, at what price will the investor get a margin call?

**Answer:**

$$\frac{\$40(1 - 0.5)}{1 - 0.25} = \$26.67$$

A margin call is triggered at a price below \$26.67.

In a short sale, the investor must deposit initial margin equal to a percentage of the value of the shares sold short to protect the broker in case the share price increases. An increase in the share price can decrease the margin percentage below the maintenance margin percentage and generate a margin call.



### MODULE QUIZ 39.1, 39.2

1. An investor who buys a government bond from a dealer's inventory is said to obtain a:
  - A. real asset in a primary market transaction.
  - B. financial asset in a primary market transaction.
  - C. financial asset in a secondary market transaction.
2. Daniel Ferramosco is concerned that a long-term bond he holds might default. He therefore buys a contract that will compensate him in the case of default. What type of contract does he hold?
  - A. Physical derivative contract.
  - B. Primary derivative contract.
  - C. Financial derivative contract.
3. A financial intermediary buys a stock and then resells it a few days later at a higher price. Which intermediary would this *most likely* describe?
  - A. Broker.
  - B. Dealer.
  - C. Arbitrageur.
4. Which of the following is *most* similar to a short position in the underlying asset?
  - A. Buying a put.
  - B. Writing a put.
  - C. Buying a call.
5. An investor buys 1,000 shares of a stock on margin at a price of \$50 per share. The initial margin requirement is 40% and the margin lending rate is 3%. The investor's broker charges a commission of \$0.01 per share on purchases and sales. The stock pays an annual dividend of \$0.30 per share. One year later, the investor sells the 1,000 shares at a price of \$56 per share. The investor's rate of return is *closest* to:
  - A. 12%.
  - B. 27%.
  - C. 36%.

## MODULE 39.3: ORDER EXECUTION AND VALIDITY



Video covering this content is available online.

**LOS 39.g: Compare execution, validity, and clearing instructions.**

**LOS 39.h: Compare market orders with limit orders.**

Securities dealers provide prices at which they will buy and sell shares. The **bid price** is the price at which a dealer will buy a security. The **ask or offer price** is the price at which a dealer will sell a security. The difference between the bid and ask prices is

referred to as the **bid-ask spread** and is the source of a dealer's compensation. The bid and ask are quoted for specific trade sizes (**bid size** and **ask size**).



#### PROFESSOR'S NOTE

Calculations with bid and ask prices are unlikely to appear on the Level I exam but they do appear at Level II. If you need to work with bid and ask prices, just remember that the price you get will be the one that is *worse for you*.

- **Securities:** If you are buying, you must pay the higher price. If you are selling, you only receive the lower price.
- **Currencies:** The bid or ask price you get is the one that gives you less of the currency you are acquiring. This works regardless of which way the exchange rate is quoted.

The quotation in the market is the highest dealer bid and lowest dealer ask from among all dealers in a particular security. More liquid securities have market quotations with bid-ask spreads that are lower (as a percentage of share price) and therefore have lower transactions costs for investors. Traders who post bids and offers are said to *make a market*, while those who trade with them at posted prices are said to *take the market*.

When investors want to buy or sell, they must enter orders that specify the size of the trade and whether to buy or sell. The order can also include *execution instructions* that specify how to trade, *validity instructions* that specify when the order can be filled, and *clearing instructions* that specify how to settle the trade.

## Execution Instructions

The most common orders, in terms of execution instructions, are market or limit orders. A **market order** instructs the broker to execute the trade immediately at the best possible price. A **limit order** places a minimum execution price on sell orders and a maximum execution price on buy orders. For example, a buy order with a limit of \$6 will be executed immediately as long as the shares can be purchased for \$6 or less.

A market order is often appropriate when the trader wants to execute quickly, as when the trader has information she believes is not yet reflected in market prices. The disadvantage of market orders is that they may execute at unfavorable prices, especially if the security has low trading volume relative to the order size. A market buy order may execute at a high price or a market sell order may execute at a low price. Executing at an unfavorable price represents a concession by the trader for immediate liquidity. Unfortunately, these price concessions are unpredictable.

To avoid price execution uncertainty, a trader can place a limit order instead of the market order. The disadvantage of the limit order is that it might not be filled. For example, if a trader places a limit buy order of \$50 and no one is willing to sell at \$50, the order will not be filled. Furthermore, if the stock price rises over time, the trader misses out on the gains.

A limit buy order above the best ask or a limit sell order below the best bid are said to be *marketable* or *aggressively priced* because at least part of the order is likely to

execute immediately. If the limit price is between the best bid and the best ask, a limit order is said to be *making a new market* or *inside the market*. Limit orders waiting to execute are called **standing limit orders**.

A limit buy order at the best bid or a limit sell order at the best ask are said to *make the market*. Again, the order might not be filled. A buy order with a limit price below the best bid, or a sell order with a limit price above the best ask, is said to be *behind the market*. It will likely not execute until security prices move toward the limit price. A limit buy order with a price considerably lower than the best bid, or a limit sell order with a price significantly higher than the best ask, is said to be *far from the market*.

Other execution instructions concern the volume of the trade. **All-or-nothing orders** execute only if the whole order can be filled. Orders can specify the minimum size of a trade, which is beneficial when trading costs depend on the number of executed trades rather than the size of the order.

Trade visibility can also be specified. **Hidden orders** are those for which only the broker or exchange knows the trade size. These are useful for investors that have a large amount to trade and do not want to reveal their intentions. Traders can also specify **display size**, where some of the trade is visible to the market, but the rest is not. These are also referred to as **iceberg orders** because part of most of the order is hidden from view. They allow the investor to advertise some of the trade, with the rest of the trade potentially executed once the visible part has executed. Sometimes entering trades for part of the position the trader wishes to establish is a way to estimate the liquidity of, or the buying interest in, the security in question.

## Validity Instructions

Validity instructions specify when an order should be executed. Most orders are **day orders**, meaning they expire if unfilled by the end of the trading day. **Good til canceled** orders last until they are filled. **Immediate-or-cancel** orders are canceled unless they can be filled immediately. They are also known as **fill-or-kill** orders. **Good-on-close** orders are only filled at the end of the trading day. If they are market orders, they are referred to as **market-on-close** orders. These are often used by mutual funds because their portfolios are valued using closing prices. There are also **good-on-open** orders.

**Stop orders** are those that are not executed unless the stop price has been met. They are often referred to as **stop loss orders** because they can be used to prevent losses or to protect profits. Suppose an investor purchases a stock for \$50. If the investor wants to sell out of the position if the price falls 10% to \$45, he can enter a stop-sell order at \$45. If the stock trades down to \$45 or lower, this triggers a market order to sell. There is no guarantee that the order will execute at \$45, and a rapidly falling stock could be sold at a price significantly lower than \$45.

A stop-buy order is entered with a stop (trigger) above the current market price. There are two primary reasons a trader would enter a stop-buy order. (1) A trader with a short position could attempt to limit losses from an increasing stock price with a stop-buy order. (2) It is often said, "You don't get paid for being right until the market agrees with you." With this in mind, an investor who believes a stock is undervalued, but does not wish to own it until there are signs that market participants are being convinced of

this undervaluation, may place a stop-buy order at a price some specific percentage above the current price.

Note that stop orders reinforce market momentum. Stop-sell orders execute when market prices are falling, and stop-buy orders execute when the market is rising. Execution prices for stop orders are therefore often unfavorable.

### **EXAMPLE: Using stop orders**

Raymond Flowers believes that the shares of Acme Corp. that he owns are overvalued currently but knows that stocks often continue to increase above their intrinsic values for some time before correcting. What type of order should Flowers place if he wants to sell his shares when the price begins to fall a significant amount?

#### **Answer:**

Flowers should enter a good til canceled stop-sell order at a price some percentage below the current level. If, for example, the shares are trading at 40, he could enter a stop-sell order at 36, 10% below the current level. Investors sometimes move these stops up as a stock continues to increase in price. In response to a price increase to 42, Flowers might move his stop-sell order up to 37.80, 10% below the new price. Note that a limit order to sell with a limit price below the current market price would likely execute immediately.

## **Clearing Instructions**

Clearing instructions tell the trader how to clear and settle a trade. They are usually standing instructions and not attached to an order. Retail trades are typically cleared and settled by the broker, whereas institutional trades may be settled by a custodian or another broker, which might be the trader's prime broker. Using two brokers allows the investor to keep one broker as her prime broker for margin and custodial services while using a variety of other brokers for specialized execution.

One important clearing instruction is whether a sell order is a short sale or long sale. In the former, the broker must confirm that the security can be borrowed and in the latter, that the security can be delivered.

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### **LOS 39.i: Define primary and secondary markets and explain how secondary markets support primary markets.**

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**Primary capital markets** refer to the sale of newly issued securities. New equity issues involve either:

- New shares issued by firms whose shares are already trading in the marketplace. These issues are called **seasoned offerings** or **secondary issues**.
- First-time issues by firms whose shares are not currently publicly traded. These are called **initial public offerings (IPOs)**.

**Secondary financial markets** are where securities trade after their initial issuance. Placing a buy order on the London Stock Exchange is an order in the secondary market and will result in purchase of existing shares from their current owner.

## Primary Market: Public Offerings

Corporate stock or bond issues are almost always sold with the assistance of an investment banking firm. The investment bank finds investors who agree to buy part of the issue. These are not actual orders but are referred to as **indications of interest**. When the number of shares covered by indications of interest are greater (less) than the number of shares to be offered, the offering price may be adjusted upward (downward). This process of gathering indications of interest is referred to as **book building**. In London, the book builder is referred to as the **book runner**. In Europe, an **accelerated book build** occurs when securities must be issued quickly. To build a book, the investment bank disseminates information about the firm's financials and prospects. The issuer must also make disclosures including how the funds will be used.

The most common way an investment bank assists with a security issuance is through an **underwritten offering**. Here, the investment bank agrees to purchase the entire issue at a price that is negotiated between the issuer and bank. If the issue is undersubscribed, the investment bank must buy the unsold portion. In the case of an IPO, the investment bank also agrees to make a market in the stock for a period after the issuance to provide price support for the issue.

An investment bank can also agree to distribute shares of an IPO on a **best efforts** basis, rather than agreeing to purchase the whole issue. If the issue is undersubscribed, the bank is not obligated to buy the unsold portion.

Note that investment banks have a conflict of interest in an underwritten offer. As the issuer's agents, they should set the price high to raise the most funds for the issuer. But, as underwriters, they would prefer that the price be set low enough that the whole issue sells. This also allows them to allocate portions of an undervalued IPO to their clients. This results in IPOs typically being underpriced. Issuers also could have an interest in underpricing the IPO because of the negative publicity when an undersubscribed IPO initially trades at a price below the IPO price investors pay. An IPO that is oversubscribed and has the expectation of trading significantly above its IPO price is referred to as a hot issue.

## Primary Market: Private Placements and Other Transactions

In a **private placement**, securities are sold directly to qualified investors, typically with the assistance of an investment bank. Qualified investors are those with substantial wealth and investment knowledge. Private placements do not require the issuer to disclose as much information as they must when the securities are being sold to the public. The issuance costs are less with a private placement and the offer price is also lower because the securities cannot be resold in public markets, making them less valuable than shares registered for public trading.

In a **shelf registration**, a firm makes its public disclosures as in a regular offering but then issues the registered securities over time when it needs capital and when the markets are favorable.

A **dividend reinvestment plan (DRP or DRIP)** allows existing shareholders to use their dividends to buy new shares from the firm at a slight discount.

In a **rights offering**, existing shareholders are given the right to buy new shares at a discount to the current market price. Shareholders tend to dislike rights offerings because their ownership is diluted unless they exercise their rights and buy the additional shares. However, rights can be traded separately from the shares themselves in some circumstances.

In addition to firms issuing securities, governments issue short-term and long-term debt, either by auction or through investment banks.

## Importance of the Secondary Market

Secondary markets are important because they provide liquidity and price/value information. Liquid markets are those in which a security can be sold quickly without incurring a discount from the current price. The better the secondary market, the easier it is for firms to raise external capital in the primary market, which results in a lower cost of capital for firms with shares that have adequate liquidity.

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### LOS 39.j: Describe how securities, contracts, and currencies are traded in quote-driven, order-driven, and brokered markets.

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The trading of securities in the secondary market has encouraged the development of market structures to facilitate trading. Trading can be examined according to when securities are traded and how they are traded.

Securities markets may be structured as call markets or continuous markets. In **call markets**, the stock is only traded at specific times. Call markets are potentially very liquid when in session because all traders are present, but they are obviously illiquid between sessions. In a call market, all trades, bids, and asks are declared, and then one negotiated price is set that clears the market for the stock. This method is used in smaller markets but is also used to set opening prices and prices after trading halts on major exchanges.

In **continuous markets**, trades occur at any time the market is open. The price is set by either the auction process or by dealer bid-ask quotes.

## Market Structures

There are three main categories of securities markets: *quote-driven markets* where investors trade with dealers, *order-driven markets* where rules are used to match buyers and sellers, and *brokered markets* where investors use brokers to locate a counterparty to a trade.

## **Quote-Driven Markets**

In **quote-driven markets**, traders transact with dealers (market makers) who post bid and ask prices. Dealers maintain an inventory of securities. Quote-driven markets are thus sometimes called **dealer markets**, **price-driven markets**, or **over-the-counter markets**. Most securities other than stocks trade in quote-driven markets. Trading often takes place electronically.

## **Order-Driven Markets**

In **order-driven markets**, orders are executed using trading rules, which are necessary because traders are usually anonymous. Exchanges and automated trading systems are examples of order-driven markets. Two sets of rules are used in these markets: order matching rules and trade pricing rules.

**Order matching rules** establish an *order precedence hierarchy*. **Price priority** is one criteria, where the trades given highest priority are those at the highest bid (buy) and lowest ask (sell). If orders are at the same prices, a **secondary precedence rule** gives priority to non-hidden orders and earliest arriving orders. These rules encourage traders to price their trades aggressively, display their entire orders, and trade earlier, thereby improving liquidity.

After orders are created using order matching rules, **trade pricing rules** are used to determine the price. Under the *uniform pricing rule*, all orders trade at the same price, which is the price that results in the highest volume of trading. The *discriminatory pricing rule* uses the limit price of the order that arrived first as the trade price.

In an electronic crossing network, the typical trader is an institution. Orders are batched together and crossed (matched) at fixed points in time during the day at the average of the bid and ask quotes from the exchange where the stock primarily trades. This pricing rule is referred to as the *derivative pricing rule* because it is derived from the security's main market. The price is not determined by orders in the crossing network.

## **Brokered Markets**

In **brokered markets**, brokers find the counterparty in order to execute a trade. This service is especially valuable when the trader has a security that is unique or illiquid. Examples are large blocks of stock, real estate, and artwork. Dealers typically do not carry an inventory of these assets and there are too few trades for these assets to trade in order-driven markets.

# **Market Information**

A market is said to be **pre-trade transparent** if investors can obtain pre-trade information regarding quotes and orders. A market is **post-trade transparent** if investors can obtain post-trade information regarding completed trade prices and sizes.

Buy-side traders value transparency because it allows them to better understand security values and trading costs. Dealers, on the other hand, prefer opaque markets because this provides them with an informational advantage over traders who trade

less frequently in the security. Transactions costs and bid-ask spreads are larger in opaque markets.

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### **LOS 39.k: Describe characteristics of a well-functioning financial system.**

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A well-functioning financial system allows entities to achieve their purposes. More specifically, **complete markets** fulfill the following:

- Investors can save for the future at fair rates of return.
- Creditworthy borrowers can obtain funds.
- Hedgers can manage their risks.
- Traders can obtain the currencies, commodities, and other assets they need.

If a market can perform these functions at low trading costs (including commissions, bid-ask spreads, and price impacts), it is said to be **operationally efficient**. If security prices reflect all the information associated with fundamental value in a timely fashion, then the financial system is **informationally efficient**. A well-functioning financial system has complete markets that are operationally and informationally efficient, with prices that reflect fundamental values.

A well-functioning financial system has financial intermediaries that:

- Organize trading venues, including exchanges, brokerages, and alternative trading systems.
- Supply liquidity.
- Securitize assets so that borrowers can obtain funds inexpensively.
- Manage banks that use depositor capital to fund borrowers.
- Manage insurance firms that pool unrelated risks.
- Manage investment advisory services that assist investors with asset management inexpensively.
- Provide clearinghouses that settle trades.
- Manage depositories that provide for asset safety.

The benefits of a well-functioning financial system are tremendous. Savers can fund entrepreneurs who need capital to fund new companies. Company risks can be shared so that risky companies can be funded. These benefits are enhanced because the transactions can occur among strangers, widening the opportunities for capital formation and risk sharing in the economy.

Furthermore, in informationally efficiently markets, capital is allocated to its most productive use. That is, they are **allocationally efficient**. Informational efficiency is brought about by traders who bid prices up and down in response to new information that changes estimates of securities' fundamental values. If markets are operationally efficient, security prices will be more informationally efficient because low trading costs encourage trading based on new information. The existence of accounting standards and financial reporting requirements also reduces the costs of obtaining information and increases security values.

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## LOS 39.l: Describe objectives of market regulation.

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Without market regulation, many problems could persist in financial markets:

- *Fraud and theft*: In complex financial markets, the potential for theft and fraud increases because investment managers and others can take advantage of unsophisticated investors. Furthermore, if returns are often random, it is difficult for investors to determine if their agents (e.g., investment managers and brokers) are performing well.
- *Insider trading*: If investors believe traders with inside information will exploit them, they will exit the market and liquidity will be reduced.
- *Costly information*: If obtaining information is relatively expensive, markets will not be as informationally efficient and investors will not invest as much.
- *Defaults*: Parties might not honor their obligations in markets.

To solve these problems, market regulation should:

- Protect unsophisticated investors so that trust in the markets is preserved.
- Require minimum standards of competency and make it easier for investors to evaluate performance. The CFA Program and the Global Investment Performance Standards are part of this effort.
- Prevent insiders from exploiting other investors.
- Require common financial reporting requirements (e.g., those of the International Accounting Standards Board) so that information gathering is less expensive.
- Require minimum levels of capital so that market participants will be able to honor their long-term commitments. This is especially important for insurance companies and pension funds that individuals depend on for their financial future. With capital at stake, market participants have more incentive to be careful about the risks they take.

Regulation can be provided by governments as well as industry groups. For example, most exchanges, clearinghouses, and dealer trade organizations are self-regulating organizations (SROs), meaning that they regulate their members. Governments sometimes delegate regulatory authority to SROs.

When they fail to address the problems mentioned previously, financial markets do not function well. Liquidity declines, firms shun risky projects, new ideas go unfunded, and economic growth slows.



### MODULE QUIZ 39.3

1. A stock is selling at \$50. An investor's valuation model estimates its intrinsic value to be \$40. Based on her estimate, she would *most likely* place a:
  - A. short-sale order.
  - B. stop order to buy.
  - C. market order to buy.
2. Which of the following limit buy orders would be the *most likely* to go unexecuted?
  - A. A marketable order.

- B. An order behind the market.
  - C. An order making a new market.
3. New issues of securities are transactions in the:
    - A. primary market.
    - B. secondary market.
    - C. seasoned market.
  4. In which of the following types of markets do stocks trade any time the market is open?
    - A. Exchange markets.
    - B. Call markets.
    - C. Continuous markets.
  5. A market is said to be informationally efficient if it features:
    - A. market prices that reflect all available information about the value of the securities traded.
    - B. timely and accurate information about current supply and demand conditions.
    - C. many buyers and sellers that are willing to trade at prices above and below the prevailing market price.
  6. Which of the following would *least likely* be an objective of market regulation?
    - A. Reduce burdensome accounting standards.
    - B. Make it easier for investors to evaluate performance.
    - C. Prevent investors from using inside information in securities trading.

## KEY CONCEPTS

### **LOS 39.a**

The three main functions of the financial system are to:

1. Allow entities to save, borrow, issue equity capital, manage risks, exchange assets, and utilize information.
2. Determine the return that equates aggregate savings and borrowing.
3. Allocate capital efficiently.

### **LOS 39.b**

Assets and markets can be classified as:

- Financial assets (e.g., securities, currencies, derivatives) versus real assets (e.g., real estate, equipment).
- Debt securities versus equity securities.
- Public securities that trade on exchanges or through dealers versus private securities.
- Physical derivative contracts (e.g., on grains or metals) versus financial derivative contracts (e.g., on bonds or equity indexes).
- Spot versus future delivery markets.
- Primary markets (issuance of new securities) versus secondary markets (trading of previously issued securities).

- Money markets (short-term debt instruments) versus capital markets (longer-term debt instruments and equities).
- Traditional investment markets (bonds, stocks) versus alternative investment markets (e.g., real estate, hedge funds, fine art).

#### **LOS 39.c**

The major types of assets are securities, currencies, contracts, commodities, and real assets.

Securities include fixed income (e.g., bonds, notes, commercial paper), equity (common stock, preferred stock, warrants), and pooled investment vehicles (mutual funds, exchange-traded funds, hedge funds, asset-backed securities).

Contracts include futures, forwards, options, swaps, and insurance contracts.

Commodities include agricultural products, industrial and precious metals, and energy products and are traded in spot, forward, and futures markets.

Most national currencies are traded in spot markets and some are also traded in forward and futures markets.

#### **LOS 39.d**

Financial intermediaries perform the following roles:

- Brokers, exchanges, and alternative trading systems connect buyers and sellers of the same security at the same location and time. They provide a centralized location for trading.
- Dealers match buyers and sellers of the same security at different points in time.
- Arbitrageurs connect buyers and sellers of the same security at the same time but in different venues. They also connect buyers and sellers of non-identical securities of similar risk.
- Securitizers and depository institutions package assets into a diversified pool and sell interests in it. Investors obtain greater liquidity and choose their desired risk level.
- Insurance companies create a diversified pool of risks and manage the risk inherent in providing insurance.
- Clearinghouses reduce counterparty risk and promote market integrity.

#### **LOS 39.e**

A long position in an asset represents current or future ownership. A long position benefits when the asset increases in value.

A short position represents an agreement to sell or deliver an asset or results from borrowing an asset and selling it (i.e., a short sale). A short position benefits when the asset decreases in value.

When an investor buys a security by borrowing from a broker, the investor is said to buy on margin and has a leveraged position. The risk of investing borrowed funds is referred to as financial leverage. More leverage results in greater risk.

### **LOS 39.f**

The leverage ratio is the value of the asset divided by the value of the equity position. Higher leverage ratios indicate greater risk.

The return on a margin transaction is the increase in the value of the position after deducting selling commissions and interest charges, divided by the amount of funds initially invested, including purchase commissions.

The maintenance margin is the minimum percentage of equity that a margin investor is required to maintain in his account. If the investor's equity falls below the maintenance margin, the investor will receive a margin call. The stock price that will result in a margin call is:

$$\text{margin call price} = P_0 \left( \frac{1 - \text{initial margin}}{1 - \text{maintenance margin}} \right)$$

where:

$P_0$  = initial purchase price

### **LOS 39.g**

Execution instructions specify how to trade. Market orders and limit orders are examples of execution instructions.

Validity instructions specify when an order can be filled. Day orders, good til canceled orders, and stop orders are examples of validity instructions.

Clearing instructions specify how to settle a trade.

### **LOS 39.h**

A market order is an order to execute the trade immediately at the best possible price. A market order is appropriate when the trader wants to execute a transaction quickly. The disadvantage of a market order is that it may execute at an unfavorable price.

A limit order is an order to trade at the best possible price, subject to the price satisfying the limit condition. A limit order avoids price execution uncertainty. The disadvantage of a limit order is that it may not be filled. A buy (sell) order with a limit of \$18 will only be executed if the security can be bought (sold) at a price of \$18 or less (more).

### **LOS 39.i**

New issues of securities are sold in primary capital markets. Secondary financial markets are where securities trade after their initial issuance.

In an underwritten offering, the investment bank guarantees that the issue will be sold at a price that is negotiated between the issuer and bank. In a best efforts offering, the bank acts only as a broker.

In a private placement, a firm sells securities directly to qualified investors, without the disclosures of a public offering.

A liquid secondary market makes it easier for firms to raise external capital in the primary market, which results in a lower cost of capital for firms.

### **LOS 39.j**

There are three main categories of securities markets:

1. Quote-driven markets: Investors trade with dealers that maintain inventories of securities, currencies, or contracts.
2. Order-driven markets: Order-matching and trade-pricing rules are used to match the orders of buyers and sellers.
3. Brokered markets: Brokers locate a counterparty to take the other side of a buy or sell order.

In call markets, securities are only traded at specific times. In continuous markets, trades occur at any time the market is open.

### **LOS 39.k**

A well-functioning financial system has the following characteristics:

- Complete markets: Savers receive a return, borrowers can obtain capital, hedgers can manage risks, and traders can acquire needed assets.
- Operational efficiency: Trading costs are low.
- Informational efficiency: Prices reflect fundamental information quickly.
- Allocational efficiency: Capital is directed to its highest valued use.

### **LOS 39.l**

The objectives of market regulation are to:

- Protect unsophisticated investors.
- Establish minimum standards of competency.
- Help investors to evaluate performance.
- Prevent insiders from exploiting other investors.
- Promote common financial reporting requirements so that information gathering is less expensive.
- Require minimum levels of capital so that market participants will be able to honor their commitments and be more careful about their risks.

## **ANSWER KEY FOR MODULE QUIZZES**

### **Module Quiz 39.1, 39.2**

1. **C** Bonds are financial assets. Real assets are physical things such as a commodity or a factory. Buying a bond from a dealer is a secondary market transaction. A primary market transaction is an issuance of securities by an entity that is raising funds. (Module 39.1, LOS 39.b)
2. **C** Daniel holds a derivative contract that has a value determined by another financial contract; in this case, the long-term bond. (Module 39.1, LOS 39.c)

3. **B** This situation best describes a dealer. A dealer buys an asset for its inventory in the hopes of reselling it later at a higher price. Brokers stand between buyers and sellers of the same security at the same location and time. Arbitrageurs trade in the same security simultaneously in different markets. (Module 39.1, LOS 39.d)
4. **A** Buying a put is most similar to a short position in the underlying asset because the put increases in value if the underlying asset value decreases. The writer of a put and the holder of a call have a long exposure to the underlying asset because their positions increase in value if the underlying asset value increases. (Module 39.2, LOS 39.e)
5. **B** The total purchase price is  $1,000 \times \$50 = \$50,000$ . The investor must post initial margin of  $40\% \times \$50,000 = \$20,000$ . The remaining  $\$30,000$  is borrowed. The commission on the purchase is  $1,000 \times \$0.01 = \$10$ . Thus, the initial equity investment is  $\$20,010$ .

In one year, the sales price is  $1,000 \times \$56 = \$56,000$ . Dividends received are  $1,000 \times \$0.30 = \$300$ . Interest paid is  $\$30,000 \times 3\% = \$900$ . The commission on the sale is  $1,000 \times \$0.01 = \$10$ . Thus, the ending value is  $\$56,000 - \$30,000 + \$300 - \$900 - \$10 = \$25,390$ .

The return on the equity investment is  $\$25,390 / \$20,010 - 1 = 26.89\%$ . (Module 39.2, LOS 39.f)

### Module Quiz 39.3

1. **A** If the investor believes the stock is overvalued in the market, the investor should place a short-sale order, which would be profitable if the stock moves toward her value estimate. (LOS 39.g, 39.h)
2. **B** A behind-the-market limit order would be least likely executed. In the case of a buy, the limit buy order price is below the best bid and will likely not execute until security prices decline. A marketable buy order is the most likely to trade because it is close to the best ask price. In an order that is making a new market or inside the market, the limit buy order price is between the best bid and ask. (LOS 39.h)
3. **A** The primary market refers to the market for newly issued securities. (LOS 39.i)
4. **C** Continuous markets are defined as markets where stocks can trade any time the market is open. Some exchange markets are call markets where orders are accumulated and executed at specific times. (LOS 39.j)
5. **A** Informational efficiency means the prevailing price reflects all available information about the value of the asset, and the price reacts quickly to new information. (LOS 39.k)
6. **A** Market regulation should require financial reporting standards so that information gathering is less expensive and the informational efficiency of the markets is enhanced. (LOS 39.l)

# READING 40

## SECURITY MARKET INDEXES

### MODULE 40.1: INDEX WEIGHTING METHODS

#### LOS 40.a: Describe a security market index.

A **security market index** is used to represent the performance of an asset class, security market, or segment of a market. They are usually created as portfolios of individual securities, which are referred to as the **constituent securities** of the index. An index has a numerical value that is calculated from the market prices (actual when available, or estimated) of its constituent securities at a point in time. An index return is the percentage change in the index's value over a period of time.



Video covering  
this content is  
available online.

#### LOS 40.b: Calculate and interpret the value, price return, and total return of an index.

An index return may be calculated using a **price index** or a **return index**. A price index uses only the prices of the constituent securities in the return calculation. A rate of return that is calculated based on a price index is referred to as a **price return**.

A return index includes both prices and income from the constituent securities. A rate of return that is calculated based on a return index is called a **total return**. If the assets in an index produce interim cash flows such as dividends or interest payments, the total return will be greater than the price return.

Once returns are calculated for each period, they then can be compounded together to arrive at the return for the measurement period:

$$R_p = (1 + R_{S1})(1 + R_{S2})(1 + R_{S3})(1 + R_{S4}) \dots (1 + R_{Sk}) - 1$$

where:

$R_p$  = portfolio return during the measurement period

$k$  = total number of subperiods

$R_{Sk}$  = portfolio return during the subperiod  $k$

For example, if the returns for the first two periods were 0.50% and 1.04%, they would be geometrically linked to produce 1.55%:

$$R_p = (1 + R_{S1})(1 + R_{S2}) - 1 = (1.005)(1.0104) - 1 = 0.0155 \text{ or } 1.55\%$$

If the starting index value is 100, its value after two periods would be  $100 \times 1.0155 = 101.55$ .

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### **LOS 40.c: Describe the choices and issues in index construction and management.**

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Index providers must make several decisions:

- What is the *target market* the index is intended to measure?
- Which securities from the target market should be included?
- How should the securities be weighted in the index?
- How often should the index be rebalanced?
- When should the selection and weighting of securities be re-examined?

The target market may be defined broadly (e.g., stocks in the United States) or narrowly (e.g., small-cap value stocks in the United States). It may also be defined by geographic region or by economic sector (e.g., cyclical stocks). The constituent stocks in the index could be all the stocks in that market or just a representative sample. The selection process may be determined by an objective rule or subjectively by a committee.

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### **LOS 40.d: Compare the different weighting methods used in index construction.**

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Weighting schemes for stock indexes include price weighting, equal weighting, market capitalization weighting, float-adjusted market capitalization weighting, and fundamental weighting.

A **price-weighted index** is simply an arithmetic average of the prices of the securities included in the index. The divisor of a price-weighted index is adjusted for stock splits and changes in the composition of the index when securities are added or deleted, such that the index value is unaffected by such changes.

The advantage of a price-weighted index is that its computation is simple. One disadvantage is that a given percentage change in the price of a higher priced stock has a greater impact on the index's value than does an equal percentage change in the price of a lower priced stock. Put another way, higher priced stocks have more weight in the calculation of a price-weighted index. Additionally, a stock's weight in the index going forward changes if the firm splits its stock, repurchases stock, or issues stock dividends, as all of these actions will affect the price of the stock and therefore its weight in the index. A portfolio that has an equal number of shares in each of the constituent stocks will have price returns (ignoring dividends) that will match the returns of a price-weighted index.

Two major price-weighted indexes are the Dow Jones Industrial Average (DJIA) and the Nikkei Dow Jones Stock Average. The DJIA is a price-weighted index based on 30 U.S. stocks. The Nikkei Dow is constructed from the prices of 225 stocks that trade in the first section of the Tokyo Stock Exchange.

An **equal-weighted index** is calculated as the arithmetic average return of the index stocks and, for a given time period, would be matched by the returns on a portfolio that had equal dollar amounts invested in each index stock. As with a price-weighted index, an advantage of an equal-weighted index is its simplicity.

One complication with an equal-weighted index return is that a matching portfolio would have to be adjusted periodically (rebalanced) as prices change so that the values of all security positions are made equal each period. The portfolio rebalancing required to match the performance of an equal-weighted index creates high transactions costs that would decrease portfolio returns.

Another concern with an equal-weighted index is that the weights placed on the returns of the securities of smaller capitalization firms are greater than their proportions of the overall market value of the index stocks. Conversely, the weights on the returns of large capitalization firms in the index are smaller than their proportions of the overall market value of the index stocks.

The Value Line Composite Average and the Financial Times Ordinary Share Index are well-known examples of equal-weighted indexes.

A **market capitalization-weighted index** (or **value-weighted index**) has weights based on the market capitalization of each index stock (current stock price multiplied by the number of shares outstanding) as a proportion of the total market capitalization of all the stocks in the index. A market capitalization-weighted index return can be matched with a portfolio in which the value of each security position in the portfolio is the same proportion of the total portfolio value as the proportion of that security's market capitalization to the total market capitalization of all of the securities included in the index. This weighting method more closely represents changes in aggregate investor wealth than price weighting. Because the weight of an index stock is based on its market capitalization, a market capitalization-weighted index does not need to be adjusted when a stock splits or pays a stock dividend.

An alternative to using a firm's market capitalization to calculate its weight in an index is to use its **market float**. A firm's market float is the total value of the shares that are actually available to the investing public and excludes the value of shares held by controlling stockholders because they are unlikely to sell their shares. For example, the float for Microsoft would exclude shares owned by Bill Gates and Paul Allen (the founders) and those of certain other large shareholders as well. The market float is often calculated excluding those shares held by corporations or governments as well. Sometimes the market float calculation excludes shares that are not available to foreign buyers and is then referred to as the **free float**. The reason for this is to better match the index weights of stocks to their proportions of the total value of all the shares of index stocks that are actually available to investors.

A **float-adjusted market capitalization-weighted index** is constructed like a market capitalization-weighted index. The weights, however, are based on the proportionate value of each firm's shares that are available to investors to the total market value of the shares of index stocks that are available to investors. Firms with relatively large percentages of their shares held by controlling stockholders will have less weight than they have in an unadjusted market-capitalization index.

The advantage of market capitalization-weighted indexes of either type is that index security weights represent proportions of total market value. The primary disadvantage of value-weighted indexes is that the relative impact of a stock's return on the index increases as its price rises and decreases as its price falls. This means that stocks that are possibly overvalued are given disproportionately high weights in the index and stocks that are possibly undervalued are given disproportionately low weights. Holding a portfolio that tracks a value-weighted index is, therefore, similar to following a momentum strategy, under which the most successful stocks are given the greatest weights and poor performing stocks are underweighted.

The Standard and Poor's 500 (S&P 500) Index Composite is an example of a market capitalization-weighted index.

An index that uses **fundamental weighting** uses weights based on firm fundamentals, such as earnings, dividends, or cash flow. In contrast to market capitalization index weights, these weights are unaffected by the share prices of the index stocks (although related to them over the long term). Fundamental weights can be based on a single measure or some combination of fundamental measures.

An advantage of a fundamental-weighted index is that it avoids the bias of market capitalization-weighted indexes toward the performance of the shares of overvalued firms and away from the performance of the shares of undervalued firms. A fundamental-weighted index will actually have a value tilt, overweighting firms with high value-based metrics such as book-to-market ratios or earnings yields. Note that a firm with a high earnings yield (total earnings to total market value) relative to other index firms will by construction have a higher weight in an earnings-weighted index because, among index stocks, its earnings are high relative to its market value.

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#### LOS 40.e: Calculate and analyze the value and return of an index given its weighting method.

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## Price Weighting

A price-weighted index adds the market prices of each stock in the index and divides this total by the number of stocks in the index. The divisor, however, must be adjusted for stock splits and other changes in the index portfolio to maintain the continuity of the series over time.

$$\text{price-weighted index} = \frac{\text{sum of stock prices}}{\text{number of stocks in index adjusted for splits}}$$

### EXAMPLE: Price-weighted index

Given the information for the three stocks presented in the following figure, calculate a price-weighted index return over a one-month period.

#### Index Firm Data

|         | Share Price<br>December 31, 20X6 | Share Price<br>January 31, 20X7 |
|---------|----------------------------------|---------------------------------|
| Stock X | \$10                             | \$20                            |
| Stock Y | \$20                             | \$15                            |
| Stock Z | \$60                             | \$40                            |

**Answer:**

The price-weighted index is  $(10 + 20 + 60) / 3 = 30$  as of December 31 and  $(20 + 15 + 40) / 3 = 25$  as of January 31. Hence, the price-weighted 1-month percentage return is:

$$\frac{25}{30} - 1 = -16.7\%$$

**EXAMPLE: Adjusting a price-weighted index for stock splits**

At the market close on Day 1, Stock A has a price of \$10, Stock B has a price of \$20, and Stock C has a price of \$90. The value of a price-weighted index of these three stocks is  $(10 + 20 + 90) / 3 = 40$  at the close of trading. If Stock C splits 2-for-1, effective on Day 2, what is the new denominator for the index?

**Answer:**

The effect of the split on the price of Stock C, in the absence of any change from the price at the end of Day 1, would be to reduce it to  $\$90 / 2 = \$45$ . The index denominator will be adjusted so that the index value would remain at 40 if there were no changes in the stock prices other than to adjust for the split. The new denominator,  $d$ , must satisfy  $(10 + 20 + 45) / d = 40$  and equals 1.875.

The returns on a price-weighted index could be matched by purchasing an equal number of shares of each stock represented in the index. Because the index is price weighted, a percentage change in a high-priced stock will have a relatively greater effect on the index than the same percentage change in a low-priced stock.

## Market Capitalization Weighting

A market capitalization-weighted index is calculated by summing the total value (current stock price multiplied by the number of shares outstanding) of all the stocks in the index. This sum is then divided by a similar sum calculated during the selected base period. The ratio is then multiplied by the index's base value (typically 100).

For example, if the total market values of the index portfolio on December 31 and January 31 are \$80 million and \$95 million, respectively, the index value at the end of January is:

$$\text{current index value} = \frac{\text{current total market value of index stocks}}{\text{base year total market value of index stocks}}$$

$\times$  base year index value

$$\text{current index value} = \frac{\$95 \text{ million}}{\$80 \text{ million}} \times 100 = 118.75$$

Thus, the market capitalization-weighted index percentage return is:

$$(118.75 / 100) - 1 = 18.75\%$$

The following example of price-weighting versus market value-weighting shows how these two indexes are calculated and how they differ.

### EXAMPLE: Price-weighted vs. market capitalization-weighted indexes

Consider the three firms described in the following table. Compare the effects on a price-weighted index and a market capitalization-weighted index if Stock A doubles in price or if Stock C doubles in price. Assume the period shown in the table is the base period for the market capitalization-weighted index and that its base value is 100.

#### Index Firm Data

| Company | Number of Shares Outstanding (000s) | Stock Price | Capitalization |
|---------|-------------------------------------|-------------|----------------|
| A       | 100                                 | \$100       | \$10,000,000   |
| B       | 1,000                               | \$10        | \$10,000,000   |
| C       | 20,000                              | \$1         | \$20,000,000   |

#### Answer:

The price-weighted index equals:

$$\frac{100 + 10 + 1}{3} = 37$$

If Stock A doubles in price to \$200, the price-weighted index value is:

$$\frac{200 + 10 + 1}{3} = 70.33$$

If Stock C doubles in price to \$2, the price-weighted index value is:

$$\frac{100 + 10 + 2}{3} = 37.33$$

If Stock A doubles in value, the index goes up 33.33 points, while if Stock C doubles in value, the index only goes up 0.33 points. Changes in the value of the firm with the highest stock price have a disproportionately large influence on a price-weighted index.

For a market capitalization-weighted index, the base period market capitalization is  $(100,000 \times \$100) + (1,000,000 \times \$10) + (20,000,000 \times \$1) = \$40,000,000$ .

If Stock A doubles in price to \$200, the index goes to:

$$\frac{100,000 \times \$200 + 1,000,000 \times \$10 + 20,000,000 \times \$1}{\$40,000,000} \times 100 = 125$$

If Stock C doubles in price to \$2, the index goes to:

$$\frac{100,000 \times \$100 + 1,000,000 \times \$10 + 20,000,000 \times \$2}{\$40,000,000} \times 100 = 150$$

In the market capitalization-weighted index, the returns on Stock C have the greatest influence on the index return because Stock C's market capitalization is larger than that of Stock A or Stock B.

## Equal Weighting

An equal-weighted index places an equal weight on the returns of all index stocks, regardless of their prices or market values. A \$2 change in the price of a \$20 stock has the same effect on the index as a \$30 change in the price of a \$300 stock regardless of the size of the company. The return of an equal-weighted index over a given period is often calculated as a simple average of the returns of the index stocks.

### EXAMPLE: Equally weighted index

Calculate the equal-weighted index value for the three stocks described in the following table, assuming an initial index value of 131.

#### Equal-Weighted Index Data

| Stock | Initial Price | Current Price | Price Change |
|-------|---------------|---------------|--------------|
| A     | \$12          | \$15          | +25.0%       |
| B     | \$52          | \$48          | -7.7%        |
| C     | \$38          | \$45          | +18.4%       |

#### Answer:

$$\text{change in index} = \frac{25\% - 7.7\% + 18.4\%}{3} = 11.9\%$$

$$\text{new index value} = 131(1 + 0.119) = 146.59$$

Note that for a total return index, period returns would include any dividends paid over the period.



#### MODULE QUIZ 40.1

- Choices that must be made when constructing a security market index *least likely* include whether to:
  - use a nominal or interval scale.
  - measure the performance of an entire market or market segment.

C. weight the securities equally or by some firm-specific characteristic.

Use the information in the following table to answer Questions 2 through 4.

|         | As of January 1 |  | As of December 31 |  |
|---------|-----------------|--|-------------------|--|
|         | Share Price     | Number of Shares Outstanding (thousands) | Share Price       | Number of Shares Outstanding (thousands) |
| Stock A | \$22            | 1,500                                    | \$28              | 1,500                                    |
| Stock B | \$40            | 10,000                                   | \$50              | 10,000                                   |
| Stock C | \$34            | 3,000                                    | \$30              | 3,000                                    |

2. The 1-year return on a price-weighted index of these three stocks is *closest* to:
  - A. 12.5%.
  - B. 13.5%.
  - C. 18.0%.
3. The 1-year return on an equal-weighted index of these three stocks is *closest* to:
  - A. 12.0%.
  - B. 12.5%.
  - C. 13.5%.
4. The 1-year return on a market capitalization-weighted index of these stocks is *closest* to:
  - A. 12.5%.
  - B. 13.5%.
  - C. 18.0%.
5. Market float of a stock is *best* described as its:
  - A. total outstanding shares.
  - B. shares that are available to domestic investors.
  - C. outstanding shares, excluding those held by controlling shareholders.
6. For which of the following indexes will rebalancing occur *most* frequently?
  - A. A price-weighted index.
  - B. An equal-weighted index.
  - C. A market capitalization-weighted index.

## MODULE 40.2: USES AND TYPES OF INDEXES



Video covering this content is available online.

### LOS 40.f: Describe rebalancing and reconstitution of an index.

**Rebalancing** refers to adjusting the weights of securities in a portfolio to their target weights after price changes have affected the weights. For index calculations, rebalancing to target weights on the index securities is done on a periodic basis, usually quarterly. Because the weights in price- and value-weighted indexes (portfolios) are adjusted to their correct values by changes in prices, rebalancing is an issue primarily for equal-weighted indexes. As noted previously, the weights on security returns in an (initially) equal-weighted portfolio are not equal as securities prices change over time. Therefore, rebalancing the portfolio at the end of each period used to calculate index returns is necessary for the portfolio return to match the index return.

**Index reconstitution** refers to periodically adding and deleting securities that make up an index. Securities are deleted if they no longer meet the index criteria and are replaced by other securities that do. Indexes are reconstituted to reflect corporate events such as bankruptcy or delisting of index firms and are at the subjective judgment of a committee.

When a security is added to an index, its price tends to rise as portfolio managers seeking to track that index in a portfolio buy the security. The prices of deleted securities tend to fall as portfolio managers sell them. Note that additions and deletions also require that the weights on the returns of other index stocks be adjusted to conform to the desired weighting scheme.

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#### **LOS 40.g: Describe uses of security market indexes.**

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Security market indexes have several uses:

- *Reflection of market sentiment.* Indexes provide a representative market return and thus reflect investor confidence. Although the Dow Jones Industrial Average is a popular index, it reflects the performance of only 30 stocks and thus may not be a good measure of sentiment with regard to the broader market.
  - *Benchmark of manager performance.* An index can be used to evaluate the performance of an active manager. Because portfolio performance depends to a large degree on its chosen style, the benchmark should be consistent with the manager's investment approach and style to assess the manager's skill accurately. The index stocks should be those that the manager will actually choose from. For example, a value manager should be compared against a value index, not a broad market index, because portfolio securities will be selected from among value stocks.
  - *Measure of market return and risk.* In asset allocation, estimates of the expected return and standard deviation of returns for various asset classes are based on historical returns for an index of securities representing that asset class.
  - *Measure of beta and risk-adjusted return.* The use of the capital asset pricing model (CAPM) to determine a stock's expected return requires an estimate of its beta and the return on the market. Index portfolio returns are used as a proxy for the returns on the market portfolio, both in estimating a stock's beta, and then again in calculating its expected return based on its systematic (beta) risk. Expected returns can then be compared to actual stock returns to determine systematic risk-adjusted returns.
  - *Model portfolio for index funds.* Investors who wish to invest passively can invest in an index fund, which seeks to replicate the performance of a market index. There are index mutual funds and index exchange-traded funds, as well as private portfolios that are structured to match the return of an index.
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#### **LOS 40.h: Describe types of equity indexes.**

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Investors can use a variety of equity market indexes. These equity indexes can be classified as follows:

- *Broad market index.* Provides a measure of a market's overall performance and usually contains more than 90% of the market's total value. For example, the Wilshire 5000 Index contains more than 6,000 equity securities and is, therefore, a good representation of the overall performance of the U.S. equity market.
- *Multi-market index.* Typically constructed from the indexes of markets in several countries and is used to measure the equity returns of a geographic region (e.g., Latin America indexes), markets based on their stage of economic development (e.g., emerging markets indexes), or the entire world (e.g., MSCI World Index).
- *Multi-market index with fundamental weighting.* Uses market capitalization-weighting for the country indexes but then weights the country index returns in the global index by a fundamental factor (e.g., GDP). This prevents a country with previously high stock returns from being overweighted in a multi-market index.
- *Sector index.* Measures the returns for an industry sector such as health care, financial, or consumer goods firms. Investors can use these indexes in cyclical analysis because some sectors do better than others in various phases of the business cycle. Sector indexes can be for a particular country or global. These indexes are used to evaluate portfolio managers and to construct index portfolios.
- *Style index.* Measures the returns to market capitalization and value or growth strategies. Some indexes reflect a combination of the two (e.g., small-cap value fund). Because there is no widely accepted definition of large-cap, mid-cap, or small-cap stocks, different indexes use different definitions. These definitions may be specified values of market capitalization or relative definitions, such as defining large-cap stocks as the largest 500 firms in a given market. In constructing value stock and growth stock indexes, price-to-earnings ratios or dividend yields are often used to identify value and growth stocks. Over time, stocks can migrate from one classification to another. For example, a successful small-cap company might grow to become a mid-cap or large-cap company. This causes style indexes to typically have higher turnover of constituent firms than broad market indexes.

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#### **LOS 40.i: Compare types of security market indexes.**

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The following table summarizes some of the noteworthy characteristics of various global indexes. Notice from the table that most security market indexes are market capitalization-weighted and often adjusted for the float (securities actually available for purchase). The number of securities in many of these indexes can vary.

| Index   | Reflects   | Number of Constituent Securities | Weighting Method                          | Notes  |
|---|--|----------------------------------|---|--|
| Dow Jones Industrial Average                  | Large U.S. stocks                                    | 30                               | Price                                     | Stocks are chosen by Wall Street Journal editors   |
| Nikkei Stock Average                          | Large Japanese stocks                                | 225                              | Modified price                            | Price weighted and adjusted for high-priced shares   |
| TOPIX   | All stocks on the Tokyo Stock Exchange First Section | Variable                         | Market capitalization, adjusted for float | Has a large number of small illiquid stocks making it hard to replicate. Contains 93% of the market cap of Japanese equities |
| MSCI All Country World Index                  | Stocks in 23 developed and 24 emerging markets       | Variable                         | Market capitalization, adjusted for float | Available in both U.S. dollars and local currency  |
| S&P Developed Ex-U.S. BMI Energy Sector Index | Global energy stocks outside the United States       | Variable                         | Market capitalization, adjusted for float | Is the model portfolio for an ETF  |
| Barclays Capital Global Aggregate Bond Index  | Global investment-grade bonds                        | Variable                         | Market capitalization                     | Formerly compiled by Lehman Brothers   |
| Markit iBoxx Euro High-Yield Bond Indexes     | Below investment-grade bonds                         | Variable                         | Market capitalization                     | Represents liquid portion of market and rebalanced monthly   |
| FTSE EPRA/NAREIT Global Real Estate Index     | Global real estate                                   | Variable                         | Market capitalization, adjusted for float | Represents publicly traded REITs   |
| HFRX Global Hedge Fund Index                  | Global hedge funds                                   | Variable                         | Asset weighted                            | Contains a variety of hedge fund strategies and is weighted based on the amount invested in each hedge fund                  |
| HFRX Equal Weighted Strategies EUR Index      | Global hedge funds                                   | Variable                         | Equal weighted                            | Contains same strategy funds as HFRX Global Hedge Fund Index and is equal weighted   |
| Morningstar Style Indexes                     | U.S. stocks grouped by value/growth and market cap   | Variable                         | Market capitalization, adjusted for float | Nine categories classified by combinations of three cap categories and three value/growth categories                         |

### LOS 40.j: Describe types of fixed-income indexes.

Fixed-income securities vary widely with respect to their coupon rates, ratings, maturities, and embedded options such as convertibility to common stock. Consequently, a wide variety of fixed-income indexes is available. Like equity indexes, fixed-income indexes are created for various sectors, geographic regions, and levels of country economic development. They can also be constructed based on type of issuer or collateral, coupon, maturity, default risk, or inflation protection. Broad market indexes, sector indexes, style indexes, and other specialized indexes are available.

Investors should be aware of several issues with the construction of fixed-income indexes:

- *Large universe of securities.* The fixed-income security universe is much broader than the universe of stocks. Fixed-income securities are issued not just by firms, but also by governments and government agencies. Each of these entities may also issue various types of fixed-income securities. Also, unlike stocks, bonds mature and must be replaced in fixed-income indexes. As a result, turnover is high in fixed-income indexes.
- *Dealer markets and infrequent trading.* Fixed-income securities are primarily traded by dealers, so index providers must depend on dealers for recent prices. Because fixed-income securities are typically illiquid, a lack of recent trades may require index providers to estimate the value of index securities from recent prices of securities with similar characteristics.

The large number of fixed-income securities results in large differences in the number of index securities among fixed-income indexes. Illiquidity, transactions costs, and high turnover of constituent securities make it both difficult and expensive for fixed-income portfolio managers to replicate a fixed-income index.

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#### **LOS 40.k: Describe indexes representing alternative investments.**

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Alternative assets are of interest to investors because of their potential diversification benefits. Three of the most widely held alternative assets are commodities, real estate, and hedge funds.

**Commodity indexes** represent futures contracts on commodities such as grains, livestock, metals, and energy. Examples include the Thomson Reuters/Core Commodity CRB Index (previously the Commodity Research Bureau Index) and the S&P GSCI (previously the Goldman Sachs Commodity Index).

The issues in commodity indexes relevant for investors are as follows:

- *Weighting method.* Commodity index providers use a variety of weighting schemes. Some use equal weighting, others weight commodities by their global production values, and others use fixed weights that the index provider determines. As a result, different indexes have significantly different commodity exposures and risk and return characteristics. For example, one index may have a large exposure to the prices of energy commodities while another has a large exposure to the prices of agricultural products.
- *Futures vs. actual.* Commodity indexes are based on the prices of commodity futures contracts, not the spot prices of commodities. Commodity futures contracts reflect the risk-free rate of return, changes in futures prices, and the roll yield. Furthermore, the contracts mature and must be replaced over time by other contracts. For these reasons, the return on commodity futures differs from the returns on a long position in the commodity itself.

**Real estate indexes** can be constructed using returns based on appraisals of properties, repeat property sales, or the performance of Real Estate Investment Trusts

(REITs). REITs are similar to closed-end mutual funds in that they invest in properties or mortgages and then issue ownership interests in the pool of assets to investors.

While real properties are quite illiquid, REIT shares trade like any common shares and many offer very good liquidity to investors. FTSE International produces a family of REIT indexes.

Hedge funds pool investor money and invest in nontraditional assets, using leverage (borrowed money or derivative contracts) and both long and short positions. Most **hedge fund indexes** equally weight the returns of the hedge funds included in the index.

Hedge funds are largely unregulated and are not required to report their performance to index providers. Consequently, some funds will report to one index but not another. The performance of different indexes can thus vary substantially.

Furthermore, it is often the case that those funds that report are the funds that have been successful, as the poorly performing funds do not want to publicize their performance. Funds that have reported in the past but have recently had poor returns may stop reporting their performance. The result is an upward bias in index returns, with hedge funds appearing to be better investments than they actually are.



## MODULE QUIZ 40.2

1. The publisher of an index that includes 50 corporate bonds removes from the index three bonds that are nearing maturity and one whose issuer has defaulted and selects four actively traded bonds to replace them in the index. This bond index is said to have been:
  - A. redefined.
  - B. rebalanced.
  - C. reconstituted.
2. Which of the following would *most likely* represent an inappropriate use of an index?
  - A. As a reflection of market sentiment.
  - B. Comparing a small-cap manager against a broad market.
  - C. Using the CAPM to determine the expected return and beta.
3. An index of 200 mid-cap growth stocks is *best* described as a:
  - A. style index.
  - B. sector index.
  - C. broad market index.
4. Which of the following is *least accurate* regarding fixed-income indexes?
  - A. Replicating the return on a fixed-income security index is difficult for investors.
  - B. There is a great deal of heterogeneity in the composition of fixed-income security indexes.
  - C. Due to the large universe of fixed-income security issues, data for fixed-income securities are relatively easy to obtain.
5. Which of the following indexes of alternative investments is *most likely* to be calculated from derivatives prices?
  - A. Real estate index.
  - B. Commodity index.
  - C. Hedge fund index.
6. Most of the widely used global security indexes are:

- A. price weighted.
- B. equal weighted.
- C. market capitalization weighted.

## KEY CONCEPTS

### LOS 40.a

A security market index represents the performance of an asset class, security market, or segment of a market. The performance of the market or segment over a period of time is represented by the percentage change in (i.e., the return on) the value of the index.

### LOS 40.b

A price index uses only the prices of the constituent securities in the return calculation. The rate of return is called a price return.

A total return index uses both the price of and the income from the index securities in the return calculation.

### LOS 40.c

Decisions that index providers must make when constructing and managing indexes include:

- The target market the index will measure.
- Which securities from the target market to include.
- The appropriate weighting method.
- How frequently to rebalance the index to its target weights.
- How frequently to re-examine the selection and weighting of securities.

### LOS 40.d

A price-weighted index is the arithmetic mean of the prices of the index securities. The divisor, which is initially equal to the number of securities in the index, must be adjusted for stock splits and changes in the composition of the index over time.

An equal-weighted index assigns the same weight to each of its constituent securities.

A market capitalization-weighted index gives each constituent security a weight equal to its proportion of the total market value of all securities in the index. Market capitalization can be adjusted for a security's market float or free float to reflect the fact that not all outstanding shares are available for purchase.

A fundamental-weighted index uses weights that are independent of security prices, such as company earnings, revenue, assets, or cash flow.

#### **LOS 40.e**

$$\text{Price-weighted index} = \frac{\text{sum of stock prices}}{\text{number of stocks in index adjusted for splits}}$$

Market capitalization-weighted index =

$$\frac{\text{current total market value of index stocks}}{\text{base year total market value of index stocks}} \times \text{base year index value}$$

$$\begin{aligned}\text{Equal-weighted index} &= (1 + \text{average percentage change in index stocks}) \\ &\quad \times \text{initial index value}\end{aligned}$$

#### **LOS 40.f**

Index providers periodically rebalance the weights of the constituent securities. This is most important for equal-weighted indexes.

Reconstitution refers to changing the securities that are included in an index. This is necessary when securities mature or when they no longer have the required characteristics to be included.

#### **LOS 40.g**

Indexes are used for the following purposes:

- Reflection of market sentiment.
- Benchmark of manager performance.
- Measure of market return.
- Measure of beta and excess return.
- Model portfolio for index funds.

#### **LOS 40.h**

Broad market equity indexes represent the majority of stocks in a market.

Multi-market equity indexes contain the indexes of several countries. Multi-market equity indexes with fundamental weighting use market capitalization weighting for the securities within a country's market but then weight the countries within the global index by a fundamental factor.

Sector indexes measure the returns for a sector (e.g., health care) and are useful because some sectors do better than others in certain business cycle phases. These indexes are used to evaluate portfolio managers and as models for sector investment funds.

Style indexes measure the returns to market capitalization and value or growth strategies. Stocks tend to migrate among classifications, which causes style indexes to have higher constituent turnover than broad market indexes.

#### **LOS 40.i**

Security market indexes available from commercial providers represent a variety of asset classes and reflect target markets that can be classified by:

- Geographic location, such as country, regional, or global indexes.

- Sector or industry, such as indexes of energy producers.
- Level of economic development, such as emerging market indexes.
- Fundamental factors, such as indexes of value stocks or growth stocks.

#### **LOS 40.j**

Fixed-income indexes can be classified by issuer, collateral, coupon, maturity, credit risk (e.g., investment grade versus high-yield), and inflation protection. They can be delineated as broad market, sector, style, or other specialized indexes. Indexes exist for various sectors, regions, and levels of development.

The fixed-income security universe is much broader than the equity universe, and fixed-income indexes have higher turnover. Index providers must depend on dealers for fixed-income security prices, and the securities are often illiquid. Fixed-income security indexes vary widely in their numbers of constituent securities and can be difficult and expensive to replicate.

#### **LOS 40.k**

Indexes have been developed to represent markets for alternative assets such as commodities, real estate, and hedge funds.

Issues in creating commodity indexes include the weighting method (different indexes can have vastly different commodity weights and resulting risk and return) and the fact that commodity indexes are based on the performance of commodity futures contracts, not the actual commodities, which can result in different performance for a commodity index versus the actual commodity.

Real estate indexes include appraisal indexes, repeat property sales indexes, and indexes of real estate investment trusts.

Because hedge funds report their performance to index providers voluntarily, the performance of different hedge fund indexes can vary substantially and index returns have an upward bias.

## **ANSWER KEY FOR MODULE QUIZZES**

### **Module Quiz 40.1**

- A** To be useful, a security market index must have a numerical value. Selecting the target market and determining the weighting method are among the choices that must be made when constructing a securities index. (LOS 40.a, 40.c)
- A**  $\frac{22 + 40 + 34}{3} = 32$ ,  $\frac{28 + 50 + 30}{3} = 36$ ,  $\frac{36}{32} - 1 = 0.125 = 12.5\%$   
(LOS 40.b, 40.d, 40.e)
- C**  $\left[ \left( \frac{28}{22} - 1 \right) + \left( \frac{50}{40} - 1 \right) + \left( \frac{30}{34} - 1 \right) \right] \left( \frac{1}{3} \right) = 0.135 = 13.5\%$   
(LOS 40.b, 40.d, 40.e)

4. C Total portfolio value January 1:

$$22(1,500) + 40(10,000) + 34(3,000) = \$535,000$$

Total portfolio value December 31:

$$28(1,500) + 50(10,000) + 30(3,000) = \$632,000$$

$$\frac{632}{535} - 1 = 0.1813 \approx 18\%$$

From a base value of 100, the December 31 index value would be

$$\frac{632}{535} \times 100 = 118.13.$$

(LOS 40.b, 40.d, 40.e)

5. C Market float represents shares available to the investing public and excludes shares held by controlling shareholders. Free float is a narrower measure that also excludes shares that are not available to foreign investors. (LOS 40.d)
6. B An equal-weighted index will be rebalanced most frequently because as stock prices change, their representation in the index needs to be adjusted. Price-weighted and market capitalization-weighted indexes do not usually need rebalancing. (LOS 40.d)

## Module Quiz 40.2

1. C Changing the constituent securities of an index is referred to as reconstituting the index. Rebalancing refers to adjusting the index weights to their target levels. (LOS 40.f)
2. B Comparing a small-cap manager against a broad market would be an inappropriate use of an index. A benchmark should be consistent with the manager's investment approach and style. A manager's performance will depend to a large degree on its chosen style. (LOS 40.g)
3. A An index for mid-cap growth stocks is best described as a style index. Sector indexes typically measure returns for a specific industry or sector of the economy (e.g., utilities or financial services firms). (LOS 40.h)
4. C Fixed-income securities are largely traded by dealers and trade infrequently. Data are therefore difficult to obtain. (LOS 40.j)
5. B Commodity indexes are typically calculated from prices of commodity futures contracts. (LOS 40.k)
6. C Most global security indexes are market capitalization-weighted with a float adjustment to reflect the amount of shares available to investors. (LOS 40.i)

# READING 41

## MARKET EFFICIENCY

### MODULE 41.1: MARKET EFFICIENCY



Video covering  
this content is  
available online.

#### **LOS 41.a: Describe market efficiency and related concepts, including their importance to investment practitioners.**

An **informationally efficient capital market** is one in which the current price of a security fully, quickly, and rationally reflects all available information about that security. This is really a statistical concept. An academic might say, “Given all available information, current securities prices are unbiased estimates of their values, so that the expected return on any security is just the equilibrium return necessary to compensate investors for the risk (uncertainty) regarding its future cash flows.” This concept is often put more intuitively as, “You can’t beat the market.”

In a perfectly efficient market, investors should use a **passive investment** strategy (i.e., buying a broad market index of stocks and holding it) because **active investment** strategies will underperform due to transactions costs and management fees. However, to the extent that market prices are inefficient, active investment strategies can generate positive risk-adjusted returns.

One method of measuring a market’s efficiency is to determine the time it takes for trading activity to cause information to be reflected in security prices (i.e., the lag from the time information is disseminated to the time prices reflect the value implications of that information). In some very efficient markets, such as foreign currency markets, this lag can be as short as a minute. If there is a significant lag, informed traders can use the information to potentially generate positive risk-adjusted returns.

Note that market prices should not be affected by the release of information that is well anticipated. Only new information (information that is unexpected and changes expectations) should move prices. The announcement that a firm’s earnings were up 45% over the last quarter may be good news if the expected increase was 20%. On the other hand, this may be bad news if a 70% increase was anticipated or no news at all if market participants correctly anticipated quarterly earnings.

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#### **LOS 41.b: Contrast market value and intrinsic value.**

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The **market value** of an asset is its current price. The **intrinsic value** or **fundamental value** of an asset is the value that a rational investor with full knowledge about the

asset's characteristics would willingly pay. For example, a bond investor would fully know and understand a bond's coupon, maturity, default risk, liquidity, and other characteristics and would use these to estimate its intrinsic value.

In markets that are highly efficient, investors can typically expect market values to reflect intrinsic values. If markets are not completely efficient, active managers will buy assets for which they think intrinsic values are greater than market values and sell assets for which they think intrinsic values are less than market values.

Intrinsic values cannot be known with certainty and are estimated by investors who will have differing estimates of an asset's intrinsic value. The more complex an asset, the more difficult it is to estimate its intrinsic value. Furthermore, intrinsic value is constantly changing as new (unexpected) information becomes available.

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### **LOS 41.c: Explain factors that affect a market's efficiency.**

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Markets are generally neither perfectly efficient nor completely inefficient. The degree of informational efficiency varies across countries, time, and market types. The following factors affect the degree of market efficiency.

**Number of market participants.** The larger the number of investors, analysts, and traders who follow an asset market, the more efficient the market. The number of participants can vary through time and across countries. For example, some countries prevent foreigners from trading in their markets, reducing market efficiency.

**Availability of information.** The more information is available to investors, the more efficient the market. In large, developed markets such as the New York Stock Exchange, information is plentiful and markets are quite efficient. In emerging markets, the availability of information is lower, and consequently, market prices are relatively less efficient. Some assets, such as bonds, currencies, swaps, forwards, mortgages, and money market securities that trade in over-the-counter (OTC) markets, may have less available information.

Access to information should not favor one party over another. Therefore, regulations such as the U.S. Securities and Exchange Commission's Regulation FD (fair disclosure) require that firms disclose the same information to the public that they disclose to stock analysts. Traders with material inside information about a firm are prohibited from trading on that information.

**Impediments to trading.** **Arbitrage** refers to buying an asset in one market and simultaneously selling it at a higher price in another market. This buying and selling of assets will continue until the prices in the two markets are equal. Impediments to arbitrage, such as high transactions costs or lack of information, will limit arbitrage activity and allow some price inefficiencies (i.e., mispricing of assets) to persist.

Short selling improves market efficiency. The sales pressure from short selling prevents assets from becoming overvalued. Restrictions on short selling, such as an inability to borrow stock cheaply, can reduce market efficiency.

**Transaction and information costs.** To the extent that the costs of information, analysis, and trading are greater than the potential profit from trading misvalued securities, market prices will be inefficient. It is generally accepted that markets are efficient if, after deducting costs, there are no risk-adjusted returns to be made from trading based on publicly available information.

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#### **LOS 41.d: Contrast weak-form, semi-strong-form, and strong-form market efficiency.**

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Professor Eugene Fama originally developed the concept of market efficiency and identified three forms of market efficiency. The difference among them is that each is based on a different set of information.

1. **Weak-form market efficiency.** The weak form of the efficient markets hypothesis (EMH) states that current security prices *fully reflect all currently available security market data*. Thus, past price and volume (market) information will have no predictive power about the future direction of security prices because price changes will be independent from one period to the next. In a weak-form efficient market, an investor cannot achieve positive risk-adjusted returns on average by using technical analysis.
2. **Semi-strong-form market efficiency.** The semi-strong form of the EMH holds that security prices rapidly adjust without bias to the arrival of all new public information. As such, current security prices *fully reflect all publicly available information*. The semi-strong form says security prices include all past security market information and nonmarket information available to the public. The implication is that an investor cannot achieve positive risk-adjusted returns on average by using fundamental analysis.
3. **Strong-form market efficiency.** The strong form of the EMH states that security prices *fully reflect all information from both public and private sources*. The strong form includes all types of information: past security market information, public, and private (inside) information. This means that no group of investors has monopolistic access to information relevant to the formation of prices, and none should be able to consistently achieve positive abnormal returns.

Given the prohibition on insider trading in most markets, it would be unrealistic to expect markets to reflect all private information. The evidence supports the view that markets are not strong-form efficient.



#### **PROFESSOR'S NOTE**

As a base level knowledge of the EMH, you should know that the weak form is based on past security market information; the semi-strong form is based on all public information (including market information); and the strong form is based on both public information and inside or private information.

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#### **LOS 41.e: Explain the implications of each form of market efficiency for fundamental analysis, technical analysis, and the choice between active and**

## passive portfolio management.

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**Abnormal profit** (or **risk-adjusted returns**) calculations are often used to test market efficiency. To calculate abnormal profits, the expected return for a trading strategy is calculated given its risk, using a model of expected returns such as the CAPM or a multifactor model. If returns are, on average, greater than equilibrium expected returns, we can reject the hypothesis of efficient prices with respect to the information on which the strategy is based.

The results of tests of the various forms of market efficiency have implications about the value of technical analysis, fundamental analysis, and portfolio management in general.

**Technical analysis** seeks to earn positive risk-adjusted returns by using historical price and volume (trading) data. Tests of weak-form market efficiency have examined whether technical analysis produces abnormal profits. Generally, the evidence indicates that technical analysis does not produce abnormal profits, so we cannot reject the hypothesis that markets are weak-form efficient. However, technical analysis has been shown to have success in emerging markets, and there are so many possible technical analysis trading strategies that they cannot all be tested. As noted previously, the success of any technical analysis strategy should be evaluated considering the costs of information, analysis, and trading.

**Fundamental analysis** is based on public information such as earnings, dividends, and various accounting ratios and estimates. The semi-strong form of market efficiency suggests that all public information is already reflected in stock prices. As a result, investors should not be able to earn abnormal profits by trading on this information.

One method of testing the semi-strong form is an **event study**. Event studies examine abnormal returns before and after the release of new information that affects a firm's intrinsic value, such as earnings announcements or dividend changes. The null hypothesis is that investors should not be able to earn positive abnormal returns on average by trading based on firm events because prices will rapidly reflect news about a firm's prospects. The evidence in developed markets indicates that markets are generally semi-strong form efficient. However, there is evidence of semi-strong form inefficiency in some emerging markets.

The evidence that developed markets are generally semi-strong form efficient raises questions about the usefulness of fundamental analysis. It must be fundamental analysis, however, that results in informationally efficient market prices. Fundamental analysis can also be of use to those exceptionally skilled investors who can generate abnormal profits through its use and to those who act rapidly before new information is reflected in prices.



### PROFESSOR'S NOTE

Markets can be weak-form efficient without being semi-strong or strong-form efficient. If markets are semi-strong form efficient, they must be weak-form efficient because public information includes market information, but semi-strong form efficient markets need not be strong-form efficient.

## Active vs. Passive Portfolio Management

If markets are semi-strong form efficient, investors should invest passively (i.e., invest in an index portfolio that replicates the returns on a market index). Indeed, the evidence shows that most mutual fund managers cannot outperform a passive index strategy over time.

If so, what is the role of a portfolio manager? Even if markets are efficient, portfolio managers can add value by establishing and implementing portfolio risk and return objectives and by assisting clients with portfolio diversification, asset allocation, and tax management.

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### LOS 41.f: Describe market anomalies.

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An anomaly is something that deviates from the common rule. Tests of the EMH are frequently called *anomaly studies*, so in the efficient markets literature, a **market anomaly** is something that would lead us to reject the hypothesis of market efficiency.

Just by chance, some variables will be related to abnormal returns over a given period, although in fact these relationships are unlikely to persist over time. Thus, analysts using historical data can find patterns in security returns that appear to violate market efficiency but are unlikely to recur in the future. If the analyst uses a 5% significance level and examines the relationship between stock returns and 40 variables, two of the variables are expected to show a statistically significant relationship with stock returns by random chance. Recall that the significance level of a hypothesis test is the probability that the null hypothesis (efficiency here) will be rejected purely by chance, even when it is true. Investigating data until a statistically significant relation is found is referred to as **data snooping** or **data mining**. Note that 1,000 analysts, each testing different hypotheses on the same data set, could produce the same results as a single researcher who performed 1,000 hypothesis tests.

To avoid data snooping bias, analysts should first ask if there is an economic basis for the relationships they find between certain variables and stock returns and then test the discovered relationships with a large sample of data to determine if the relationships are persistent and present in various subperiods.

## Anomalies in Time-Series Data

**Calendar anomalies.** The **January effect** or **turn-of-the-year effect** is the finding that during the first five days of January, stock returns, especially for small firms, are significantly higher than they are the rest of the year. In an efficient market, traders would exploit this profit opportunity in January, and in so doing, eliminate it.

Possible explanations for the January effect are **tax-loss selling**, as investors sell losing positions in December to realize losses for tax purposes and then repurchase stocks in January, pushing their prices up, and **window dressing**, as portfolio managers sell risky stocks in December to remove them from their year-end statements and repurchase them in January. Evidence indicates that each of these explains only a

portion of the January effect. However, after adjustments are made for risk, the January effect does not appear to persist over time.

Other calendar anomalies that were found at one time but no longer appear to persist are the *turn-of-the-month effect* (stock returns are higher in the days surrounding month end), the *day-of-the-week effect* (average Monday returns are negative), the *weekend effect* (positive Friday returns are followed by negative Monday returns), and the *holiday effect* (pre-holiday returns are higher).

**Overreaction and momentum anomalies.** The **overreaction effect** refers to the finding that firms with poor stock returns over the previous three or five years (losers) have better subsequent returns than firms that had high stock returns over the prior period. This pattern has been attributed to investor overreaction to both unexpected good news and unexpected bad news. This pattern is also present for bonds and in some international markets. **Momentum effects** have also been found where high short-term returns are followed by continued high returns. This pattern is present in some international markets as well.

Both the overreaction and momentum effects violate the weak form of market efficiency because they provide evidence of a profitable strategy based only on market data. Some researchers argue that the evidence of overreaction to new information is due to the nature of the statistical tests used and that evidence of momentum effects in securities prices reflects rational investor behavior.

## Anomalies in Cross-Sectional Data

The **size effect** refers to initial findings that small-cap stocks outperform large-cap stocks. This effect could not be confirmed in later studies, suggesting that either investors had traded on, and thereby eliminated, this anomaly or that the initial finding was simply a random result for the time period examined.

The **value effect** refers to the finding that **value stocks** [those with lower price-to-earnings (P/E), lower market-to-book (M/B), and higher dividend yields] have outperformed **growth stocks** (those with higher P/E, higher M/B, and lower dividend yields). This violates the semi-strong form of market efficiency because the information necessary to classify stocks as value or growth is publicly available. However, some researchers attribute the value effect to greater risk of value stocks that is not captured in the risk adjustment procedure used in the studies.

## Other Anomalies

**Closed-end investment funds.** The shares of **closed-end investment funds** trade at prices that sometimes deviate from the **net asset value (NAV)** of the fund shares, often trading at large discounts to NAV. Such large discounts are an anomaly because, by arbitrage, the value of the pool of assets should be the same as the market price for closed-end shares. Various explanations have been put forth to explain this anomaly, including management fees, taxes on future capital gains, and share illiquidity. None of these explanations fully explains the pricing discrepancy. However, transactions costs

would eliminate any profits from exploiting the unexplained portion of closed-end fund discounts.

**Earnings announcements.** An **earnings surprise** is that portion of announced earnings that was not expected by the market. Positive earnings surprises (earnings higher than expected) precede periods of positive risk-adjusted post-announcement stock returns, and negative surprises lead to predictable negative risk-adjusted returns. The anomaly is that the adjustment process does not occur entirely on the announcement day. Investors could exploit this anomaly by buying positive earnings surprise firms and selling negative earnings surprise firms. Some researchers argue that evidence of predictable abnormal returns after earnings surprises is a result of estimating risk-adjusted returns incorrectly in the tests and that transactions costs would eliminate any abnormal profits from attempting to exploit this returns anomaly.

**Initial public offerings.** IPOs are typically underpriced, with the offer price below the market price once trading begins. However, the long-term performance of IPO shares as a group is below average. This suggests that investors overreact, in that they are too optimistic about a firm's prospects on the offer day. Some believe this is not an anomaly, but rather a result of the statistical methodologies used to estimate abnormal returns.

**Economic fundamentals.** Research has found that stock returns are related to known economic fundamentals such as dividend yields, stock volatility, and interest rates. However, we would expect stock returns to be related to economic fundamentals in efficient markets. The relationship between stock returns and dividend yields is also not consistent over all time periods.

## Implications for Investors

The majority of the evidence suggests that reported anomalies are not violations of market efficiency but are due to the methodologies used in the tests of market efficiency. Furthermore, both underreaction and overreaction have been found in the markets, meaning that prices are efficient on average. Other explanations for the evidence of anomalies are that they are transient relations, too small to profit from, or simply reflect returns to risk that the researchers have failed to account for.

The bottom line for investors is that portfolio management based on previously identified anomalies will likely be unprofitable. Investment management based solely on anomalies has no sound economic basis.

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### LOS 41.g: Describe behavioral finance and its potential relevance to understanding market anomalies.

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**Behavioral finance** examines the actual decision-making processes of investors. Many observers have concluded that investors are not the rational utility-maximizing decision makers with complete information that traditional finance assumes they are. Investors appear to exhibit bias in their decision making, base decisions on the actions of others, and not evaluate risk in the way traditional models assume they do.

Various types of investor irrationality have been proposed as explanations for reported pricing anomalies. Whether widespread investor irrationality is the underlying cause of reported returns anomalies is an open question. Market efficiency does not require an assumption that every investor acts rationally in accordance with traditional finance theory. Semi-strong form market efficiency requires that investors cannot earn positive abnormal returns on average (beat the market) using public information. The evidence on market efficiency certainly suggests that this is the case. Evidence that some investors exhibit bias, or other deviations from perfect rationality, in their investment decision making does not necessarily mean that market prices themselves are irrational, at least not in ways that lead to violations of market efficiency.

Observed investor behaviors and biases that are considered evidence of irrational behavior include:

- **Loss aversion**, which refers to the tendency of investors to be more risk averse when faced with potential losses than they are when faced with potential gains. Put another way, investors dislike a loss more than they like a gain of an equal amount.
- **Investor overconfidence**, which is a tendency of investors to overestimate their abilities to analyze security information and identify differences between securities' market prices and intrinsic values.
- **Herding**, which is a tendency of investors to act in concert on the same side of the market, acting not on private analysis, but mimicking the investment actions of other investors.

An **information cascade** results when investors mimic the decisions of others. The idea is that uninformed or less-informed traders watch the actions of informed traders and follow their investment actions. If those who act first are more knowledgeable investors, others following their actions may, in fact, be part of the process of incorporating new information into securities prices and actually move market prices toward their intrinsic values, improving informational efficiency.

Behavioral finance can explain how securities' market prices can deviate from rational prices and be biased estimates of intrinsic value. If investor rationality is viewed as a prerequisite for market efficiency, then markets are not efficient. If market efficiency only requires that investors cannot consistently earn abnormal risk-adjusted returns, then research supports the belief that markets are efficient.



## MODULE QUIZ 41.1

1. In an informationally efficient capital market:
  - A. active managers can generate abnormal profits.
  - B. security prices quickly reflect new information.
  - C. investors react to all information releases rapidly.
2. The intrinsic value of an asset:
  - A. changes through time as new information is released.
  - B. is the price at which the asset can be bought or sold at a given point in time.
  - C. can be easily determined with a financial calculator, given investor risk preferences.
3. In terms of market efficiency, short selling *most likely*:

- A. leads to excess volatility, which reduces market efficiency.
  - B. promotes market efficiency by making assets less likely to become overvalued.
  - C. has little effect on market efficiency because short sellers face the risk of unlimited losses.
4. The weak-form EMH asserts that stock prices fully reflect which of the following types of information?
- A. Market only.
  - B. Market and public.
  - C. Public and private.
5. Research has revealed that the performance of professional money managers tends to be:
- A. equal to the performance of a passive investment strategy.
  - B. inferior to the performance of a passive investment strategy.
  - C. superior to the performance of a passive investment strategy.
6. Which of the following *best* describes the majority of the evidence regarding anomalies in stock returns?
- A. Weak-form market efficiency holds, but semi-strong form efficiency does not.
  - B. Neither weak-form nor semi-strong form market efficiency holds.
  - C. Reported anomalies are not violations of market efficiency but are the result of research methodologies.
7. Investors who exhibit loss aversion *most likely*:
- A. have symmetric risk preferences.
  - B. are highly risk averse.
  - C. dislike losses more than they like equal gains.

## KEY CONCEPTS

### LOS 41.a

In an informationally efficient capital market, security prices reflect all available information fully, quickly, and rationally. The more efficient a market is, the quicker its reaction will be to new information. Only unexpected information should elicit a response from traders.

If the market is fully efficient, active investment strategies cannot earn positive risk-adjusted returns consistently, and investors should therefore use a passive strategy.

### LOS 41.b

An asset's market value is the price at which it can currently be bought or sold.

An asset's intrinsic value is the price that investors with full knowledge of the asset's characteristics would place on the asset.

### LOS 41.c

Large numbers of market participants and greater information availability tend to make markets more efficient.

Impediments to arbitrage and short selling and high costs of trading and gathering information tend to make markets less efficient.

#### **LOS 41.d**

The weak form of the efficient markets hypothesis (EMH) states that security prices fully reflect all past price and volume information.

The semi-strong form of the EMH states that security prices fully reflect all publicly available information.

The strong form of the EMH states that security prices fully reflect all public and private information.

#### **LOS 41.e**

If markets are weak-form efficient, technical analysis does not consistently result in abnormal profits.

If markets are semi-strong form efficient, fundamental analysis does not consistently result in abnormal profits. However, fundamental analysis is necessary if market prices are to be semi-strong form efficient.

If markets are strong-form efficient, active investment management does not consistently result in abnormal profits.

Even if markets are strong-form efficient, portfolio managers can add value by establishing and implementing portfolio risk and return objectives and assisting with portfolio diversification, asset allocation, and tax minimization.

#### **LOS 41.f**

A market anomaly is something that deviates from the efficient market hypothesis. Most evidence suggests anomalies are not violations of market efficiency but are due to the methodologies used in anomaly research, such as data mining or failing to adjust adequately for risk.

Anomalies that have been identified in time-series data include calendar anomalies such as the January effect (small firm stock returns are higher at the beginning of January), overreaction anomalies (stock returns subsequently reverse), and momentum anomalies (high short-term returns are followed by continued high returns).

Anomalies that have been identified in cross-sectional data include a size effect (small-cap stocks outperform large-cap stocks) and a value effect (value stocks outperform growth stocks).

Other identified anomalies involve closed-end investment funds selling at a discount to NAV, slow adjustments to earnings surprises, investor overreaction to and long-term underperformance of IPOs, and a relationship between stock returns and prior economic fundamentals.

#### **LOS 41.g**

Behavioral finance examines whether investors behave rationally, how investor behavior affects financial markets, and how cognitive biases may result in anomalies. Behavioral finance describes investor irrationality but does not necessarily refute

market efficiency as long as investors cannot consistently earn abnormal risk-adjusted returns.

## ANSWER KEY FOR MODULE QUIZ

### Module Quiz 41.1

1. **B** In informationally efficient capital markets, new information is quickly reflected in security prices. Investors react only to unexpected information releases because information releases that are expected will already be reflected in securities prices. Active strategies will underperform in an efficient market because they have greater transactions and management costs than passive strategies and will not consistently create positive abnormal returns after adjusting for risk. (LOS 41.a)
2. **A** Intrinsic value changes as new information arrives in the marketplace. It cannot be known with certainty and can only be estimated. The price of an asset at a given point in time is its market value, which will differ from its intrinsic value if markets are not fully efficient. (LOS 41.b)
3. **B** Short selling promotes market efficiency because the sales pressure from short selling can reduce the prices of assets that have become overvalued. (LOS 41.c)
4. **A** Weak-form EMH states that stock prices fully reflect all market (i.e., price and volume) information. (LOS 41.d)
5. **B** Tests indicate that mutual fund performance has been inferior to that of a passive index strategy. (LOS 41.e)
6. **C** The majority of evidence is that anomalies are not violations of market efficiency but are due to the research methodologies used. Portfolio management based on anomalies will likely be unprofitable after transactions costs are considered. (LOS 41.f)
7. **C** Loss aversion refers to the tendency of investors to be more risk averse when faced with potential losses and less risk averse when faced with potential gains. That is, they dislike losses more than they like gains of an equal amount. Their risk preferences are asymmetric. (LOS 41.g)

## READING 42

# OVERVIEW OF EQUITY SECURITIES

### MODULE 42.1: TYPES OF EQUITY INVESTMENTS



Video covering this content is available online.

#### LOS 42.a: Describe characteristics of types of equity securities.

**Common shares** are the most common form of equity and represent an ownership interest. Common shareholders have a residual claim (after the claims of debtholders and preferred stockholders) on firm assets if the firm is liquidated and govern the corporation through voting rights. Firms are under no obligation to pay dividends on common equity; the firm determines what dividend will be paid periodically. Common stockholders are able to vote for the board of directors, on merger decisions, and on the selection of auditors. If they are unable to attend the annual meeting, shareholders can vote by **proxy** (having someone else vote as they direct them, on their behalf).

In a **statutory voting** system, each share held is assigned one vote in the election of each member of the board of directors. Under **cumulative voting**, shareholders can allocate their votes to one or more candidates as they choose. For example, consider a situation where a shareholder has 100 shares and three directors will be elected. Under statutory voting, the shareholder can vote 100 shares for his director choice in each election. Under cumulative voting, the shareholder has 300 votes, which can be cast for a single candidate or spread across multiple candidates. The three receiving the greatest number of votes are elected. Cumulative voting makes it possible for a minority shareholder to have more proportional representation on the board. The way the math works, a holder of 30% of the firm's shares could choose three of ten directors with cumulative voting but could elect no directors under statutory voting.

**Preference shares** (or **preferred stock**) have features of both common stock and debt. As with common stock, preferred stock dividends are not a contractual obligation, and the shares usually do not mature. Like debt, preferred shares typically make fixed periodic payments to investors and do not usually have voting rights. Preference shares may be callable, giving the firm the right to repurchase the shares at a pre-specified call price. They may also be putable, giving the shareholder the right to sell the preference shares back to the issuer at a specified price.

**Cumulative preference shares** are usually promised fixed dividends, and any dividends that are not paid must be made up before common shareholders can receive dividends. The dividends of **non-cumulative preference shares** do not accumulate

over time when they are not paid, but dividends for any period must be paid before common shareholders can receive dividends.

Preferred shares have a stated par value and pay a percentage dividend based on the par value of the shares. An \$80 par value preferred with a 10% dividend pays a dividend of \$8 per year. Investors in **participating preference shares** receive extra dividends if firm profits exceed a predetermined level and may receive a value greater than the par value of the preferred stock if the firm is liquidated. **Non-participating preference shares** have a claim equal to par value in the event of liquidation and do not share in firm profits. Smaller and riskier firms whose investors may be concerned about the firm's future often issue participating preferred stock so investors can share in the upside potential of the firm.

**Convertible preference shares** can be exchanged for common stock at a conversion ratio determined when the shares are originally issued. They have the following advantages:

- The preferred dividend is higher than a common dividend.
- If the firm is profitable, the investor can share in the profits by converting his shares into common stock.
- The conversion option becomes more valuable when the common stock price increases.
- Preferred shares have less risk than common shares because the dividend is stable and they have priority over common stock in receiving dividends and in the event of liquidation of the firm.

Because of their upside potential, convertible preferred shares are often used to finance risky venture capital and private equity firms. The conversion feature compensates investors for the additional risk they take when investing in such firms.

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#### **LOS 42.b: Describe differences in voting rights and other ownership characteristics among different equity classes.**

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A firm may have different classes of common stock (e.g., "Class A" and "Class B" shares). One class may have greater voting power and seniority if the firm's assets are liquidated. The classes may also be treated differently with respect to dividends, stock splits, and other transactions with shareholders. Information on the ownership and voting rights of different classes of equity shares can be found in the company's filings with securities regulators, such as the Securities and Exchange Commission in the United States.

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#### **LOS 42.c: Compare and contrast public and private equity securities.**

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The discussion so far has centered on equity that is publicly traded. **Private equity** is usually issued to institutional investors via private placements. Private equity markets are smaller than public markets but are growing rapidly.

Compared to public equity, private equity has the following characteristics:

- Less liquidity because no public market for the shares exists.
- Share price is negotiated between the firm and its investors, not determined in a market.
- More limited firm financial disclosure because there is no government or exchange requirement to do so.
- Lower reporting costs because of less onerous reporting requirements.
- Potentially weaker corporate governance because of reduced reporting requirements and less public scrutiny.
- Greater ability to focus on long-term prospects because there is no public pressure for short-term results.
- Potentially greater return for investors once the firm goes public.

The three main types of private equity investments are venture capital, leveraged buyouts, and private investments in public equity.

**Venture capital** refers to the capital provided to firms early in their life cycles to fund their development and growth. Venture capital financing at various stages of a firm's development is referred to as *seed* or *start-up*, *early stage*, or *mezzanine* financing. Investors can be family, friends, wealthy individuals, or private equity funds. Venture capital investments are illiquid and investors often have to commit funds for three to ten years before they can cash out (exit) their investment. Investors hope to profit when they can sell their shares after (or as part of) an initial public offering or to an established firm.

In a **leveraged buyout (LBO)**, investors buy all of a firm's equity using debt financing (leverage). If the buyers are the firm's current management, the LBO is referred to as a **management buyout (MBO)**. Firms in LBOs usually have cash flow that is adequate to service the issued debt or have undervalued assets that can be sold to pay down the debt over time.

In a **private investment in public equity (PIPE)**, a public firm that needs capital quickly sells private equity to investors. The firm may have growth opportunities, be in distress, or have large amounts of debt. The investors can often buy the stock at a sizeable discount to its market price.



## MODULE QUIZ 42.1

1. The advantage of participating preferred shares versus non-participating preferred shares is that participating preferred shares can:
  - A. obtain voting rights.
  - B. receive extra dividends.
  - C. be converted into common stock.
2. Which of the following *best* describes the benefit of cumulative share voting?
  - A. It provides significant minority shareholders with proportional representation on the board.
  - B. It prevents minority shareholders from exercising excessive control.

- C. If cumulative dividends are not paid, preferred shareholders are given voting rights.
3. Compared to public equity, which of the following is *least likely* to characterize private equity?
  - A. Lower reporting costs.
  - B. Potentially weaker corporate governance.
  - C. Lower returns because of its less liquid market.

## MODULE 42.2: FOREIGN EQUITIES AND EQUITY RISK



Video covering this content is available online.

### LOS 42.d: Describe methods for investing in non-domestic equity securities.

When capital flows freely across borders, markets are said to be *integrated*. The world's financial markets have become more integrated over time, especially as a result of improved communications and trading technologies. However, barriers to global capital flows still exist. Some countries restrict foreign ownership of their domestic stocks, primarily to prevent foreign control of domestic companies and to reduce the variability of capital flows in and out of their countries.

An increasing number of countries have dropped foreign capital restrictions. Studies have shown that reducing capital barriers improves equity market performance. Furthermore, companies are increasingly turning to foreign investors for capital by listing their stocks on foreign stock exchanges or by encouraging foreign ownership of shares.

From the firm's perspective, listing on foreign stock exchanges increases publicity for the firm's products and the liquidity of the firm's shares. Foreign listing also increases firm transparency due to the stricter disclosure requirements of many foreign markets.

**Direct investing** in the securities of foreign companies simply refers to buying a foreign firm's securities in foreign markets. Some obstacles to direct foreign investment are that:

- The investment and return are denominated in a foreign currency.
- The foreign stock exchange may be illiquid.
- The reporting requirements of foreign stock exchanges may be less strict, impeding analysis.
- Investors must be familiar with the regulations and procedures of each market in which they invest.

Other methods for investing in foreign companies are provided by global depository receipts (GDRs), American depository receipts (ADRs), global registered shares (GRSs), and baskets of listed depository receipts (BLDRs).

**Depository receipts (DRs)** represent ownership in a foreign firm and are traded in the markets of other countries in local market currencies. A bank deposits shares of the

foreign firm and then issues receipts representing ownership of a specific number of the foreign shares. The **depository bank** acts as a custodian and manages dividends, stock splits, and other events. Although the investor does not have to convert to the foreign currency, the value of the DR is affected by exchange rate changes, as well as firm fundamentals, economic events, and any other factors that affect the value of any stock.

If the firm is involved with the issue, the depository receipt is a **sponsored DR**; otherwise, it is an **unsponsored DR**. A sponsored DR provides the investor voting rights and is usually subject to greater disclosure requirements. In an unsponsored DR, the depository bank retains the voting rights.

**Global depository receipts (GDRs)** are issued outside the United States and the issuer's home country. Most GDRs are traded on the London and Luxembourg exchanges. Although not listed on U.S. exchanges, they are usually denominated in U.S. dollars and can be sold to U.S. institutional investors. GDRs are not subject to the capital flow restrictions imposed by governments and thus offer the firm and the investor greater opportunities for foreign investment. The firm usually chooses to list the GDR in a market where many investors are familiar with the firm.

**American depository receipts (ADRs)** are denominated in U.S. dollars and trade in the United States. The security on which the ADR is based is the **American depository share (ADS)**, which trades in the firm's domestic market. Some ADRs allow firms to raise capital in the United States or use the shares to acquire other firms. Most require U.S. Securities and Exchange Commission (SEC) registration, but some are privately placed (Rule 144A or Regulation S receipts).

The four types of ADRs, with different levels of trading availability and firm requirements, are summarized in Figure 42.1.

**Figure 42.1: Types of ADRs**

|   | <b>Level I</b>         | <b>Level II</b>        | <b>Level III</b>       | <b>Rule 144A</b> |
|---|------------------------|------------------------|------------------------|------------------|
| Trading location                          | Over-the-counter (OTC) | NYSE, Nasdaq, and AMEX | NYSE, Nasdaq, and AMEX | Private          |
| SEC registration required                 | Yes                    | Yes                    | Yes                    | No               |
| Ability to raise capital in United States | No                     | No                     | Yes                    | Yes              |
| Firm listing expenses                     | Low                    | High                   | High                   | Low              |

**Global registered shares (GRS)** are traded in different currencies on stock exchanges around the world.

A **basket of listed depository receipts (BLDR)** is an exchange-traded fund (ETF) that is a collection of DRs. ETF shares trade in markets just like common stocks.

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**LOS 42.e: Compare the risk and return characteristics of different types of equity securities.**

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The returns on equity investments consist of price changes, dividend payments, and, in the case of equities denominated in a foreign currency, gains or losses from changes in exchange rates. A Japanese investor who invests in euro-denominated shares will have greater yen-based returns if the euro appreciates relative to the yen.

Gains from dividends and the reinvestment of dividends have been an important part of equity investors' long-term returns. For example, \$1 invested in U.S. stocks in 1900 would have been worth \$1,402 in real terms in 2016 with dividends reinvested but only \$11.90 with price appreciation alone. Over the same time period, the terminal wealth for bonds and bills would have been \$9.80 and \$2.60, respectively.<sup>1</sup>

The risk of equity securities is most commonly measured as the standard deviation of returns. Preferred stock is less risky than common stock because preferred stock pays a known, fixed dividend to investors that is a large part of the return, whereas common dividends are variable and can vary with earnings. Also, preferred stockholders receive their distributions before common shareholders and have a claim in liquidation equal to the par value of their shares that has priority over the claims of common stock owners. Because it is less risky, preferred stock has a lower average return than common stock.

Cumulative preferred shares have less risk than non-cumulative preferred shares because they retain the right to receive any missed dividends before any common stock dividends can be paid.

For both common and preferred shares, putable shares are less risky and callable shares are more risky compared to shares with neither option. Putable shares are less risky because if the market price drops, the investor can put the shares back to the firm at a fixed price (assuming the firm has the capital to honor the put). Because of this feature, putable shares usually pay a lower dividend yield than non-putable shares.

Callable shares are the most risky because if the market price rises, the firm can call the shares, limiting the upside potential of the shares. Callable shares, therefore, usually have higher dividend yields than non-callable shares.

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**LOS 42.f: Explain the role of equity securities in the financing of a company's assets.**

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Equity capital is used for the purchase of long-term assets, equipment, research and development, and expansion into new businesses or geographic areas. Equity securities provide the firm with "currency" that can be used to buy other companies or that can be offered to employees as incentive compensation. Having publicly traded equity securities provides liquidity, which may be especially important to firms that need to meet regulatory requirements, capital adequacy ratios, and liquidity ratios.

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## **LOS 42.g: Contrast the market value and book value of equity securities.**

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The primary goal of firm management is to increase the book value of the firm's equity and thereby increase the market value of its equity. The **book value of equity** is the value of the firm's assets on the balance sheet minus its liabilities. It increases when the firm has positive net income and retained earnings that flow into the equity account. When management makes decisions that increase income and retained earnings, they increase the book value of equity.

The **market value of equity** is the total value of a firm's outstanding equity shares based on market prices and reflects the expectations of investors about the firm's future performance. Investors use their perceptions of the firm's risk and the amounts and timing of future cash flows to determine the market value of equity. The market value and book value of equity are seldom equal. Although management may be maximizing the book value of equity, this may not be reflected in the market value of equity because book value does not reflect investor expectations about future firm performance.

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## **LOS 42.h: Compare a company's cost of equity, its (accounting) return on equity, and investors' required rates of return.**

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A key ratio used to determine management efficiency is the **accounting return on equity**, usually referred to simply as the **return on equity (ROE)**. ROE is calculated as net income available to common (net income minus preferred dividends) divided by the average book value of common equity over the period:

$$\text{ROE}_t = \frac{\text{NI}_t}{\text{average } \text{BV}_t} = \frac{\text{NI}_t}{(\text{BV}_t + \text{BV}_{t-1})/2}$$

Alternatively, ROE is often calculated using only beginning-of-year book value of equity (i.e., book value of equity for end of year  $t - 1$ ):

$$\text{ROE}_t = \frac{\text{NI}_t}{\text{BV}_{t-1}}$$

The first method is more appropriate when it is the industry convention or when book value is volatile. The latter method is more appropriate when examining ROE for a number of years or when book value is stable.

Higher ROE is generally viewed as a positive for a firm, but the reason for an increase should be examined. For example, if book value is decreasing more rapidly than net income, ROE will increase. This is not, however, a positive for the firm. A firm can also issue debt to repurchase equity, thereby decreasing the book value of equity. This would increase the ROE but also make the firm's shares riskier due to the increased financial leverage (debt).



### **PROFESSOR'S NOTE**

The DuPont formula discussed in the reading on Financial Analysis Techniques can help the analyst determine the reasons for changes in ROE.

The book value of equity reflects a firm's financial decisions and operating results since its inception, whereas the market value of equity reflects the market's consensus view of a firm's future performance. The **price-to-book ratio** (also called the **market-to-book ratio**) is the market value of a firm's equity divided by the book value of its equity. The more optimistic investors are about the firm's future growth, the greater its price-to-book ratio. The price-to-book ratio is used as a measure of relative value. Often, firms with low price-to-book ratios are considered *value stocks*, while firms with high price-to-book ratios are considered *growth stocks*.

### EXAMPLE: ROE, market, and book value of equity calculations

Given the following data for O'Grady Industries, calculate the return on average equity for 20X9 and the total market value of equity, the book value per share, and the price-to-book ratio at the end of 20X9.

| Fiscal Year-End Dec. 31        | 20X9    | 20X8    |
|--------------------------------|---------|---------|
| Total stockholder's equity     | 18,503  | 17,143  |
| Net income available to common | 3,526   | 3,056   |
| Stock price                    | \$16.80 | \$15.30 |
| Shares outstanding             | 3,710   | 2,790   |

#### Answer:

The return on average equity for 20X9 is:

$$\text{ROE}_t = \frac{\text{NI}_t}{\text{average } \text{BV}_t} = \frac{\text{NI}_t}{(\text{BV}_t + \text{BV}_{t-1})/2}$$

$$= \frac{\$3,526}{(\$18,503 + \$17,143)/2} = 19.78\%$$

The total market value of the firm's equity at the end of 20X9 is:

$$\$16.80 \times 3,710 = \$62,328$$

The book value per share at the end of 20X9 is:

$$= \frac{\$18,503}{3,710} = \$4.99$$

The price-to-book ratio at the end of 20X9 is:

$$= \frac{\$16.80}{\$4.99} = 3.37$$

## Investors' Required Return and the Cost of Equity

A firm's **cost of equity** is the expected equilibrium total return (including dividends) on its shares in the market. Cost of equity is usually estimated in practice using a dividend discount model or the capital asset pricing model. At any point in time, a decrease in share price will increase the expected return on the shares and an increase in share price will decrease expected returns, other things equal. Because the intrinsic

value of a firm's shares is the discounted present value of its future cash flows, an increase (decrease) in the required return used to discount future cash flows will decrease (increase) intrinsic value.

Investors also estimate the expected market returns on equity shares and compare this to the minimum return they will accept for bearing the risk inherent in a particular stock.

If an investor estimates the expected return on a stock to be greater than her minimum required rate of return on the shares, given their risk, then the shares are an attractive investment. Investors can have different required rates of return for a given risk, different estimates of a firm's future cash flows, and different estimates of the risk of a firm's equity shares. A firm's cost of equity can be interpreted as the minimum rate of return required by investors (in the aggregate) to compensate them for the risk of the firm's equity shares.



## MODULE QUIZ 42.2

1. Global depository receipts are most often denominated in:
  - A. the currency of the country where they trade and issued outside the United States.
  - B. U.S. dollars and issued in the United States.
  - C. U.S. dollars and issued outside the United States.
2. Which of the following types of preferred shares has the *most* risk for investors?
  - A. Putable shares.
  - B. Callable shares.
  - C. Non-putable, non-callable shares.
3. Which of the following *best* describes the book value of equity?
  - A. Management should attempt to maximize book value of equity.
  - B. Book value of equity decreases when retained earnings increase.
  - C. Book value of equity reflects investors' perceptions of the firm's future.
4. Which of the following causes of an increase in return on equity is *most likely* a positive sign for a firm's equity investors?
  - A. A firm issues debt to repurchase equity.
  - B. Net income is increasing at a faster rate than book value of equity.
  - C. Net income is decreasing at a slower rate than book value of equity.

## KEY CONCEPTS

### LOS 42.a

Common shareholders have a residual claim on firm assets and govern the corporation through voting rights. Common shares have variable dividends which the firm is under no legal obligation to pay.

Preferred stock typically does not mature, does not have voting rights, and has dividends that are fixed in amount but are not a contractual obligation of the firm.

Cumulative preferred shares require any dividends that were missed in the past (dividends in arrears) to be paid before common shareholders receive any dividends.

Participating preferred shares receive extra dividends if firm profits exceed a pre-specified level and a value greater than the par value if the firm is liquidated.

Convertible preferred stock can be converted to common stock at a pre-specified conversion ratio.

Callable shares allow the firm the right to repurchase the shares at a pre-specified price. Putable shares give the shareholder the right to sell the shares back to the firm at a pre-specified price.

#### **LOS 42.b**

Some companies' equity shares are divided into different classes, such as Class A and Class B shares. Different classes of common equity may have different voting rights and priority in liquidation.

#### **LOS 42.c**

Compared to publicly traded firms, private equity firms have lower reporting costs, greater ability to focus on long-term prospects, and potentially greater return for investors once the firm goes public. However, private equity investments are illiquid, firm financial disclosure may be limited, and corporate governance may be weaker.

#### **LOS 42.d**

Investors who buy foreign stock directly on a foreign stock exchange receive a return denominated in a foreign currency, must abide by the foreign stock exchange's regulations and procedures, and may be faced with less liquidity and less transparency than is available in the investor's domestic markets. Investors can often avoid these disadvantages by purchasing depository receipts for the foreign stock that trade on their domestic exchange.

Global depository receipts are issued outside the United States and outside the issuer's home country. American depository receipts are denominated in U.S. dollars and are traded on U.S. exchanges.

Global registered shares are common shares of a firm that trade in different currencies on stock exchanges throughout the world.

Baskets of listed depository receipts are exchange-traded funds that invest in depository receipts.

#### **LOS 42.e**

Equity investor returns consist of dividends, capital gains or losses from changes in share prices, and any foreign exchange gains or losses on shares traded in a foreign currency. Compounding of reinvested dividends has been an important part of an equity investor's long-term return.

Preferred stock is less risky than common stock because preferred stock pays a known, fixed dividend to investors; preferred stockholders must receive dividends before common stock dividends can be paid; and preferred stockholders have a claim equal to par value if the firm is liquidated. Putable shares are the least risky and callable shares are the most risky. Cumulative preferred shares are less risky than non-cumulative

preferred shares, as any dividends missed must be paid before a common stock dividend can be paid.

#### **LOS 42.f**

Equity securities provide funds to the firm to buy productive assets, to buy other companies, or to offer to employees as compensation. Equity securities provide liquidity that may be important when the firm must raise additional funds.

#### **LOS 42.g**

The book value of equity is the difference between the financial statement value of the firm's assets and liabilities. Positive retained earnings increase the book value of equity. Book values reflect the firm's past operating and financing choices.

The market value of equity is the share price multiplied by the number of shares outstanding. Market value reflects investors' expectations about the timing, amount, and risk of the firm's future cash flows.

#### **LOS 42.h**

The accounting return on equity (ROE) is calculated as the firm's net income divided by the book value of common equity. ROE measures whether management is generating a return on common equity but is affected by the firm's accounting methods.

The firm's cost of equity is the minimum rate of return that investors in the firm's equity require. Investors' required rates of return are reflected in the market prices of the firm's shares.

## **ANSWER KEY FOR MODULE QUIZZES**

### **Module Quiz 42.1**

1. **B** Participating preferred shares can receive extra dividends if firm profits exceed a pre-specified level and a value greater than the par value if the firm is liquidated. (LOS 42.a)
2. **A** Cumulative voting allows minority shareholders to gain representation on the board because they can use all of their votes for specific board members. (LOS 42.b)
3. **C** Private equity has less liquidity because no public market for it exists. The lower liquidity of private equity would increase required returns. (LOS 42.c)

### **Module Quiz 42.2**

1. **C** Global Depository Receipts are not listed on U.S. exchanges and are most often denominated in U.S. dollars. They are not issued in the United States. (LOS 42.d)
2. **B** Callable shares are the most risky because if the market price rises, the firm can call in the shares, limiting the investor's potential gains. Putable shares are the least risky because if the market price drops, the investor can put the shares back

to the firm at a predetermined price. The risk of non-putable, non-callable shares falls in between. (LOS 42.e)

3. A The primary goal of firm management is to increase the book value of equity. It increases when retained earnings are positive. The *market* value of equity reflects the collective expectations of investors about the firm's future performance. (LOS 42.g)
4. B Net income increasing at a faster rate than book value of equity generally would be a positive sign. If a firm issues debt to repurchase equity, this decreases the book value of equity and increases the ROE. However, now the firm becomes riskier due to the increased debt. Net income decreasing at a slower rate than book value of equity would increase ROE, but decreasing net income is not a positive sign. (LOS 42.h)

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<sup>1</sup> Ryan C. Fuhrmann, CFA, and Asjeet S. Lamba, CFA, *Overview of Equity Securities*, CFA Program Level I 2024 Curriculum, Volume 3 (CFA Institute, 2023).

## READING 43

# COMPANY ANALYSIS: PAST AND PRESENT

## MODULE 43.1: COMPANY RESEARCH REPORTS



Video covering this content is available online.

### LOS 43.a: Describe the elements that should be covered in a thorough company research report.

A **company research report** includes an analyst's valuation and investment recommendations, based on the company's projected earnings, cash flows, and financial position.

An initial research report for external distribution (said to be "initiating coverage" of a company) is likely to be thorough, followed by subsequent reports that are less thorough. These may focus on more specific topics or serve as updates to previously issued reports. A research report that is only for internal distribution is likely to be less thorough and may even be provided verbally.

Key items typically included in an initial company research report are as follows:

- Front matter (e.g., issuer name, buy/hold/sell recommendation, target buy/sell prices, and legal disclosures)
- Rationales for the recommendation
- Company description (e.g., business model, strategy)
- Industry overview and competitive positioning (e.g., industry size, growth rate and main drivers, profitability, competitive analysis)
- Financial analysis and model (e.g., past and pro forma financial statements; analysis and projection of revenue, cost, and cash flow drivers and sources and uses of capital)
- Valuation (e.g., value vs. target price, using either or both of relative and present value methodologies)
- Environmental, social, and governance factors
- Key upside and downside risks and their valuation impact

Key items typically included in a subsequent company research report are as follows:

- Front matter
  - Recommendation, including rationales for changes
  - Analysis of new information (e.g., variance analysis of expected vs. actual results; updated financial statements)
  - Changes to the initial valuation with supporting rationales
  - Changes in risks since the initial or most recent report
- 

### **LOS 43.b: Determine a company's business model.**

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A company's **business model** will highlight the key drivers that ultimately affect its income statement and balance sheet. The business model is the foundation for determining the analyst's expectations.

The business model considers the following items that describe its operations: (1) products and services, (2) customers, (3) sales channels, (4) pricing and payment terms, and (5) suppliers and other key relationships. Analysts should inquire into what and to whom the company is selling, its methods of obtaining customers, its methods of distributing its products or providing its services, its price setting, and its key supplier relationships. They should also analyze the bargaining power of customers (e.g., few or many customers) and the bargaining power of suppliers (e.g., specialized or common inputs). If a company uses a traditional business model, an analyst should highlight any ways this specific company's model differs from those used by its peers.

Analysts use four general types of information to determine a company's business model:

1. Information directly from the company (e.g., annual or quarterly regulatory filings, investor presentations, press releases, investor relations department, website)
2. Publicly available third-party information (e.g., analyst reports, government research and reports, news outlets, social media)
3. Proprietary third-party information (e.g., analyst reports, Bloomberg)
4. Proprietary primary research, performed or commissioned by the analyst (e.g., surveys, market studies)



#### **MODULE QUIZ 43.1**

1. Which of the following statements regarding company research reports subsequent to initiating coverage is *most accurate*?
  - A. The report updates the recommendation in light of new information about the company.
  - B. The primary audience is those who are not already knowledgeable about the company or security.
  - C. The report provides information such as industry overview, competitive positioning, and ESG considerations.
2. Reports and data from Bloomberg are *best* considered to be:
  - A. public third-party sources.
  - B. proprietary primary research.

C. proprietary third-party sources.

## MODULE 43.2: REVENUE, PROFITABILITY, AND CAPITAL



Video covering this content is available online.

### LOS 43.c: Evaluate a company's revenue and revenue drivers, including pricing power.

## Revenue Drivers

After analyzing a company's business model, and before financial forecasting that leads to an eventual valuation of a company, an analyst must examine the company's past and current financial statements. Financial statement analysis most commonly begins with the income statement—specifically, revenues. The focus is on **revenue drivers**, which can be analyzed on a bottom-up or top-down basis. In a bottom-up analysis, revenue is broken down into specific drivers such as price and volume, business segments, or geography. In a top-down analysis, macroeconomic variables such as market share or GDP growth serve as drivers of revenue. Analysts often use both approaches to evaluate a company.

## Pricing Power

Revenues are driven by prices, and prices are limited by the company's **pricing power**, the extent to which a company can determine its selling prices without hurting sales. Recall from Economics that pricing power depends on the market structure of an industry, as well as the company's competitive position in the market.

Highly competitive markets are characterized by companies that sell virtually identical items. In such cases, companies have low pricing power, and the price is determined by supply and demand. This means that all participants are price takers (will sell at the market price). In the long run, price-taker markets usually result in returns being close to the cost of capital, so there is zero economic profit. One notable exception is a **low-cost producer**. A company that has significantly lower costs than its competitors may earn returns exceeding the cost of capital, but to sustain such profits in the long run would require the company to maintain its cost advantage permanently.

Highly competitive markets are also characterized as follows: absence of product differentiation, many substitutes, few or no barriers to entry, little or no brand loyalty, and low or no switching costs. **Commoditization** describes an industry that is evolving toward this state as more participants enter the market. In a commoditizing industry, participants tend to innovate less and imitate each other more.

Less competitive markets (monopoly, oligopoly, monopolistic competition) are characterized by greater product differentiation, few or no substitutes, high barriers to entry, high customer loyalty, and high switching costs. In such markets, companies may have some or considerable pricing power, which allows for price increases without

significant declines in sales. Strategies such as value-based pricing and price discrimination require a company to have pricing power.

Profit margins can be an indicator of pricing power. When prices rise more than costs over time, this demonstrates the ability of a company to transfer those costs to its customers through higher prices without losing sales. This is more likely in a market that exhibits high switching costs or for a product that does not have good substitutes.

## Macro Factors

A top-down approach considers how external (macro) factors affect revenue, including market size and the company's market share. **Market size** refers to the total revenue of all the companies in the market. **Market share** is the ratio of the company's revenue to the market size. Tracking market share over time provides insights as to how favorably the company is viewed by customers.

Computing market size can be problematic. For example, should it include only sales of identical products, or should it include sales of similar or substitute products? Analysts typically include identical and similar products but exclude substitute products, but that is not always appropriate.

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### LOS 43.d: Evaluate a company's operating profitability and working capital using key measures.

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## Operating Costs

Company financial statements reflect three types of costs: operating costs, investing costs (e.g., purchase of capital and intangible assets), and financing costs (e.g., interest expense). Here we focus on operating costs, which are those a company incurs in generating current period revenue. An analyst might not necessarily regard a company's costs the same way IFRS and U.S. GAAP treat them. For example, research and development costs would logically be considered investing costs, but the accounting standards treat them as operating costs.

Operating costs are driven by business model and company size. We can categorize operating costs in the following three ways:

- By their relationship with output (fixed or variable)
- By nature (e.g., work in process, utilities, promotion)
- By function (e.g., selling, advertising, travel, income tax)

### *Analyzing Costs by Relationship With Output*

We can state operating profit in terms of fixed and variable costs, as follows:

$$\text{operating profit} = [Q \times (P - VC)] - FC$$

where:

$Q$  = number of units sold

$P$  = price per unit

$VC$  = variable costs per unit, those that change with the level of output  
(e.g., materials, direct labor)

$FC$  = fixed costs in total, those that do not change within a specific range of output (e.g., rent, management salaries)

The term  $(P - VC)$  in this equation is known as the **contribution margin (CM)** per unit. A company will earn profits when the CM per unit is positive and  $Q$  is large enough that the total contribution margin is greater than fixed costs.

**Operating leverage** results from the fixed portion of a company's operating costs. The larger the proportion of a company's costs that are fixed, the more rapidly operating profits will increase with a given increase in quantity sold (and the faster they will decrease with a given decrease in quantity). We can express operating leverage using a metric called **degree of operating leverage (DOL)**:

$$DOL = \% \Delta \text{ operating profit} / \% \Delta \text{ sales}$$

### *Analyzing Costs by Nature or Function*

In looking at costs from an accounting perspective, a functional classification is usually the norm. The result is consistency among companies in how they present income statement line items that refer to specific functions (e.g., "cost of sales" and "selling, general, and administrative").

Common metrics used for operating profitability include gross profit; earnings before interest, taxes, depreciation, and amortization (EBITDA); and earnings before interest and taxes (EBIT). EBIT is often referred to as operating profit.

- Gross profit = revenue – cost of sales
- EBITDA = gross profit – operating expenses
- EBIT = EBITDA – depreciation and amortization

We may divide each of these measures by revenue to produce the ratios gross margin, EBITDA margin, and EBIT margin (or operating margin).

Although functional cost classifications are not the same as classifying based on fixed and variable costs, the concepts overlap. For many companies the cost of sales is highly variable, so that gross margin and contribution margin are often similar amounts. Many operating expenses reported as separate line items on the income statement, such as rent, promotion, and management salaries, are mainly fixed in nature.

Operating costs are largely driven by the level of output. That is obvious for variable costs, but it is also true in the long run for fixed costs because increases in output eventually require cash outlays such as the purchase of more productive equipment.

Because companies within a particular industry earn the same types of revenues and incur similar input costs, it is competition among the companies that determines industry profitability. For example, in a highly competitive industry, if one company decreases its prices, then other companies are likely to follow. The end result may be

reduced industry profitability. Analysts should consider individual company profitability in the context of overall industry profitability.

**Economies of scale** occur when increasing output decreases unit costs. The basic idea is that the company's fixed costs are being allocated over a greater amount of output. However, even a company with a high proportion of variable costs can experience economies of scale if it becomes large enough to exert greater bargaining power over its suppliers and reduce its variable costs over time.

**Economies of scope** occur when adding divisions or product lines results in decreasing unit costs. This can result if multiple divisions or product lines share costs and reduce redundancies. For example, each division would need its own human resources department if it were a stand-alone company, but as divisions of a larger firm they can use the same human resources department.

## Working Capital

Recall from Corporate Issuers that analysts can evaluate a company's working capital management in terms of its cash conversion cycle. The longer the cash conversion cycle, the more need a company has to finance working capital.

Another key measure is the ratio of net working capital to sales. When net working capital is positive, the company can finance its working capital needs from internal sources. When net working capital is negative, financing is being provided by external sources (e.g., suppliers).

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### LOS 43.e: Evaluate a company's capital investments and capital structure.

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A company's sources of capital include cash flows from operations, proceeds from debt and share issuances, and proceeds from asset sales. Uses of capital include liquidity in the form of cash and marketable securities; purchases of tangible and intangible assets; debt repayment; dividend payments; and share repurchases.

Evaluating a company's capital investments involves determining whether the company has earned at least the required rate of return in the long run, and therefore created economic value from the investors' capital. Evaluating its capital structure involves determining whether its opportunities exceed the risks.

In assessing capital structure risks, analysts use measures such as leverage ratios, coverage ratios, and the **degree of financial leverage (DFL)**.

$$DFL = \% \Delta \text{ net income} / \% \Delta \text{ operating income}$$

DFL increases when a company adds fixed interest expense by borrowing.

Unlevered returns are expressed as return on assets (ROA) or return on invested capital (ROIC). Financial leverage is reflected in return on equity (ROE). Recall from Financial Statement Analysis that ROE can be decomposed using DuPont analysis to highlight the factors that affect it, including financial leverage.



## MODULE QUIZ 43.2

1. A pet food company earned \$500 million in revenue in the current year. Based on an estimated market share of 10%, what is the market size for pet food?
  - A. \$50.0 million.
  - B. \$4.5 billion.
  - C. \$5.0 billion.
2. Jayco, Inc., sells 10,000 units at a price of \$5 per unit. Jayco's fixed costs are \$8,000, interest expense is \$2,000, variable costs are \$3 per unit, and EBIT is \$12,000. Disregarding taxes, the degree of operating leverage (DOL) and degree of financial leverage (DFL) are *closest* to:
  - A. 2.50 DOL and 1.00 DFL.
  - B. 1.67 DOL and 2.00 DFL.
  - C. 1.67 DOL and 1.20 DFL.

## KEY CONCEPTS

### LOS 43.a

Key items typically included in an initial company research report are as follows:

- Front matter
- Recommendation, including rationales behind the recommendation
- Company description
- Industry overview and competitive positioning
- Financial analysis
- Valuation
- ESG factors
- Risks and their valuation impact

Key items typically included in a subsequent company research report are as follows:

- Front matter
- Changes in recommendation with rationales
- Analysis of new information
- Changes in valuation and risks

### LOS 43.b

A business model considers a company's products and services, customers, sales channels, pricing and payment terms, and reliance on key suppliers.

### LOS 43.c

Revenue drivers can be analyzed bottom-up based on financial statements or top-down based on economic and industry factors.

Pricing power is a function of market structure and a company's competitive position in the market. Companies in highly competitive markets have low pricing power. Pricing power for companies in less competitive markets may result from greater

product differentiation, lack of good substitutes, high barriers to entry, high customer loyalty, and high switching costs.

#### LOS 43.d

Operating profit =  $[Q \times (P - VC)] - FC$

Contribution margin per unit =  $(P - VC)$

Degree of operating leverage =  $\% \Delta$  operating profit /  $\% \Delta$  sales

Economies of scale occur when increases in output decrease unit costs. Economies of scope occur adding divisions or product lines decreases unit costs.

A long (short) conversion cycle indicates greater (less) need for external financing.

#### LOS 43.e

In assessing capital structure risks, the degree of financial leverage (DFL) is often used.

$DFL = \% \Delta$  net income /  $\% \Delta$  operating income

Unlevered returns are expressed as return on assets (ROA) or return on invested capital (ROIC). Levered returns are expressed as return on equity (ROE).

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 43.1

1. A Subsequent research reports update the recommendation and rationale from an initial research report. The primary audience for an *initial* company report is those who are not already knowledgeable about the issuer or security. (LOS 43.a)
2. C Reports and data from platforms such as Bloomberg and FactSet are classified as proprietary third-party sources, available for a fee. They are not publicly available for free (e.g., general news, social media), and the information provided is not primary research. (LOS 43.b)

### Module Quiz 43.2

1. C Market share = revenue / market size =  $0.10 = \$500$  million / market size. So, market size =  $\$5$  billion. (LOS 43.c)
2. C Jayco's operating income is  $\$12,000$ . If its sales increase by 1%, its operating income will increase to  $1.01(10,000)(\$5 - \$3) - \$8,000 = \$12,200$ , which is an increase of  $\$200 / \$12,000 = 0.0167$  or 1.67%. Therefore Jayco's DOL is  $1.67\% / 1\% = 1.67$ .

Jayco's net income is  $\$12,000 - \$2,000 = \$10,000$ . If its operating income increases by 1% to  $1.01(\$12,000) = \$12,120$ , its net income will increase to  $\$12,120 - \$2,000 = \$10,120$ , which is an increase of  $\$120 / \$10,000 = 0.012$  or 1.2%. Therefore Jayco's DFL is  $1.20\% / 1\% = 1.20$ .

(LOS 43.d, 43.e)

## READING 44

# INDUSTRY AND COMPETITIVE ANALYSIS

### MODULE 44.1: INDUSTRY ANALYSIS



Video covering this content is available online.

#### LOS 44.a: Describe the purposes of, and steps involved in, industry and competitive analysis.

Industry and competitive analysis is a macro approach to analyzing what drives industry size, profits, and market share, as well as determining a company's position within its industry.

Different industries have different long-run levels of profitability that depend on the opportunities they have and the risks to which they are exposed. Whether a company can sustain economic profits over time depends largely on its industry. Competition tends to drive company profitability toward an industry base rate over time.

Within a given industry, differences in profitability among the participants result from differences in business model, company size, and competitive strategy. While industry factors function as a limit on companies' profitability, company-specific factors have tended to be more to blame when firms underperform their industries.

The role of industry and competitive analysis is to determine an industry's base rate of profitability and what factors affect that rate. Based on this, an analyst can project the future profitability of the industry and assess companies' positions in relation to the industry median or mean.

Industry analysis is useful for improving financial forecasts by examining industry drivers and compiling industry-wide data. For an analyst, it is important not to underestimate the impact of macro factors and to remember that company-specific factors alone have a limited impact on a company's success.

Industry analysis is also useful for finding desirable investments that may have been overlooked without analyzing the overall industry and its participants. From a portfolio perspective, investors may desire more industry-specific risk and less company-specific risk. This can be achieved through smaller investments in multiple companies within a targeted industry.

Industry and competitive analysis involves five steps:

1. *Define the industry.* This involves some subjectivity as to what factors define an industry (such as product similarity or geographical region) and how to treat companies that operate in multiple industries. Classification systems produced by third parties can be useful.
  2. *Survey the industry* in terms of its size, growth rate, profitability, and trends in the market shares of its participants.
  3. *Analyze the industry structure* using a framework such as Porter's five forces and determine which forces are key for the industry's profitability.
  4. *Examine external influences* on the industry, such as political, economic, social, technological, legal, and environmental impacts (PESTLE).
  5. *Analyze companies' competitive strategies* in terms of how each company fits within the industry and what competitive advantages each company has.
- 

### **LOS 44.b: Describe industry classification methods and compare methods by which companies can be grouped.**

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Many problems exist in properly defining an industry. Initially, there were government-created classification systems that were production based (e.g., manufacturing, distribution, retail) and infrequently updated with new companies. With the rise of global markets and evolving technology, such national classification systems eventually become obsolete. As a result, third-party firms developed more global industry classification systems that are more useful to analysts. Classifying firms by industry provides a method of examining trends and firm valuations. It also allows analysts to compare firms in different countries.

## **Commercial Classifications**

One way to group companies into an industry is by the *products and services* they offer. For example, firms that produce automobiles constitute the auto industry. A **sector** is a group of similar industries. Hospitals, doctors, pharmaceutical firms, and other industries are included in the health care sector. Systems that are grouped by products and services usually classify firms by their principal business activity (largest source of sales or earnings).

Commercial industry classifications include the Global Industry Classification Standard (GICS), which was developed by S&P Dow Jones Indices and MSCI, and the Industry Classification Benchmark (ICB), which was developed by FTSE Russell for public companies. The Refinitiv Business Classification (TRBC) includes public companies, private companies, not-for-profits, and government entities.

The hierarchical structures (four or five tiers) for these classification systems are as follows:

- GICS: sector, industry groups, industries, subindustries
- ICB: industries, supersectors, sectors, subsectors
- TRBC: economic sectors, business sectors, industry groups, industries, activities

While their nomenclature may differ, the top level for all three systems consists of 11 common sectors or industries as follows:

1. Energy
2. Financials
3. Basic materials
4. Information technology
5. Industrials
6. Telecommunications services
7. Consumer discretionary/cyclical
8. Utilities
9. Consumer staples/noncyclical
10. Real estate
11. Health care

The process these providers use to classify firms may be summarized as follows:

- A firm with one business line is classified in that business line.
- A firm with multiple business lines is classified in the one that comprises more than 60% of total revenue.
- If no business line meets the 60% test, classify the firm by a business line that accounts for more than 50% of total revenue, profits, or assets.
- If no business line meets the 50% test, use judgment to select the most appropriate business line, or classify the firm as a conglomerate.

### ***Potential Limitations of Classification Systems***

#### ***Inappropriate Groupings***

Some of the industry groupings may be either too wide or too narrow for an analyst's specific needs. When this occurs, an analyst might choose to use different classification tiers and possibly alter the groupings on a subjective basis. In some instances, firms may be classified in the same group when an analyst would prefer to separate them. For example, "computer software" could range from accounting and bookkeeping software to nutrition management software. An analyst might want to focus on a smaller group that produces directly competing products. In other instances, companies that sell a wide variety of products (such as large retailers like Costco or Walmart) might be classified in different industries or subindustries, even if an analyst might consider them competitors.

#### ***Companies Selling Multiple Products***

Given the nature of the classification systems, a single company with multiple divisions in differing industries is assigned to one group only. This creates comparability issues if a given division of a company is not in the same industry as the one assigned to the overall company. A prominent example would be Amazon being assigned to the

“consumer discretionary retailer” industry, even though most of its profits come from its activities in IT service management.

### *Geography*

For services such as health care or insurance that companies largely cannot offer on a global basis, it makes sense to analyze them in terms of local or national markets. The reverse is true for media companies that were local in nature in the pre-internet age, but can now compete on a global level by offering their services to virtually anyone in any place.

### *Grouping Changes*

To recognize natural business changes over time, classification system providers update their groupings periodically. This can disrupt the continuity of industry-level statistics, and it may be necessary to revise historical data to be consistent with current grouping systems. For example, some existing sectors may be further subdivided with new sectors established, which means the historical results of the subdivided sector will be difficult to compare with future results. New companies being established and companies going out of business change the constituents of groupings and can impair comparability. Over long periods, industry data may exhibit survivorship bias.

## **Other Ways to Group Companies**

Companies can be grouped in ways other than by product or service. These ways are often useful for constructing indexes and performing investment attribution analysis.

### *Geography*

Companies can be grouped by countries, which in turn can be assigned categories such as developed, emerging, or frontier economies. The country is most often where a company is headquartered or listed on an exchange, even if it does most of its business elsewhere. For example, Toyota is considered a Japanese company but generates most of its revenues in North America.

### *Business Cycle Sensitivity*

We can describe companies’ sensitivity to business cycles on a range from defensive to cyclical. A **defensive company** produces goods and services for which demand is relatively stable over the business cycle. Examples of defensive sectors include health care, utilities, telecommunications, and consumer staples. Those are items required for day-to-day living, for which demand is not affected significantly by the business cycle stage.

A **cyclical company** is one whose earnings are highly dependent on the stage of the business cycle. Such firms have high earnings volatility and typically high operating leverage. Their products are often materials or equipment sold to other producers, or high-unit-value items whose purchase can be delayed until the economy improves. Examples of cyclical industries include basic materials and processing, consumer

discretionary, energy, financial services, industrial and producer durables, and technology.

### ***Financial Measures***

Groupings may occur based on company size (e.g., market capitalization) or other financial measures such as valuation and profitability ratios or growth rates of earnings or sales. Groupings based on financial measures demonstrate more turnover in their composition than groupings based on country or product, because a company's financial measures are much likelier to change than its country or industry.

Alternatively, statistical methods like cluster analysis can be used. This method groups firms that historically have had highly correlated returns. The resulting groups should then have lower returns correlations with each other.

### ***Environmental, Social, and Governance (ESG)***

ESG factors such as the level of personnel diversity or use of "green" production methods can be quantified and reported as standardized ESG scores.

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### **LOS 44.c: Determine an industry's size, growth characteristics, profitability, and market share trends.**

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## **Industry Size**

**Industry size** is total annual sales of the product, which is not always the same as total annual sales of all the companies in the industry. Because some of the companies included in the industry operate in multiple product lines, only a fraction of a company's total annual sales might be relevant for a given industry.

In some industries, the overall size may include a significant percentage of sales from private companies and unincorporated businesses, which creates problems in gathering relevant data. In these cases, industry size is usually approximated using alternative data, such as government economic indicators or independent third-party data.

## **Industry Growth Characteristics**

An industry growth rate can be calculated as an annual rate each year or as a compound annual growth rate over several years. Analysts classify industry groups broadly as growth industries or mature industries.

**Growth industries** are those with product markets that have considerable growth potential, which is often related to new technology. Drivers of success in growth industries tend to be independent of the general economy. Analysts must judge the persistence of the high growth rates and estimate when they will begin to decline. This is more problematic when growth is based on an emerging technology.

In contrast, **mature industries** have little or no growth potential remaining in their markets. Industry growth rates are likely in line with the general economy, or may be declining if the industry faces threats from substitute products. Analysts should focus

on any significant changes in the intensity of competition among industry participants as well as any signs that the industry might be declining overall.

Business cycle sensitivity also needs to be considered. Cyclical industries experience more volatility in returns, but varying perceptions of the duration and severity of business cycles can result in a wide range of valuations.

A style box can be used to classify industries based on business cycle sensitivity (cyclical vs. defensive) and growth rate (mature vs. growth). For example, utilities can be classified as a defensive and mature industry; crude oil production as cyclical and mature; biotechnology as defensive and growth; and digital advertising as cyclical and growth.

This sort of analysis has some drawbacks. A broad economic recession will probably hurt all companies, so classification as cyclical or defensive is a matter of degree. It is also possible to have growth firms in a cyclical industry that are relatively unaffected by a recession as their product gains increasing acceptance with the public.

## Industry Profitability

Ideally, industry profitability should be based on return on invested capital (ROIC), which is an after-tax metric independent of capital structure. Companies can be segmented in deciles or percentiles, for example, to observe a company's relative profitability over time. Unfortunately, it is often impractical to estimate ROIC for private companies that do not have publicly available financial statements. Instead, analysts may use the returns of publicly traded companies and assume they are similar for private companies, based on publicly available market prices for the end products and production costs, or using data provided by the government or a third-party researcher.

The goal is to determine if there are any clear trends—increasing, decreasing, or stable industry profits over time.

**唯一微信：xuebjun88s**

## Market Share

Market share is a company's annual revenues divided by the industry size. Because measuring industry size is problematic, market shares are estimates rather than exact data. The trend in a company's market share over time is crucial for determining whether its products are viewed favorably by customers.

Acquiring a competitor automatically increases a company's market share. Closer investigation is needed to determine if a company is increasing its market share net of acquisitions.

Industry concentration is often expressed numerically through the Herfindahl-Hirschman Index (HHI). The HHI is the sum of the squares of the market shares of all participants. For example, a market consisting of five firms each with shares of 35, 25, 20, 10, and 10 would have an HHI of  $35^2 + 25^2 + 20^2 + 10^2 + 10^2 = 2,450$ . An industry with an HHI less than 1,500 is considered to have low concentration; HHI between

1,500 and 2,500 is considered moderate concentration; and an HHI greater than 2,500 indicates high concentration.

In general (with notable exceptions in the case of local industries and highly differentiated products), low or decreasing concentration implies higher competitive intensity, less pricing power, and lower profitability; while high or increasing concentration implies lower competitive intensity, more pricing power, and greater profitability.



### MODULE QUIZ 44.1

1. Industry classification systems from commercial index providers typically classify firms by:
  - A. statistical methods.
  - B. products and services.
  - C. business cycle sensitivity.
2. Firms and industries are *most appropriately* classified as cyclical or non-cyclical based on:
  - A. their stock price fluctuations relative to the market.
  - B. the sensitivity of their earnings to the business cycle.
  - C. the volatility of their earnings relative to their competitors.

## MODULE 44.2: INDUSTRY STRUCTURE AND COMPETITIVE POSITIONING



Video covering this content is available online.

**LOS 44.d: Analyze an industry's structure and external influences using Porter's Five Forces and PESTLE frameworks.**

### Porter's Five Forces

One component of an analyst's industry analysis should be industry structure analysis, which examines how an industry's competitive environment influences a firm's strategy. The analysis framework developed by Michael Porter<sup>1</sup> delineates five forces that determine industry competition—and ultimately, the industry's long-run profitability. Of the five forces described next, if some or all of them are strong, then firms will likely earn zero or close to zero economic profits (return on invested capital minus cost).

1. *Rivalry among existing competitors.* Rivalry increases when many firms of relatively equal size compete within an industry. Slow growth leads to competition as firms fight for market share, and high fixed costs lead to price decreases as firms try to operate at full capacity. For example, the high fixed costs in the auto industry from capital investments and labor contracts force firms to produce a large number of vehicles that they can only sell at low margins. Industries with products that are undifferentiated or have barriers (are costly) to exit tend to have high levels of competition.
2. *Threat of entry.* Industries that have significant barriers to entry (e.g., large capital outlays for facilities) will find it easier to maintain premium pricing. It is costly to

enter the steel or oil production industries. Those industries have high barriers to entry and thus less competition from newcomers. An analyst should identify factors that discourage new entrants, such as economies of scale.

3. *Threat of substitutes*. Substitute products limit the profit potential of an industry because they limit the prices firms can charge by increasing the elasticity of demand. Commodity-like products have high levels of competition and low profit margins. The more differentiated the products are within an industry, the less price competition there will be. For example, in the pharmaceutical industry, patents protect a producer from competition in the markets for patented drugs.
4. *Power of buyers*. Buyers' ability to bargain for lower prices or higher quality influences industry profitability. Bargaining by governments and ever-larger health care providers have put downward pressure even on patented drugs.
5. *Power of suppliers*. Suppliers' ability to raise prices or limit supply influences industry profitability. Suppliers are more powerful if there are just a few of them and their products are scarce. For example, Microsoft is one of the few suppliers of operating system software and thus has pricing power.

The first two forces deserve further attention because almost all firms must be concerned about the threat of new entrants and competition that would erode profits. Studying these forces also helps the analyst better understand the subject firm's competitors and prospects. The following summary describes how these two factors influence the competitive environment in an industry:

- Higher barriers to entry reduce competition.
- Greater concentration (a small number of firms control a large part of the market) reduces competition, whereas market fragmentation (a large number of firms, each with a small market share) increases competition.
- Unused capacity in an industry, especially if prolonged, results in intense price competition. For example, underutilized capacity in the auto industry has resulted in very competitive pricing.
- Stability in market share reduces competition. For example, loyalty of a firm's customers tends to stabilize market share and profits.
- More price sensitivity in customer buying decisions results in greater competition.
- Greater maturity of an industry results in slowing growth.

An example of an analysis using Porter's five forces is provided next.

#### **EXAMPLE: Porter's five forces analysis for U.S. retail<sup>2</sup>**

##### **Threat of New Entrants: Very High**

Opening a retailer, especially an ecommerce retailer that uses third-party merchant services, is relatively easy and common. In the United States, retailers are the most common type of business formed—by a wide margin, with over 40,000 new firms filing formation papers each month (the next-most common is transportation and warehousing, with around half the number of retailer formations). Customers can easily switch retailers, as most do not have an ongoing relationship such as a subscription fee or contract, and there are minimal regulatory barriers such as licenses and patents.

### **Threat of Substitutes: Low**

Broadly speaking, the substitute for retail is consumer services (e.g., restaurants, travel, health care), which also includes digital services (e.g., streaming video subscriptions and gaming). Most categories of goods, however, are not easily replaceable with services (e.g., apparel and home decor), or they enjoy a cost advantage because of lower labor intensity (e.g., fresh food). There have been periods when services grew faster than goods, but as shown in an earlier exhibit, retail sales have grown essentially in line with U.S. nominal output/income. Retail is arguably one of the oldest industries, and while it has evolved over time, it has yet to be replaced.

### **Bargaining Power of Customers: Moderate**

Retail customers are highly fragmented, with each consumer representing a distinct decision maker, as there are generally no group purchasing organizations. However, many products are sold by many retailers, and the internet has enabled easy comparison shopping at retailers. Customers are price sensitive, with respect to identical products sold by different retailers.

### **Bargaining Power of Suppliers: Low to Moderate**

Key suppliers for retailers include manufacturers of goods, employees, and lessors of retail or fulfillment space. In most cases, numerous options are available. However, branded goods are sold exclusively by a sole manufacturer that may impose high prices and other economic terms, like shelf space and visibility, and may want to sell only to certain retailers (e.g., makers of luxury goods may not sell to discount retailers to maintain exclusivity).

### **Rivalry Among Existing Competitors: High**

Given the sheer number of similarly sized firms selling similar or identical products, retailers compete fiercely, often with price promotions and discounts. Price is one of the few ways that they can lure customers away from competitors.

## **PESTLE Analysis**

While Porter's five forces are crucial for internal analysis of an industry, an analyst must also consider the external factors that may affect it. In that regard, a **PESTLE analysis** considers political, economic, social, technological, legal, and environmental factors. Because the nature of external factors is that they tend to evolve gradually, a PESTLE analysis does not need to be performed as frequently as an analysis of competitive forces. Not all of the influences might be key for a specific industry; analysis should focus on only the key influences.

*Political influences* have an important and widespread effect on businesses through various channels, including taxes and regulation. Three sectors that are most notably exposed to political influences are energy, health care, and defense.

The energy sector must consider three specific political influences:

1. Governments desire low and stable energy prices to maintain their popularity with the general public, who would otherwise have to bear most of the burden of rising energy prices.
2. Climate agreements and regulations, which are aimed at reducing emissions, conflict with the desire for low prices for nonrenewable energy sources (mainly fossil fuels). If governments remain focused on reducing fossil fuel use in the future, higher energy prices are unavoidable.
3. The Organization of the Petroleum Exporting Countries (OPEC) has significant influence on energy prices. It is likely that as a group, the OPEC members desire to maintain low energy prices to lengthen the move to renewable energy sources.

The influence of governments is substantial for the health care sector because governments are the largest purchasers of health care products and services. For political reasons, governments may increase the amount of public health care provided (by purchasing more products and services from the providers), or may implement price controls or ration services.

For the defense sector, governments are usually the only buyers. The amount of defense spending depends on the level of geopolitical threats and military commitments among allied nations. Defense spending is also constrained by competing fiscal spending priorities, including health care.

*Economic influences* can be cyclical trends (economic output as measured by GDP or some other measure) or structural trends such as productivity improvements and the size of the labor force. Interest rates affect financing costs for firms and individuals, as well as financial institution profitability. Credit availability affects consumer and business expenditures and funding. Inflation affects costs, prices, interest rates, and business and consumer confidence. Economic influences are key for cyclical sectors.

*Social influences* relate to trends in how people work, play, spend their money, and conduct their lives. These factors are particularly important for industries that sell directly to individuals. For example, the increased presence of social media and “influencers” has increased the demand for high-quality beauty products. Some companies are bowing to pressures to use sustainable inputs and to ensure that production processes are ethical and observe human rights.

*Technological influences* can change an industry dramatically through the introduction of new or improved products, which can make some existing products redundant. We can categorize technological innovations as sustaining or disruptive. **Sustaining innovation** refers to improvements in a product over time that do not fundamentally change its nature. In contrast, **disruptive innovation** creates a new market, or enters an existing market and creates value in a new way. An example of a business that experienced disruptive innovation is photography, which has largely moved from film to digital media. Disruptive innovation typically comes from new entrants to an industry. Existing firms may continue to succeed during the time it takes for customers to accept a new innovation, but to maintain market share in the long term, it is necessary to become part of the disruptive innovation, even though it will cannibalize their existing business.

*Legal influences* consider changes in laws and regulations that present both business risks and opportunities. Consider the tobacco industry, which has faced declining revenues due to laws implemented in many jurisdictions over the past few decades, such as prohibiting smoking in public places and requiring extensive disclosures on cigarette packages. In contrast, consider the relatively new cannabis industry that has developed in jurisdictions that have legalized its sale and use.

*Environmental influences*, such as climate change and concerns about environmental sustainability of some industries, continue to gain importance as a factor in industry growth and profitability.

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#### **LOS 44.e: Evaluate the competitive strategy and position of a company.**

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Every company can be said to have a competitive strategy, whether intentionally or not. Intentional strategies are carefully planned and follow repeated cycles of execution and evaluation to refine. Unintentional strategies are haphazard, with little or no coordination and an emphasis on following past or industry practices. Much of the time, unintentional strategies do not provide optimal results, although there have been some notable exceptions—particularly in the pharmaceutical industry, where many new drugs were developed by smaller companies following a more informal and less organized approach.

Effective competitive strategies are known with hindsight by producing consistent and positive economic profits over the long run. On a forward-looking basis, competitive strategies can be evaluated by considering whether the strategy can respond appropriately to the relevant forces, whether the strategy is neutral to or benefits from relevant external influences, and whether the firm is able to execute the strategy properly.

Porter has identified three types of competitive strategies: a cost leadership (low-cost) strategy, a product or service differentiation strategy, and a focus strategy. According to Porter, a firm must choose one of these to compete effectively.

In a **cost leadership strategy**, the firm seeks to have the lowest costs of production in its industry, offer the lowest prices, and generate enough volume to make a superior return. The strategy can be used defensively to protect market share, or offensively to gain market share. A cost leadership firm should have managerial incentives that are geared toward improving operating efficiency.

In a **differentiation strategy**, the firm's products and services should be distinctive in terms of type, quality, or delivery. For success, the firm's cost of differentiation must be less than the price premium that buyers are willing to pay for it. The price premium should also be sustainable over time. Successful differentiators will have outstanding marketing research teams (to allow for premium pricing), strong production personnel (to allow for superior quality), and creative advertising personnel (to promote unique product features).

A **focus strategy** refers to targeting a niche market. Executing a focus strategy can include aspects of both cost leadership and differentiation.

Figure 44.1 summarizes the three generic competitive strategies.

**Figure 44.1: Generic Competitive Strategies<sup>3</sup>**

|  | <b>Cost Leadership</b>   | <b>Differentiation</b>   | <b>Focus</b>  |
|--|--|--|---|
| Means of executing strategy                                | <ul style="list-style-type: none"> <li>■ Economies of scale from fixed costs</li> <li>■ Favorable access to raw materials</li> <li>■ Culture of strict cost control</li> <li>■ Aggressive pricing to gain high volume</li> <li>■ Low-cost distribution</li> <li>■ Economies of scope</li> </ul>  | <ul style="list-style-type: none"> <li>■ Investments in advertising, brand, customer service, proprietary distribution channels</li> <li>■ Protection using trademarks, copyright, patents</li> <li>■ Superior quality, unique features</li> <li>■ Culture of strong customer experience</li> <li>■ Premium pricing</li> <li>■ Integration of services, software, and hardware</li> </ul>  | <ul style="list-style-type: none"> <li>■ Proximity to customers and strong understanding of their needs</li> <li>■ May incorporate elements of strategy from both cost leadership and differentiation, but focused on particular group</li> </ul>                                       |
| Which of the Five Forces it defends against (why it works) | <ul style="list-style-type: none"> <li>■ Threat of new entrants: Capital requirements and scale advantages deter entrants</li> <li>■ Bargaining power of customers: Customers can only bring prices down to the costs of the marginal producer, leaving margin for the cost leaders</li> <li>■ Industry rivalry: Rivals may not be able to compete on price with cost leaders</li> </ul> | <ul style="list-style-type: none"> <li>■ Threat of new entrants and of substitutes: Customer loyalty to unique product can deter switching, protect market share</li> <li>■ Bargaining power of customers: Customers may be unable to unwilling to comparison shop or switch</li> <li>■ Bargaining power of suppliers: The company may have the ability to pass along price increases to customers and/or margin to absorb cost increases</li> </ul> | <ul style="list-style-type: none"> <li>■ Threat of new entrants and of substitutes: Customer loyalty to unique product can deter switching, protect market share</li> <li>■ Bargaining power of customers: Customers may be unable or unwilling to comparison shop or switch</li> </ul> |
| Industry appropriateness                                   | <ul style="list-style-type: none"> <li>■ Capital intensive</li> <li>■ Price-conscious customers</li> <li>■ Customers do not value or notice product differences</li> <li>■ Minimal innovation in industry</li> </ul>   | <ul style="list-style-type: none"> <li>■ Price is not foremost concern for customers</li> <li>■ Customers value distinctiveness</li> <li>■ Innovation in industry, with products varying in features and forms</li> </ul>  | <ul style="list-style-type: none"> <li>■ Difficult (or uneconomical) to serve customer group, product, or geography for other players</li> </ul>  |
| Risks to the strategy                                      | <ul style="list-style-type: none"> <li>■ Cost inflation, loss of discipline</li> <li>■ Technological change that results in loss of cost leadership or market share</li> <li>■ Desire for premiumization among customers</li> </ul>  | <ul style="list-style-type: none"> <li>■ Imitation by competitors</li> <li>■ Buyers become sophisticated, no longer demand level of service</li> <li>■ Pricing premium becomes too high for customers to bear</li> <li>■ May preclude high market share, as customers value exclusivity</li> </ul>   | <ul style="list-style-type: none"> <li>■ Larger competitors outcompete on price</li> <li>■ The differences in demand between the narrow group and industry as a whole</li> <li>■ Buyers become sophisticated, no longer demand level of service</li> </ul>                              |



## MODULE QUIZ 44.2

1. Two of the five competitive forces in the Porter framework are:
  - A. threat of entry and barriers to exit.
  - B. power of suppliers and threat of substitutes.
  - C. rivalry among competitors and power of regulators.
2. Which of the following *best* describes a cost leadership strategy?
  - A. Volume sold can range from modest to high.
  - B. Managerial incentives promote operational efficiency.
  - C. Success depends heavily on investments in customer service and proprietary distribution channels.

## KEY CONCEPTS

### LOS 44.a

Industry and competitive analysis involves five steps:

1. Define the industry
2. Survey the industry's size, growth, profitability, and market share trends
3. Analyze the industry's structure
4. Analyze external influences on the industry
5. Determine industry participants' competitive strategies

### LOS 44.b

The three classification systems and their hierarchical structures (four or five tiers) are as follows:

- GICS: sector, industry groups, industries, subindustries
- ICB: industries, supersectors, sectors, subsectors
- TRBC: economic sectors, business sectors, industry groups, industries, activities

Potential limitations of classification systems include inappropriate groupings, inaccurate classifications of companies selling multiple products, inability to deal with products and services offered in local or national markets only, and grouping changes over time.

Other ways to group companies are by country or region, business cycle sensitivity, financial measures, and ESG considerations.

### LOS 44.c

Industry size is the total annual sales of the product, which is not always the same as total annual sales of all the companies in the industry.

Growth industries are those that have considerable growth potential, which is usually related to new technology. Mature industries have growth rates in line with the general economy or decreasing as the industry faces threats from substitute products.

Cyclical industries involve sales of less essential items for consumers, while defensive industries involve sales of more essential items.

Market share is a company's annual revenues as a percentage of the industry size. Industry concentration is often expressed numerically using the Herfindahl-Hirschman Index.

#### **LOS 44.d**

Porter's five forces that determine industry competition are as follows:

1. Threat of new entrants
2. Threat of substitutes
3. Bargaining power of customers
4. Bargaining power of suppliers
5. Rivalry among existing competitors

A PESTLE analysis consists of the following elements:

1. Political influences
2. Economic influences
3. Social influences
4. Technology influences
5. Legal influences
6. Environmental influences

#### **LOS 44.e**

In a cost leadership strategy, the firm seeks to have the lowest costs of production in its industry, offer the lowest prices, and generate enough volume to make a superior return.

In a differentiation strategy, the firm's products and services should be distinctive in terms of type, quality, or delivery.

In a focus strategy, a niche market is targeted.

### **ANSWER KEY FOR MODULE QUIZZES**

#### **Module Quiz 44.1**

1. **B** Commercial classification systems (e.g., GICS, ICB, and TRBC) classify firms according to the product or service they produce. (LOS 44.b)
2. **B** For industry analysis, cyclical firms and industries are those with earnings that are highly dependent on the business cycle, while non-cyclical firms and industries are those with earnings that are relatively less sensitive to the business cycle. (LOS 44.c)

#### **Module Quiz 44.2**

1. **B** Porter's five forces are rivalry among existing competitors, threat of entry, threat of substitutes, bargaining power of buyers, and bargaining power of suppliers.

(LOS 44.d)

2. **B** Firms that use a cost leadership strategy should have managerial incentives to create efficient operations. In a cost leadership strategy, the firm seeks to generate a high-enough sales volume to make a superior return. Investments in customer service and proprietary distribution channels are key elements of a differentiation strategy. (LOS 44.e)
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<sup>1</sup> Michael Porter, "The Five Competitive Forces That Shape Strategy," *Harvard Business Review*, Volume 86, No. 1: pp. 78–93.

<sup>2</sup> Reprinted from the Level I CFA curriculum learning module "Industry and Competitive Analysis," with permission from CFA Institute.

<sup>3</sup> Reprinted from the Level I CFA curriculum learning module, "Industry and Competitive Analysis," with permission from CFA Institute.

## READING 45

# COMPANY ANALYSIS: FORECASTING

## MODULE 45.1: FORECASTING IN COMPANY ANALYSIS



Video covering this content is available online.

### LOS 45.a: Explain principles and approaches to forecasting a company's financial results and position.

Financial statement forecasts are used for both valuation and investment recommendations. Forecasts that will be distributed to external users typically emphasize key metrics such as revenue and EPS. A company's internal forecasts can be much more thorough and may span many future years.

### Forecast Objects

The four key **forecast objects** include the following:

- *Financial statement lines with clear drivers.* For example, in the retail industry, an analyst might model net sales as being driven by the number of stores operating and sales per store. The primary advantages of forecasting drivers are explanatory value and forecast accuracy. A disadvantage is that a given line item could have numerous drivers that are difficult to forecast as a group.
- *Financial statement items without clear drivers.* An analyst can forecast these items directly, using estimates obtained from management or by adjusting amounts from prior years.
- *Summary measures.* Metrics such as earnings per share or free cash flow combine several financial statement line items. Forecasting summary measures is most effective when they are not subject to significant period-to-period fluctuations. Summary measures speed up the forecasting process, but the results are less transparent for users of the forecasts.
- *Ad hoc items.* An analyst might want to account for events a company's financial statements do not yet reflect. These might include contingent liabilities (e.g., regulatory change requiring future costs to comply) and potential gains or losses (e.g., windfall from an expected victory in a lawsuit).

It is best to base forecasts on information that is readily available and reasonably frequent and recurring. For example, with a company that produces multiple products or operates multiple divisions, an analyst would like the financial statements to provide details on individual product lines or divisions. If financial information is only provided on a consolidated basis, it is much more difficult to perform a more detailed forecast.

An analyst should avoid making forecasting models more complicated or detailed than necessary. Complex models require significant effort to create and to maintain and are not necessarily more accurate than simpler models. It is often beneficial to eliminate a few steps to avoid uneconomical work on items that do not materially improve a forecast.

## Forecast Approaches

The following four forecast approaches can be used individually or combined:

1. Base forecasts on historical results.
2. Assume results will converge to a historical base rate.
3. Use management guidance.
4. Use other methods to make discretionary forecasts.

### ***Historical Results***

The most basic forecasting method is to use actual past results as the starting point and assume the results will continue in the future. Of course, the major drawback is that past conditions might not be the same in the future. Using historical results works best for companies and industries that are noncyclical or in the mature stage. As well, using historical results is often done to forecast objects considered immaterial.

This approach can be inappropriate for companies operating in a cyclical industry because a year-by-year comparison could see the economy in a different stage of the business cycle. A longer or multiyear forecast that accounts for the full business cycle would make more sense. Analysts should also not rely on historical results for firms that are transitioning into a new competitive strategy or significantly changing their business operations.

### ***Historical Base Rate Convergence***

An analyst might assume that a forecasting object, such as a company's growth rate, will converge to an industry average or median growth rate (or even the rate of GDP growth, if appropriate). This base rate should be computed over a sufficiently long and representative time period. The approach makes sense for established industries with many competitors that are publicly traded, and for industries where few structural changes or external disruptions are expected. It also makes sense for relatively new companies that are transitioning to become more like their larger and more established competitors.

For industries that are new or rapidly changing, determining a base rate may be difficult and assuming forecast objects will converge to it might not be appropriate. This approach is also not appropriate for cyclical industries because it is likely to

underestimate the volatility of their results. Finally, for companies that are dominant in their industry, this approach essentially becomes the historical results method because the dominant company accounts for most of the calculated industry base rate.

### ***Management Guidance***

Managers of public companies often reveal their earnings and revenue targets for the upcoming periods. The first disclosures for a coming year might occur during the fourth quarter of the current year, with quarterly updates during the year. Because management has internal and industry information that is unavailable to the public, analysts pay close attention to management's forward-looking guidance.

Guidance may be detailed, but it is rarely presented as a point estimate and much more frequently presented as a range (e.g., operating expenses are expected to increase by 1% to 3% in the coming year). Such guidance contains a significant number of assumptions by management regarding factors such as GDP growth, pricing changes, and cost increases. Analysts and investors are particularly interested in determining whether management's assumptions make sense in the current economic and operating environment. It may not always be prudent for analysts to use the midpoint of the range to gauge management expectations. Managements have been known to shade their revenue growth ranges downward and their expense growth ranges upward to give the impression that they have exceeded expectations once actual results are determined.

Using management guidance is best when management has a proven history of providing reasonable estimates. This can be verified by performing variance analyses of budget versus actual. Similar to the other approaches, using guidance may not be helpful for cyclical companies because management might be no better than the analyst at forecasting business cycles. However, management is likely to make better forecasts for items that are more in their control, such as expenses and fixed investment.

### ***Analyst Discretionary Forecast***

This is the "catch all" for any other forecasting approach than the three we have discussed. Discretionary forecasts can be derived from surveys, models, or probability distributions. They are most appropriate when the other approaches tend to fall short, such as for companies in cyclical industries, with few or no peers, that do not offer guidance, or are in a significant transition of their operations. For example, forecasting the effects on energy companies of transitioning to renewable energy sources cannot rely on historical precedent. Instead, an analyst must create a forecast using publicly available information such as regulatory changes, implementation timelines, and emission reduction targets.

## **Forecast Horizon**

The appropriate forecast horizon for any particular analysis depends on factors such as an investor's or portfolio manager's time horizon, whether the industry is cyclical, or factors specific to a company. For cyclical industries, a forecast horizon should be at least long enough to include the midpoint of a business cycle. Specific company changes

made to improve business operations may require a long enough forecast horizon to allow the benefits of the changes to be measurable.

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### **LOS 45.b: Explain approaches to forecasting a company's revenues.**

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## **Top-Down Revenue Forecasts**

Top-down analysis starts with expectations about a macro variable, often the expected growth rate of nominal GDP or of the market for a particular good or service.

When forecasting revenues relative to nominal GDP growth, an analyst may model the relationship between nominal GDP and company sales, or use the real GDP growth rate to forecast quantity and an inflation forecast to estimate prices. An analyst will often project that a company's growth will exceed or lag GDP growth. For example, if an analyst forecasts that nominal GDP will grow at 5% and believes a company's revenue will grow at a 20% faster rate, he will project the company's sales to increase by  $5\% \times (1 + 0.20) = 6\%$ . Growth or decline expectations are typically based on a company's life cycle stage and degree of cyclicalities.

An alternative approach is to forecast revenues based on expected market growth and market share. To use this approach, an analyst begins with an estimate of industry sales (market growth), then estimates company revenue as a percentage of industry sales based on the company's expected market share. For example, consider a company that currently has GBP12 million in sales, a 12% share of industry sales that are GBP100 million. If an analyst expects the company to increase its market share next year to 13%, and forecasts industry sales to grow to GBP104 million, the analyst will project the company to have  $13\% \times \text{GBP}104 \text{ million} = \text{GBP}13.52 \text{ million}$  in sales, an increase of about 12.7%.

## **Bottom-Up Revenue Forecasts**

Bottom-up analysis starts with an individual company or its reportable segments. Revenue projections based on historical revenue growth or a company's new product introductions over the forecast horizon are considered bottom-up approaches.

Examples of bottom-up drivers include the following:

1. *Average selling prices (P) and volumes (Q).* Forecasting P and Q separately and then multiplying them will generate a revenue forecast, assuming such information is readily available to the analyst.
2. *Product line or segment revenues.* An analyst may forecast revenues for separate products, business lines, geographic areas, or reporting segments, then combine them into a company-wide revenue forecast. This is only practical if a company provides such detailed information.
3. *Capacity-based measures.* An analyst may forecast revenue growth for a company's existing locations, and add a separate forecast for its newly opened locations.
4. *Return- or yield-based measures.* These involve forecasting balance sheet items and the return the company will earn on them. For example, interest revenue forecasts

for a bank require changes in loan balances (assets) and changes in customer deposits (liabilities).

Incorporating elements of both top-down and bottom-up approaches can highlight any inconsistencies in their assumptions. For example, if a company's forecast sales based on expected capacity are far out of line with what they should be given expected economic growth, an analyst should recheck the model's assumptions to confirm whether the forecast is reasonable.

## Recurring and Nonrecurring Items

Nonrecurring items should not be included in a forecast object, but rather should be analyzed on a stand-alone basis. Nonrecurring items include those disclosed by company management and other items that an analyst believes a forecast should encompass. An analyst must be prepared to quantify both types.

Nonrecurring items disclosed by management typically focus on one-time events (e.g., large special orders, foreign exchange gains) that do not constitute sustainable or ongoing revenues. One-time items might be removed from regular revenues and disclosed on a separate line item. This makes it easier for analysts to determine the amount of revenue that is more likely to recur, assuming they believe management's judgments are reliable. If a company cites "nonrecurring" items regularly, analysts might reasonably expect this trend to continue and incorporate them into their forecasts.

Nonrecurring items that are not quantified by management require analyst insight and judgment. For example, some analysts believed the COVID-19 pandemic of 2020–21 would cause a fundamental and permanent shift in retail sales to online platforms, and that the rise in online sales would persist for many years to come. However, about 18 months into the pandemic, online sales as a percentage of total retail sales began receding back toward pre-pandemic levels. With hindsight, analysts who treated the shift to online sales as nonrecurring turned out to be correct.

## Forecast Approaches

When choosing among the forecast approaches we have described, analysts must account for risk factors such as competition, business cycle changes, inflation or deflation, and technological changes. Not all of them may be significant for a given company or industry, but an analyst must determine which ones are significant and account for them in forecasts. Scenario analysis is a useful approach to forecasting the effects of these kinds of risk.

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**LOS 45.c: Explain approaches to forecasting a company's operating expenses and working capital.**

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## Cost of Sales and Gross Margins

Because cost of sales (cost of goods sold, or COGS) is closely related to revenue, analysts typically estimate future COGS as a percentage of revenue:

- Forecast COGS = (historical COGS / revenue) × estimate of future revenue
- Forecast COGS = (1 – gross margin) × estimate of future revenue

Changes in a company's market share can signal changes in its gross margin. If a company is losing market share because cheaper and more attractive substitutes are becoming available, this should put pressure on the company's gross margins. By contrast, if a company is gaining market share by introducing a new and innovative product that does not yet have any substitutes available, this should enable it to increase its gross margin.

### EXAMPLE: The effect of prices and costs on gross profit and margin<sup>1</sup>

Assume that a company's COGS as a percentage of sales equals 25% and that the quantity sold is the same in Period 2 as in Period 1. If input costs double in Period 2 and the company can pass the entire increase on to its customers through a 25% price increase, COGS as a percentage of sales will increase (to 40%) because an equal absolute amount has been added to the numerator and to the denominator.

|                    | Period 1 | Period 2 |
|--------------------|----------|----------|
| Sales              | 100.0    | 125.0    |
| COGS               | 25.0     | 50.0     |
| Gross profit       | 75.0     | 75.0     |
| COGS as % of sales | 25%      | 40%      |
| Gross margin %     | 75%      | 60%      |

Thus, although the absolute amount of gross profit will remain constant, the gross margin will decrease (from 75% to 60%).

Because COGS is typically a large portion of a company's costs, small changes can have a significant impact on profitability forecasts. Close examination of the volume and price of a firm's inputs may improve a forecast of COGS, especially in the short run. For example, an airline's fuel costs can be volatile and will have a significant impact on its COGS, gross margin, and net margin.

Firms often hedge their future input costs using forward contracts or other derivative securities. An analyst must be aware of the proportion of future input costs hedged that way or, at a minimum, whether the firm has historically hedged those costs and over what time horizon. A hedge that protects the firm's gross margins from decreasing

when input prices rise will also “protect” its gross margins from increasing when input prices fall.

It can be worthwhile to examine the gross margins of a firm’s competitors as a check of the reasonableness of gross margin estimates. In some cases, differences between firms’ business models may be the underlying reason for differences in gross margins.

## SG&A Expenses

Compared to COGS, selling, general, and administrative (SG&A) operating expenses are less sensitive to changes in sales volume. Their fixed cost component (e.g. research and development, corporate headquarters, management salaries) is generally larger than their variable cost component. Such costs might be modeled using a fixed growth rate that accounts for expected inflation. Selling and distribution costs may be more directly related to sales volume because a company likely needs to hire more salespeople to support higher sales.

Segment disclosures are unlikely to provide specific line items such as COGS and SG&A by segment. Therefore, an analyst creating segment forecasts can only rely on summary information such as operating margin by segment.

## Working Capital

Three balance sheet items comprise working capital forecasts—accounts receivable, inventories, and accounts payable. To describe forecasting the components of working capital, we draw on concepts and ratios that we introduced in the Corporate Issuers and Financial Statement Analysis topic areas.

### ***Accounts Receivable***

Recall that days sales outstanding (DSO) are calculated as  $365 / \text{receivables turnover}$ . We can forecast receivables turnover as  $\text{forecast annual revenues} / \text{forecast average receivables}$ , or we can forecast accounts receivable as  $\text{DSO}' (\text{forecast revenues} / 365)$ .

### ***Inventory***

Inventory days on hand (DOH) are calculated as  $365 / \text{inventory turnover}$ . We can forecast inventory turnover as  $\text{forecast COGS} / \text{forecast average inventory}$ , or forecast inventory as  $\text{DOH}' (\text{forecast COGS} / 365)$ .

### ***Accounts Payable***

Days payable outstanding (DPO) are calculated as  $365 / \text{payables turnover}$ . We can forecast payables turnover as  $\text{forecast annual purchases} / \text{forecast annual payables}$ , or we can forecast accounts payable as  $\text{DPO}' (\text{forecast COGS} / 365)$ .

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### **LOS 45.d: Explain approaches to forecasting a company’s capital investments and capital structure.**

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Forecasting capital investments in tangible and intangible assets requires an analyst to use the cash flow statement to determine acquisitions and dispositions, and the income

statement to determine depreciation and amortization expense. For more accurate forecasts, capital expenditures should be divided into two categories: maintenance and growth.

Historical depreciation is usually the starting point to forecast capital spending for maintenance. An analyst should account for the expected inflation rate when estimating maintenance expenditures because replacement cost can be expected to increase with inflation. Depreciation and amortization can be forecast using net book value of property, plant, and equipment and the estimated useful life of the assets. Forecasting capital expenditures for growth requires an analyst to understand management's future business and revenue growth strategies.

Forecasting a firm's capital structure is often based on its leverage ratios (e.g., debt to assets, debt to equity). Analysts should note any borrowing requirements caused by planned capital expenditures. Company management may provide information about their target capital structure or any debt covenant ratios with which they must comply.

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### **LOS 45.e: Describe the use of scenario analysis in forecasting.**

---

Forecast financial statements should not simply rely on a single point estimate for forecast objects such as net income. Instead, an analyst should perform scenario analysis with multiple alternative assumptions to examine the sensitivity of net income to changes in assumptions. Those assumptions could involve changes in the economic environment, competition, and technological changes, for example. The end result is to develop a range of estimates using multiple scenarios.



#### **MODULE QUIZ 45.1**

1. Which approach is *most appropriate* for an analyst to use to forecast revenues for a company in a highly cyclical industry?
  - A. Historical results.
  - B. Analyst's discretionary forecast.
  - C. Historical base rates and convergence.
2. Which of the following items is an example of a summary measure?
  - A. Revenue.
  - B. Free cash flow.
  - C. Contingent liability.
3. An analyst is performing scenario analysis for a company's gross margin. Selected financial data from the current period is provided here:

|                                   |             |
|-----------------------------------|-------------|
| Average selling price per product | \$10        |
| Quantity sold                     | 4.5 million |
| Gross profit margin               | 60%         |

For the next period, input prices are expected to increase by 15% and the analyst expects the company to increase selling prices by 12%, resulting in a 10% decrease in volume sold. The forecast decrease in gross profit margin for the company in the next period is *closest* to:

- A. 1%.
- B. 2%.

C. 3%.

## KEY CONCEPTS

### LOS 45.a

Key forecast objects include the following:

- Drivers of financial statement lines
- Individual financial statement lines
- Summary measures
- Ad hoc objects

The following forecast approaches (usually combined) are used for objects:

- Historical results
- Historical base rate and convergence
- Management guidance
- Analyst discretionary forecast

The forecast horizon depends on factors such as the portfolio strategy for the security, whether the industry is cyclical and company-specific factors.

### LOS 45.b

Top-down analysis models a company's sales as a function of economic growth or as a function of market growth and the company's market share.

Bottom-up analysis starts with an individual company or its reportable segments.

Examples of bottom-up drivers include the following:

- Average selling prices and volumes
- Product-line or segment revenues
- Capacity-based measures
- Return- or yield-based measures

Nonrecurring items should be analyzed on a stand-alone basis.

### LOS 45.c

COGS and gross margin are usually estimated as a percentage of revenue.

The fixed cost component of SG&A expenses is generally larger than its variable cost component and might be modeled using a fixed growth rate. Selling and distribution costs may be more directly related to sales volumes.

In forecasting working capital, the following measures are relevant:

- forecast accounts receivable = DSO × (forecast revenues / 365)
- forecast inventory = DOH × (forecast COGS / 365)
- forecast accounts payable = DPO × (forecast COGS / 365)

#### **LOS 45.d**

Historical depreciation is usually the starting point for forecasting capital expenditures for maintenance. Forecasting capital expenditures to grow the firm requires knowledge of the management's future business and revenue growth strategies.

Forecasting the firm's capital structure may be based on analysis of leverage ratios, while considering any borrowing requirements caused by planned capital expenditures as well as management guidance about its target capital structure.

#### **LOS 45.e**

An analyst should perform scenario analysis with multiple alternative assumptions to examine the sensitivity of net income to changes in these assumptions. The result is to develop a range of estimates.

### **ANSWER KEY FOR MODULE QUIZZES**

#### **Module Quiz 45.1**

1. **B** An analyst's discretionary forecast is most frequently used for companies in cyclical industries as well as companies that have few or no peers, those that do not provide management guidance, and those in the midst of a significant business transition.

The historical results approach is not appropriate for companies in cyclical industries because a future period is probably going to be at a dissimilar point in the business cycle compared to the current or past period, so the results would not be comparable. The historical base rates and convergence approach is not appropriate for companies in highly cyclical industries because the smooth convergence to a long-term base rate would hide the annual volatility. (LOS 45.a)

2. **B** Free cash flow is an example of a summary measure as it combines several measures into one (e.g., net income, depreciation expense, fixed capital investment). Revenue is an individual financial statement line. A contingent liability (e.g., pending legal proceeding) is an ad hoc object. (LOS 45.a)

3. **A** Forecast average selling price =  $\$10 \times 1.12 = \$11.20$

$$\text{Forecast quantity sold} = 4,500,000 \times (1 - 0.10) = 4,050,000$$

$$\text{Forecast average input cost} = [(45,000,000 \times 0.40) / 4,500,000] \times 1.15 = \$4.60$$

$$\text{Forecast total revenues} = 4,050,000 \times \$11.20 = \$45,360,000$$

$$\text{Forecast gross profit} = 4,050,000 \times (\$11.20 - \$4.60) = \$26,730,000$$

$$\text{Forecast gross profit margin} = \$26,730,000 / \$45,360,000 = 58.92\%, \text{ which is } 1.08\% \text{ less than } 60\%. \text{ (LOS 45.e)}$$

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<sup>1</sup> Reproduced from the Level I CFA curriculum learning module, "Company Analysis: Forecasting," with permission from CFA Institute.

## READING 46

# EQUITY VALUATION: CONCEPTS AND BASIC TOOLS

## MODULE 46.1: DIVIDENDS, SPLITS, AND REPURCHASES

**LOS 46.a: Evaluate whether a security, given its current market price and a value estimate, is overvalued, fairly valued, or undervalued by the market.**



Video covering this content is available online.

Recall from the reading on Market Efficiency that **intrinsic value** or **fundamental value** is defined as the rational value investors would place on the asset if they had full knowledge of the asset's characteristics. Analysts use valuation models to estimate the intrinsic values of stocks and compare them to the stocks' market prices to determine whether individual stocks are overvalued, undervalued, or fairly valued. In doing valuation analysis for stocks, analysts are assuming that some stocks' prices deviate significantly from their intrinsic values.

To the extent that market prices deviate from intrinsic values, analysts who can estimate a stock's intrinsic value better than the market can earn abnormal profits if the stock's market price moves toward its intrinsic value over time. There are several things to consider, however, in deciding whether to invest based on differences between market prices and estimated intrinsic values.

1. The larger the percentage difference between market prices and estimated values, the more likely the investor is to take a position based on the estimate of intrinsic value. Small differences between market prices and estimates of intrinsic values are to be expected.
2. The more confident the investor is about the appropriateness of the valuation model used, the more likely the investor is to take an investment position in a stock that is identified as overvalued or undervalued.
3. The more confident the investor is about the estimated inputs used in the valuation model, the more likely the investor is to take an investment position in a stock that is identified as overvalued or undervalued. Analysts must also consider the sensitivity of a model value to each of its inputs in deciding whether to act on a difference between model values and market prices. If a decrease of one-half percent in the long-term growth rate used in the valuation model would produce an

estimated value equal to the market price, an analyst would have to be quite sure of the model's growth estimate to take a position in the stock based on its estimated value.

4. Even if we assume that market prices sometimes deviate from intrinsic values, market prices must be treated as fairly reliable indications of intrinsic value. Investors must consider why a stock is mispriced in the market. Investors may be more confident about estimates of value that differ from market prices when few analysts follow a particular security.
  5. Finally, to take a position in a stock identified as mispriced in the market, an investor must believe that the market price will actually move toward (and certainly not away from) its estimated intrinsic value and that it will do so to a significant extent within the investment time horizon.
- 

#### **LOS 46.b: Describe major categories of equity valuation models.**

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Analysts use a variety of models to estimate the value of equities. Usually, an analyst will use more than one model with several different sets of inputs to determine a range of possible stock values.

In **discounted cash flow models** (or **present value models**), a stock's value is estimated as the present value of cash distributed to shareholders (*dividend discount models*) or the present value of cash available to shareholders after the firm meets its necessary capital expenditures and working capital expenses (*free cash flow to equity models*).

There are two basic types of **multiplier models** (or **market multiple models**) that can be used to estimate intrinsic values. In the first type, the ratio of stock price to such fundamentals as earnings, sales, book value, or cash flow per share is used to determine if a stock is fairly valued. For example, the price to earnings (P/E) ratio is frequently used by analysts.

The second type of multiplier model is based on the ratio of **enterprise value** to either earnings before interest, taxes, depreciation, and amortization (EBITDA) or revenue. Enterprise value is the market value of all a firm's outstanding securities minus cash and short-term investments. Common stock value can be estimated by subtracting the value of liabilities and preferred stock from an estimate of enterprise value.

In **asset-based models**, the intrinsic value of common stock is estimated as total asset value minus liabilities and preferred stock. Analysts typically adjust the book values of the firm's assets and liabilities to their fair values when estimating the market value of its equity with an asset-based model.

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#### **LOS 46.c: Describe regular cash dividends, extra dividends, stock dividends, stock splits, reverse stock splits, and share repurchases.**

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**Cash dividends**, as the name implies, are payments made to shareholders in cash. They may be regularly scheduled dividends or one-time special dividends. **Regular**

**dividends** occur when a company pays out a portion of profits on a consistent schedule (e.g., quarterly). A long-term record of stable or increasing dividends is widely viewed by investors as a sign of a company's financial stability. **Special dividends** are used when favorable circumstances allow the firm to make a one-time cash payment to shareholders, in addition to any regular dividends the firm pays. Many cyclical firms (e.g., automakers) will use a special dividend to share profits with shareholders when times are good but maintain the flexibility to conserve cash when profits are poor. Other names for special dividends include *extra dividends* and *irregular dividends*.

**Stock dividends** are dividends paid out in new shares of stock rather than cash. In this case, there will be more shares outstanding, but each one will be worth less. Total shareholders' equity remains unchanged. Stock dividends are commonly expressed as a percentage. A 20% stock dividend means every shareholder gets 20% more stock.

**Stock splits** divide each existing share into multiple shares, creating more shares. There are now more shares, but the price of each share will drop correspondingly to the number of shares created, so there is no change in the owner's wealth. Splits are expressed as a ratio. In a 3-for-1 stock split, each old share is split into three new shares. Stock splits are currently more common than stock dividends.

**Reverse stock splits** are the opposite of stock splits. After a reverse split, there are fewer shares outstanding but there is a higher stock price. Because these factors offset one another, shareholder wealth is unchanged.

A **share repurchase** is a transaction in which a company buys outstanding shares of its own common stock. Share repurchases are an alternative to cash dividends as a way of distributing cash to shareholders, and they have the same effect on shareholders' wealth as cash dividends of the same size. A company might repurchase shares to support their price or to signal that management believes the shares are undervalued. Share repurchases may also be used to offset an increase in outstanding shares from the exercise of employee stock options. In countries that tax capital gains at lower rates than dividends, shareholders may prefer share repurchases to dividend payments as a way to distribute cash to shareholders.

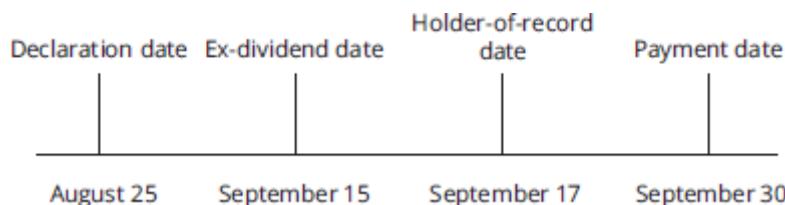
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#### LOS 46.d: Describe dividend payment chronology.

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The dates relevant to dividend payments are shown in Figure 46.1.

**Figure 46.1: Dividend Payment Chronology**



**Declaration date.** The date the board of directors approves payment of a dividend, specifying the per-share dividend amount, the date shareholders must own the stock to

receive the dividend (record date), and the date the dividend payment will be made (payment date).

**Ex-dividend date.** The first day on which a share purchaser will not receive the next dividend. The ex-dividend date is one or two business days before the holder-of-record date, depending on the settlement period for stock purchases. If you buy the share on or after the ex-dividend date, you will not receive the dividend.

**Holder-of-record date (record date).** The date on which all owners of shares become entitled to receive the dividend payment on their shares.

**Payment date.** The date dividend checks are mailed to, or payment is made electronically to, holders of record.

On the ex-dividend date, the share price will decrease from the previous day's closing price by approximately the amount of the dividend, in the absence of other factors affecting the stock price. Consider shares that are trading at \$25 on the day prior to the ex-dividend date and will pay a \$1 dividend. Purchasing a share on the day prior to the ex-dividend date will give the owner a share of stock and the \$1 dividend on the payment date. Purchasing a share on the ex-dividend date will entitle the owner only to the share; the dividend payment will go to the seller.



## MODULE QUIZ 46.1

1. An analyst estimates a value of \$45 for a stock with a market price of \$50. The analyst is *most likely* to conclude that a stock is overvalued if:
  - A. few analysts follow the stock and the analyst has less confidence in his model inputs.
  - B. few analysts follow the stock and the analyst is confident in his model inputs.
  - C. many analysts follow the stock and the analyst is confident in his model inputs.
2. A valuation model based on free cash flow to equity is *most likely* to be a(n):
  - A. multiplier model.
  - B. asset-based model.
  - C. present value model.
3. A company is evaluating the likely effects on its share price of declaring a 50% stock dividend or a 3-for-2 stock split. Other things equal, which of these will result in a lower share price?
  - A. 3-for-2 stock split.
  - B. 50% stock dividend.
  - C. Both should have the same effect.
4. The first date on which the purchaser of a stock will not receive a dividend that has been declared is the:
  - A. declaration date.
  - B. ex-dividend date.

C. holder-of-record date.

## MODULE 46.2: DIVIDEND DISCOUNT MODELS



Video covering this content is available online.

**LOS 46.e: Explain the rationale for using present value models to value equity and describe the dividend discount and free-cash-flow-to-equity models.**

The **dividend discount model (DDM)** is based on the rationale that the intrinsic value of stock is the present value of its future dividends.

The most general form of the model is as follows:

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + k_e)^t}$$

where:

$V_0$  = current stock value

$D_t$  = dividend at time  $t$

$k_e$  = required rate of return on common equity

**One-year holding period DDM.** For a holding period of one year, the value of the stock today is the present value of any dividends during the year plus the present value of the expected price of the stock at the end of the year (referred to as its **terminal value**).

The one-year holding period DDM is simply:

$$\text{value} = \frac{\text{dividend to be received}}{(1 + k_e)} + \frac{\text{year-end price}}{(1 + k_e)}$$

### EXAMPLE: One-period DDM valuation

Calculate the value of a stock that paid a \$1 dividend last year, if next year's dividend will be 5% higher and the stock will sell for \$13.45 at year-end. The required return is 13.2%.

#### Answer:

The next dividend is the current dividend increased by the estimated growth rate. In this case, we have:

$$D_1 = D_0 \times (1 + \text{dividend growth rate}) = \$1.00 \times (1 + 0.05) = \$1.05$$

The present value of the expected future cash flows is:

$$\text{dividend: } \frac{\$1.05}{1.132} = \$0.93$$

$$\text{year-end price: } \frac{\$13.45}{1.132} = \$11.88$$

The current value based on the investor's expectations is:

$$\text{stock value} = \$0.93 + \$11.88 = \$12.81$$

**Multiple-year holding period DDM.** With a multiple-year holding period, we simply sum the present values of the estimated dividends over the holding period and the estimated terminal value.

For a two-year holding period, we have:

$$\text{value} = \frac{D_1}{(1 + k_e)} + \frac{D_2}{(1 + k_e)^2} + \frac{P_2}{(1 + k_e)^2}$$



#### PROFESSOR'S NOTE

It is useful to think of the subscript  $t$  on dividends ( $D_t$ ) and prices ( $P_t$ ) as the end of period  $t$ . For example, in the preceding equation,  $P_2$  is the price at the end of Year 2. Think of it as the selling price of a share, immediately after  $D_2$  is received.

#### EXAMPLE: Multiple-period DDM valuation

A stock recently paid a dividend of \$1.50 which is expected to grow at 8% per year. The required rate of return of 12%. Calculate the value of this stock assuming that it will be priced at \$51.00 three years from now.

#### Answer:

Find the PV of the future dividends:

$$D_1 = \$1.50(1.08) = \$1.62$$

$$D_2 = \$1.50(1.08)^2 = \$1.75$$

$$D_3 = \$1.50(1.08)^3 = \$1.89$$

$$\text{PV of dividends} = \$1.62 / 1.12 + \$1.75 / (1.12)^2 + \$1.89 / (1.12)^3 = \$4.19$$

Find the PV of the future price:

$$\$51.00 / (1.12)^3 = \$36.30$$

Add the present values. The current value based on the investor's expectations is  $\$4.19 + \$36.30 = \$40.49$ .

The most general form of the DDM uses an infinite holding period because a corporation has an indefinite life. In an infinite-period DDM model, the present value of all expected future dividends is calculated and there is no explicit terminal value for the stock. In practice, as we will see, a terminal value can be calculated at a time in the future after which the growth rate of dividends is expected to be constant.

**Free cash flow to equity (FCFE)** is often used in discounted cash flow models instead of dividends because it represents the potential amount of cash that could be paid out to common shareholders. That is, FCFE reflects the firm's capacity to pay dividends. FCFE is also useful for firms that do not currently pay dividends.

FCFE is defined as the cash remaining after a firm meets all of its debt obligations and provides for the capital expenditures necessary to maintain existing assets and to purchase the new assets needed to support the assumed growth of the firm. In other words, it is the cash available to the firm's equity holders after a firm meets all of its other obligations. FCFE for a period is often calculated as:

$$\text{FCFE} = \text{net income} + \text{depreciation} - \text{increase in working capital} - \text{fixed capital investment (FCInv)} - \text{debt principal repayments} + \text{new debt issues}$$

FCFE can also be calculated as:

$$\text{FCFE} = \text{cash flow from operations} - \text{FCInv} + \text{net borrowing}$$

In the second formula, **net borrowing** is the increase in debt during the period (i.e., amount borrowed minus amount repaid) and is assumed to be available to shareholders. Fixed capital investment must be subtracted because the firm must invest in assets to sustain itself. FCFE is projected for future periods using the firm's financial statements.

Restating the general form of the DDM in terms of FCFE, we have:

$$V_0 = \sum_{t=1}^{\infty} \frac{\text{FCFE}_t}{(1 + k_e)^t}$$

## Estimating the Required Return for Equity

The capital asset pricing model (CAPM) provides an estimate of the required rate of return ( $k_i$ ) for security  $i$  as a function of its systematic risk ( $\beta_i$ ), the risk-free rate ( $R_f$ ), and the expected return on the market [ $E(R_{mkt})$ ] as:

$$k_i = R_f + \beta_i [E(R_{mkt}) - R_f]$$

There is some controversy over whether the CAPM is the best model to calculate the required return on equity. Also, different analysts will likely use different inputs, so there is no single number that is correct.



### PROFESSOR'S NOTE

The CAPM is discussed in detail in Portfolio Management.

For firms with publicly traded debt, analysts often estimate the required return on the firm's common equity by adding a risk premium to the firm's current bond yield. If the firm does not have publicly traded debt, an analyst can add a larger risk premium to a government bond yield.

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## LOS 46.g: Calculate the intrinsic value of a non-callable, non-convertible preferred stock.

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### PROFESSOR'S NOTE

At the end of this reading we will address the LOS that concerns advantages and disadvantages of each category of valuation model.

**Preferred stock** pays a dividend that is usually fixed and usually has an indefinite maturity. When the dividend is fixed and the stream of dividends is infinite, the infinite period dividend discount model reduces to a simple ratio:

$$\text{preferred stock value} = \frac{D_p}{(1 + k_p)^1} + \frac{D_p}{(1 + k_p)^2} + \dots + \frac{D_p}{(1 + k_p)^{\infty}} = \frac{D_p}{k_p}$$

### EXAMPLE: Preferred stock valuation

A company's \$100 par preferred stock pays a \$5.00 annual dividend and has a required return of 8%. Calculate the value of the preferred stock.

**Answer:**

Value of the preferred stock:  $D_p / k_p = \$5.00 / 0.08 = \$62.50$

### LOS 46.h: Calculate and interpret the intrinsic value of an equity security based on the Gordon (constant) growth dividend discount model or a two-stage dividend discount model, as appropriate.

The **Gordon growth model** (or **constant growth model**) assumes the annual growth rate of dividends,  $g_c$ , is constant. Hence, next period's dividend,  $D_1$ , is  $D_0(1 + g_c)$ , the second year's dividend,  $D_2$ , is  $D_0(1 + g_c)^2$ , and so on. The extended equation using this assumption gives the present value of the expected future dividends ( $V_0$ ) as:

$$V_0 = \frac{D_0(1 + g_c)}{(1 + k_e)} + \frac{D_0(1 + g_c)^2}{(1 + k_e)^2} + \frac{D_0(1 + g_c)^3}{(1 + k_e)^3} + \dots + \frac{D_0(1 + g_c)^{\infty}}{(1 + k_e)^{\infty}}$$

When the growth rate of dividends is constant, this equation simplifies to the Gordon (constant) growth model:

$$V_0 = \frac{D_0(1 + g_c)}{k_e - g_c} = \frac{D_1}{k_e - g_c}$$



#### PROFESSOR'S NOTE

In much of the finance literature, you will see this model referred to as the constant growth DDM, infinite period DDM, or the Gordon growth model.

Whatever you call it, memorize  $D_1$  over ( $k$  minus  $g$ ). Note that our valuation model for preferred stock is the same as the constant growth model with no growth ( $g = 0$ ).

The assumptions of the Gordon growth model are:

- Dividends are the appropriate measure of shareholder wealth.
- The constant dividend growth rate,  $g_c$ , and required return on stock,  $k_e$ , are never expected to change.
- $k_e$  must be greater than  $g_c$ . If not, the math will not work.

If any one of these assumptions is not met, the model is not appropriate.

## EXAMPLE: Gordon growth model valuation

Calculate the value of a stock that paid a \$1.50 dividend last year, if dividends are expected to grow at 8% forever and the required return on equity is 12%.

### Answer:

Determine  $D_1$ :  $D_0(1 + g_c) = \$1.50(1.08) = \$1.62$

$$\begin{aligned}\text{Calculate the stock's value} &= D_1 / (k_e - g_c) \\ &= \$1.62 / (0.12 - 0.08) \\ &= \$40.50\end{aligned}$$



### PROFESSOR'S NOTE

When doing stock valuation problems on the exam, watch for words like "forever," "infinitely," "indefinitely," "for the foreseeable future," and so on. This will tell you that the Gordon growth model should be used. Also watch for words like "just paid" or "recently paid." These will refer to the last dividend,  $D_0$ . Words like "will pay" or "is expected to pay" refer to  $D_1$ .

This example demonstrates that the stock's value is determined by the relationship between the investor's required rate of return on equity,  $k_e$ , and the projected growth rate of dividends,  $g_c$ :

- As the difference between  $k_e$  and  $g_c$  widens, the value of the stock falls.
- As the difference narrows, the value of the stock rises.
- Small changes in the difference between  $k_e$  and  $g_c$  can cause large changes in the stock's value.

Because the estimated stock value is very sensitive to the denominator, an analyst should calculate several different value estimates using a range of required returns and growth rates.

An analyst can also use the Gordon growth model to determine how much of the estimated stock value is due to dividend growth. To do this, assume the growth rate is zero and calculate a value. Then, subtract this value from the stock value estimated using a positive growth rate.

## EXAMPLE: Amount of estimated stock value due to dividend growth

Using the data from the previous example, calculate how much of the estimated stock value is due to dividend growth.

### Answer:

The estimated stock value with a growth rate of zero is:

$$V_0 = D / k = \$1.50 / 0.12 = \$12.50$$

The amount of the estimated stock value due to estimated dividend growth is:

$$\$40.50 - \$12.50 = \$28.00$$

## Estimating the Growth Rate in Dividends

To estimate the growth rate in dividends, the analyst can use three methods:

1. Use the historical growth in dividends for the firm.
2. Use the median industry dividend growth rate.
3. Estimate the sustainable growth rate.

The **sustainable growth rate** is the rate at which equity, earnings, and dividends can continue to grow indefinitely assuming that ROE is constant, the dividend payout ratio is constant, and no new equity is sold.

$$\text{sustainable growth} = (1 - \text{dividend payout ratio}) \times \text{ROE}$$

The quantity  $(1 - \text{dividend payout ratio})$  is also referred to as the **retention rate**, the proportion of net income that is not paid out as dividends and goes to retained earnings, thus increasing equity.

### EXAMPLE: Sustainable growth rate

Green, Inc., is expected to pay dividends equal to 25% of earnings. Green's ROE is 21%. Calculate and interpret its sustainable growth rate.

#### Answer:

$$g = (1 - 0.25) \times 21\% = 15.75\%$$

With long-run economic growth typically in the single digits, it is unlikely that a firm could sustain 15.75% growth forever. The analyst should also examine the growth rate for the industry and the firm's historical growth rate to determine whether the estimate is reasonable.

Some firms do not currently pay dividends but are expected to begin paying dividends at some point in the future. A firm may not currently pay a dividend because it is in financial distress and cannot afford to pay out cash or because the return the firm can earn by reinvesting cash is greater than what stockholders could expect to earn by investing dividends elsewhere.

For these firms, an analyst must estimate the amount and timing of the first dividend in order to use the Gordon growth model. Because these parameters are highly uncertain, the analyst should check the estimate from the Gordon growth model against estimates made using other models.

### EXAMPLE: A firm with no current dividend

A firm currently pays no dividend but is expected to pay a dividend at the end of Year 4. Year 4 earnings are expected to be \$1.64, and the firm will maintain a

dividend payout ratio of 50%. Assuming a constant growth rate of 5% and a required rate of return of 10%, estimate the current value of this stock.

**Answer:**

The first step is to find the value of the stock at the end of Year 3. Remember,  $P_3$  is the present value of dividends in Years 4 through infinity, calculated at the end of Year 3, one period *before* the first dividend is paid.

Calculate  $D_4$ , the estimate of the dividend that will be paid at the end of Year 4:

$$D_4 = (\text{dividend payout ratio})(E_4) = (0.5)(1.64) = \$0.82$$

Apply the constant growth model to estimate  $V_3$ :

$$V_3 = D_4 / (k_e - g_c) = \$0.82 / (0.10 - 0.05) = \$16.40$$

The second step is to calculate the current value,  $V_0$ :

$$V_0 = 16.40 / 1.1^3 = \$12.32$$

## Multistage Dividend Growth Models

A firm may temporarily experience a growth rate that exceeds the required rate of return on the firm's equity, but no firm can maintain this relationship indefinitely. A firm with an extremely high growth rate will attract competition, and its growth rate will eventually fall. We must assume the firm will return to a more sustainable rate of growth at some point in the future in order to calculate the present value of expected future dividends.

One way to value a dividend-paying firm that is experiencing temporarily high growth is to add the present values of dividends expected during the high-growth period to the present value of the constant growth value of the firm at the end of the high-growth period. This is referred to as the **multistage dividend discount model**.

$$\text{value} = \frac{D_1}{(1 + k_e)} + \frac{D_2}{(1 + k_e)^2} + \dots + \frac{D_n}{(1 + k_e)^n} + \frac{P_n}{(1 + k_e)^n}$$

where  $P_n = \frac{D_{n+1}}{k_e - g_c}$  is the terminal stock value, assuming that dividends at  $t = n + 1$  and beyond grow at a constant rate of  $g_c$ .

Steps in using the multistage model:

- Determine the discount rate,  $k_e$ .
- Project the size and duration of the high initial dividend growth rate,  $g^*$ .
- Estimate dividends during the high-growth period.
- Estimate the constant growth rate at the end of the high-growth period,  $g_c$ .
- Estimate the first dividend of the constant growth period.
- Use this dividend to calculate the stock value at the end of the high-growth period.

- Add the PVs of all dividends during the high-growth period to the PV of the value of the stock at the end of the high-growth period.

### **EXAMPLE: Multistage growth**

Consider a stock with dividends that are expected to grow at 15% per year for two years, after which they are expected to grow at 5% per year, indefinitely. The last dividend paid was \$1.00, and  $k_e = 11\%$ . Calculate the value of this stock using the multistage growth model.

#### **Answer:**

Calculate the dividends over the high-growth period:

$$D_1 = D_0(1 + g^*) = 1.00(1.15) = \$1.15$$

$$D_2 = D_1(1 + g^*) = 1.15(1.15) = 1.15^2 = \$1.32$$

Calculate the first dividend of the constant-growth period:

$$D_3 = D_2(1 + g) = 1.32 \times 1.05 = \$1.386$$

Use the constant growth model to get  $P_2$ , a value for all the (infinite) dividends expected from time = 3 onward:

$$P_2 = \frac{D_3}{k_e - g_c} = \frac{1.386}{0.11 - 0.05} = \$23.10$$

Finally, we can sum the present values of dividends 1 and 2 and of  $P_2$  to get the present value of all the expected future dividends during both the high-growth and constant-growth periods:

$$\frac{1.15}{1.11} + \frac{1.32 + 23.10}{(1.11)^2} = \$20.86$$

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### **LOS 46.i: Identify characteristics of companies for which the constant growth or a multistage dividend discount model is appropriate.**

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The Gordon growth model uses a single constant growth rate of dividends and is most appropriate for valuing stable and mature, non-cyclical, dividend-paying firms.

For dividend-paying firms with dividends that are expected to grow rapidly, slowly, or erratically over some period, followed by constant dividend growth, some form of the multistage growth model should be employed. The important points are that dividends must be estimable and must grow at a constant rate after some initial period so that the constant growth model can be used to determine the terminal value of the stock. Thus, we can apply multistage dividend growth models to a firm with high current growth that will drop to a stable rate in the future or to a firm that is temporarily losing market share and growing slowly or getting smaller, as long as its growth is expected to stabilize to a constant rate at some point in the future.

One variant of a multistage growth model assumes that the firm has three stages of dividend growth, not just two. These three stages can be categorized as growth,

transition, and maturity. A 3-stage model would be suitable for firms with an initial high growth rate, followed by a lower growth rate during a second, transitional period, followed by the constant growth rate in the long run, such as a young firm still in the high growth phase.

When a firm does not pay dividends, estimates of dividend payments some years in the future are highly speculative. In this case, and in any case where future dividends cannot be estimated with much confidence, valuation based on FCFE is appropriate as long as growth rates of earnings can be estimated. In other cases, valuation based on price multiples may be more appropriate.



## MODULE QUIZ 46.2

1. The constant growth model requires which of the following?
  - A.  $g < k$ .
  - B.  $g > k$ .
  - C.  $g \neq k$ .
2. What would an investor be willing to pay for a share of preferred stock that pays an annual \$7 dividend if the required return is 7.75%?
  - A. \$77.50.
  - B. \$87.50.
  - C. \$90.32.
3. An analyst estimates that a stock will pay a \$2 dividend next year and that it will sell for \$40 at year-end. If the required rate of return is 15%, what is the value of the stock?
  - A. \$33.54.
  - B. \$36.52.
  - C. \$43.95.
4. What is the intrinsic value of a company's stock if dividends are expected to grow at 5%, the most recent dividend was \$1, and investors' required rate of return for this stock is 10%?
  - A. \$20.00.
  - B. \$21.00.
  - C. \$22.05.
5. Assume that a stock is expected to pay dividends at the end of Year 1 and Year 2 of \$1.25 and \$1.56, respectively. Dividends are expected to grow at a 5% rate thereafter. Assuming that  $k_e$  is 11%, the value of the stock is *closest* to:
  - A. \$22.30.
  - B. \$23.42.
  - C. \$24.55.
6. An analyst feels that Brown Company's earnings and dividends will grow at 25% for two years, after which growth will fall to a constant rate of 6%. If the projected discount rate is 10%, and Brown's most recently paid dividend was \$1, the value of Brown's stock using the multistage dividend discount model is *closest* to:
  - A. \$31.25.
  - B. \$33.54.
  - C. \$36.65.
7. Which of the following firms would *most likely* be appropriately valued using the constant growth DDM?
  - A. An auto manufacturer.

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- B. A producer of bread and snack foods.
- C. A biotechnology firm in existence for two years.

## MODULE 46.3: RELATIVE VALUATION MEASURES



Video covering this content is available online.

### LOS 46.j: Explain the rationale for using price multiples to value equity, how the price to earnings multiple relates to fundamentals, and the use of multiples based on comparables.

Because the dividend discount model is very sensitive to its inputs, many investors rely on other methods. In a **price multiple** approach, an analyst compares a stock's price multiple to a benchmark value based on an index, industry group of firms, or a peer group of firms within an industry. Common price multiples used for valuation include price-to-earnings, price-to-cash flow, price-to-sales, and price-to-book value ratios.

Price multiples are widely used by analysts and readily available in numerous media outlets. Price multiples are easily calculated and can be used in time series and cross-sectional comparisons. Many of these ratios have been shown to be useful for predicting stock returns, with low multiples associated with higher future returns.

A critique of price multiples is that they reflect only the past because historical (trailing) data are often used in the denominator. For this reason, many practitioners use forward (leading or prospective) values in the denominator. The use of projected values can result in much different ratios. An analyst should be sure to use price multiple calculations consistently across firms.

When we compare a price multiple, such as P/E, for a firm to those of other firms based on market prices, we are using **price multiples based on comparables**. By contrast, **price multiples based on fundamentals** tell us what a multiple should be based on some valuation model and therefore are not dependent on the current market prices of other companies to establish value.

### LOS 46.k: Calculate and interpret the following multiples: price to earnings, price to an estimate of operating cash flow, price to sales, and price to book value.

Price multiples used for valuation include:

- **Price-earnings (P/E) ratio:** The P/E ratio is a firm's stock price divided by earnings per share and is widely used by analysts and cited in the press.
- **Price-sales (P/S) ratio:** The P/S ratio is a firm's stock price divided by sales per share.
- **Price-book value (P/B) ratio:** The P/B ratio is a firm's stock price divided by book value of equity per share.
- **Price-cash flow (P/CF) ratio:** The P/CF ratio is a firm's stock price divided by cash flow per share, where cash flow may be defined as operating cash flow or free cash flow.

Other multiples can be used that are industry specific. For example, in the cable television industry, stock market capitalization is compared to the number of subscribers.

## Multiples Based on Fundamentals

To understand fundamental price multiples, consider the Gordon growth valuation model:

$$P_0 = \frac{D_1}{k - g}$$

If we divide both sides of the equation by next year's projected earnings,  $E_1$ , we get

$$\frac{P_0}{E_1} = \frac{D_1/E_1}{k - g}$$

which is the leading P/E for this stock if it is valued in the market according to the constant growth DDM.

This P/E based on fundamentals is also referred to as a **justified P/E**. It is “justified” because, assuming we have the correct inputs for  $D_1$ ,  $E_1$ ,  $k_e$ , and  $g$ , the previous equation will provide a P/E ratio that is based on the present value of the future cash flows. We refer to this as a *leading P/E ratio* because it is based on expected earnings next period, not on actual earnings for the previous period, which would produce a lagging or *trailing P/E ratio*.

One advantage of this approach is that it makes clear how the firm's P/E ratio should be related to its fundamentals. It illustrates that the P/E ratio is a function of:

- $D_1 / E_1$  = expected dividend payout ratio.
- $k$  = required rate of return on the stock.
- $g$  = expected constant growth rate of dividends.

### EXAMPLE: P/E based on fundamentals

A firm has an expected dividend payout ratio of 30%, a required rate of return of 13%, and an expected dividend growth rate of 6%. Calculate the firm's fundamental (justified) leading P/E ratio.

#### Answer:

$$\text{expected P/E ratio: } 0.3 / (0.13 - 0.06) = 4.3$$

The justified P/E ratio serves as a benchmark for the price at which the stock should trade. In the previous example, if the firm's actual P/E ratio (based on the market price and expected earnings) was 8, the stock would be considered overvalued. If the firm's market P/E ratio was 2, the stock would be considered undervalued.

P/E ratios based on fundamentals are very sensitive to the inputs (especially the denominator,  $k - g$ ), so the analyst should use several different sets of inputs to indicate a range for the justified P/E.

Because we started with the equation for the constant growth DDM, the P/E ratio calculated in this way is the P/E ratio consistent with the constant growth DDM. We can see from the formula that, *other things equal*, the P/E ratio we have defined here will increase with (1) a higher dividend payout rate, (2) a higher growth rate, or (3) a lower required rate of return. So, if the subject firm has a higher dividend payout ratio, higher growth rate, and lower required return than its peers, a higher P/E ratio may be justified.

In practice, other things are not equal. An increase in the dividend payout ratio, for example, will reduce the firm's sustainable growth rate. While higher dividends will increase firm value, a lower growth rate will decrease firm value. This relationship is referred to as the **dividend displacement of earnings**. The net effect on firm value of increasing the dividend payout ratio is ambiguous. As intuition would suggest, firms cannot continually increase their P/Es or market values by increasing the dividend payout ratio. Otherwise, all firms would have 100% payout ratios.



#### PROFESSOR'S NOTE

Watch for the wording "other things equal" or "other variables unchanged" in any exam questions about the effect of changing one variable.

#### EXAMPLE: Fundamental P/E ratio comparison

Holt Industries makes decorative items. The following figures are for Holt and its industry.

|                       | Holt Industries | Industry Average |
|-----------------------|-----------------|------------------|
| Dividend payout ratio | 25%             | 16%              |
| Sales growth          | 7.5%            | 3.9%             |
| Total debt to equity  | 113%            | 68%              |

Which of these factors suggest a higher fundamental P/E ratio for Holt?

#### Answer:

- The higher dividend payout ratio supports Holt having a higher P/E ratio than the industry.
- Higher growth in sales suggests that Holt will be able to increase dividends at a faster rate, which supports Holt having a higher P/E ratio than the industry.
- The higher level of debt, however, indicates that Holt has higher risk and a higher required return on equity, which supports Holt having a lower P/E ratio than the industry.

## Multiples Based on Comparables

Valuation based on price multiple comparables (or comps) involves using a price multiple to evaluate whether an asset is valued properly relative to a benchmark. Common benchmarks include the stock's historical average (a time series comparison)

or similar stocks and industry averages (a cross-sectional comparison). Comparing firms within an industry is useful for analysts who are familiar with a particular industry. Price multiples are readily calculated and provided by many media outlets.

The economic principle guiding this method is the **law of one price**, which asserts that two identical assets should sell at the same price, or in this case, two comparable assets should have approximately the same multiple.

The analyst should be sure that any comparables used really are comparable. Price multiples may not be comparable across firms if the firms are different sizes, are in different industries, or will grow at different rates. Furthermore, using P/E ratios for cyclical firms is complicated due to their sensitivity to economic conditions. In this case, the P/S ratio may be favored over the P/E ratio because the sales are less volatile than earnings due to both operating and financial leverage.

The disadvantages of using price multiples based on comparables are (1) a stock may appear overvalued by the comparable method but undervalued by the fundamental method, or vice versa; (2) different accounting methods can result in price multiples that are not comparable across firms, especially internationally; and (3) price multiples for cyclical firms may be greatly affected by economic conditions at a given point in time.

### EXAMPLE: Valuation using comparables

The following figures are for Renee's Bakery. All figures except the stock price are in millions.

| Fiscal Year-End               | 20X3    | 20X2    | 20X1    |
|-------------------------------|---------|---------|---------|
| Total stockholder's equity    | \$55.60 | \$54.10 | \$52.60 |
| Net revenues                  | \$77.30 | \$73.60 | \$70.80 |
| Net income                    | \$3.20  | \$1.10  | \$0.40  |
| Net cash flow from operations | \$17.90 | \$15.20 | \$12.20 |
| Stock price                   | \$11.40 | \$14.40 | \$12.05 |
| Shares outstanding            | 4.476   | 3.994   | 3.823   |

Calculate Renee's lagging P/E, P/CF, P/S, and P/B ratios. Judge whether the firm is undervalued or overvalued using the following relevant industry averages for 20X3 and the firm's historical trend.

| Lagging Industry Ratios | 20X3 |
|-------------------------|------|
| Price-to-earnings       | 8.6  |
| Price-to-cash flow      | 4.6  |
| Price-to-sales          | 1.4  |
| Price-to-book value     | 3.6  |

### Answer:

To calculate the lagging price multiples, first divide the relevant financial statement items by the number of shares to get per-share amounts. Then, divide the stock price by this figure.

For example, for the P/S ratio for 20X3, divide net revenue (net sales) by the number of shares:

$$\frac{\text{sales}}{\text{number of shares}} = \frac{\$77.30}{4.476} = 17.270$$

Then, divide the stock price by sales per share:

$$\frac{P}{S} = \frac{\$11.40}{17.3} = 0.7$$

Using the net income for earnings, the net cash flow from operations for the cash flow, and stockholder's equity for book value, the ratios for Renee's Bakery are:

|      | 20X3 | 20X2 | 20X1  |
|------|------|------|-------|
| P/E  | 15.9 | 52.3 | 115.2 |
| P/CF | 2.9  | 3.8  | 3.8   |
| P/S  | 0.7  | 0.8  | 0.7   |
| P/B  | 0.9  | 1.1  | 0.9   |

Comparing Renee's Bakery's ratios to the industry averages for 20X3, the price multiples are lower in all cases except for the P/E multiple. This cross-sectional evidence suggests that Renee's Bakery is undervalued.

The P/E ratio merits further investigation. Renee's Bakery may have a higher P/E because its earnings are depressed by high depreciation, interest expense, or taxes. Calculating the price-EBITDA ratio would provide an alternative measure that is unaffected by these expenses.

On a time series basis, the ratios are trending downward. This indicates that Renee's Bakery may be currently undervalued relative to its past valuations. We could also calculate average price multiples for the ratios over 20X1–20X3 as a benchmark for the current values:

|                                |      |
|--------------------------------|------|
| Company average P/E 20X1–20X3  | 61.1 |
| Company average P/CF 20X1–20X3 | 3.5  |
| Company average P/S 20X1–20X3  | 0.7  |
| Company average P/B 20X1–20X3  | 1.0  |

The current P/E, P/CF, and P/B ratios are lower than their 3-year averages. This indicates that Renee's Bakery may be currently undervalued. It also may be the case, however, that P/E ratios for the market as a whole have been decreasing over the period due to systematic factors.

#### LOS 46.l: Describe enterprise value multiples and their use in estimating equity value.

**Enterprise value (EV)** measures total company value. EV can be viewed as what it would cost to acquire the firm:

$$\text{EV} = \text{market value of common and preferred stock} + \text{market value of debt} - \text{cash and short-term investments}$$

Cash and short-term investments are subtracted because an acquirer's cost for a firm would be decreased by the amount of the target's liquid assets. Although an acquirer assumes the firm's debt, it also receives the firm's cash and short-term investments. Enterprise value is appropriate when an analyst wants to compare the values of firms that have significant differences in capital structure.

EBITDA (earnings before interest, taxes, depreciation, and amortization are subtracted) is probably the most frequently used denominator for EV multiples; operating income can also be used. Because the numerator represents total company value, it should be compared to earnings of both debt and equity owners. An advantage of using EBITDA instead of net income is that EBITDA is usually positive even when earnings are not. When net income is negative, value multiples based on earnings are meaningless. A disadvantage of using EBITDA is that it often includes non-cash revenues and expenses.

A potential problem with using enterprise value is that the market value of a firm's debt is often not available. In this case, the analyst can use the market values of similar bonds or can use their book values. Book value, however, may not be a good estimate of market value if firm and market conditions have changed significantly since the bonds were issued.

### EXAMPLE: Calculating EV/EBITDA multiples

Daniel, Inc., is a manufacturer of small refrigerators and other appliances. The following figures are from Daniel's most recent financial statements except for the market value of long-term debt, which has been estimated from financial market data.

|                                |             |
|--------------------------------|-------------|
| Stock price                    | \$40.00     |
| Shares outstanding             | 200,000     |
| Market value of long-term debt | \$600,000   |
| Book value of long-term debt   | \$900,000   |
| Book value of total debt       | \$2,100,000 |
| Cash and marketable securities | \$250,000   |
| EBITDA                         | \$1,000,000 |

Calculate the EV/EBITDA multiple.

### Answer:

First, we must estimate the market value of the firm's short-term debt and liabilities. To do so, subtract the book value of long-term debt from the book value of total debt:  $\$2,100,000 - \$900,000 = \$1,200,000$ . This is the book value of the firm's short-term debt. We can assume the market value of these short-term items is close to their book value. (As we will see in the Fixed Income topic area, the market values of debt instruments approach their face values as they get close to maturity.)

Add the market value of long-term debt to get the market value of total debt:  
 $\$600,000 + \$1,200,000 = \$1,800,000$ .

The market value of equity is the stock price multiplied by the number of shares:  
 $\$40 \times 200,000 = \$8,000,000$ .

The enterprise value of the firm is the sum of debt and equity minus cash:  $\$1,800,000 + \$8,000,000 - \$250,000 = \$9,550,000$ .

$$\text{EV/EBITDA} = \$9,550,000 / \$1,000,000 \approx 9.6$$

If the competitor or industry average EV/EBITDA is above 9.6, Daniel is relatively undervalued. If the competitor or industry average EV/EBITDA is below 9.6, Daniel is relatively overvalued.

### LOS 46.m: Describe asset-based valuation models and their use in estimating equity value.

Our third category of valuation model is **asset-based models**, which are based on the idea that equity value is the market or fair value of assets minus the market or fair value of liabilities. Because market values of firm assets are usually difficult to obtain, the analyst typically starts with the balance sheet to determine the values of assets and liabilities. In most cases, market values are not equal to book values. Possible approaches to valuing assets are to value them at their depreciated values, inflation-adjusted depreciated values, or estimated replacement values.

Applying asset-based models is especially problematic for a firm that has a large amount of intangible assets, on or off the balance sheet. The effect of the loss of the current owners' talents and customer relationships on forward earnings may be quite difficult to measure. Analysts often consider asset-based model values as floor or minimum values when significant intangibles, such as business reputation, are involved. An analyst should consider supplementing an asset-based valuation with a more forward-looking valuation, such as one from a discounted cash flow model.

Asset-based model valuations are most reliable when the firm has primarily tangible short-term assets, assets with ready market values (e.g., financial or natural resource firms), or when the firm will cease to operate and is being liquidated. Asset-based models are often used to value private companies but may be increasingly useful for public firms as they move toward fair value reporting on the balance sheet.

#### EXAMPLE: Using an asset-based model for a public firm

Williams Optical is a publicly traded firm. An analyst estimates that the market value of net fixed assets is 120% of book value. Liability and short-term asset market values are assumed to equal their book values. The firm has 2,000 shares outstanding.

Using the selected financial results in the table, calculate the value of the firm's net assets on a per-share basis.

|                              |                  |
|------------------------------|------------------|
| Cash                         | \$10,000         |
| Accounts receivable          | \$20,000         |
| Inventories                  | \$50,000         |
| Net fixed assets             | <u>\$120,000</u> |
| Total assets                 | \$200,000        |
|                              |                  |
| Accounts payable             | \$5,000          |
| Notes payable                | \$30,000         |
| Term loans                   | \$45,000         |
| Common stockholder equity    | <u>\$120,000</u> |
| Total liabilities and equity | \$200,000        |

**Answer:**

Estimate the market value of assets, adjusting the fixed assets for the analyst's estimates of their market values:

$$\$10,000 + \$20,000 + \$50,000 + \$120,000(1.20) = \$224,000$$

Determine the market value of liabilities:

$$\$5,000 + \$30,000 + \$45,000 = \$80,000$$

Calculate the adjusted equity value:

$$\$224,000 - \$80,000 = \$144,000$$

Calculate the adjusted equity value per share:

$$\$144,000 / 2,000 = \$72$$

### LOS 46.f: Explain advantages and disadvantages of each category of valuation model.

Advantages of discounted cash flow models:

- They are based on the fundamental concept of discounted present value and are well grounded in finance theory.
- They are widely accepted in the analyst community.

Disadvantages of discounted cash flow models:

- Their inputs must be estimated.
- Value estimates are very sensitive to input values.

Advantages of comparable valuation using price multiples:

- Evidence that some price multiples are useful for predicting stock returns.
- Price multiples are widely used by analysts.
- Price multiples are readily available.
- They can be used in time series and cross-sectional comparisons.

- EV/EBITDA multiples are useful when comparing firm values independent of capital structure or when earnings are negative and the P/E ratio cannot be used.

Disadvantages of comparable valuation using price multiples:

- Lagging price multiples reflect the past.
- Price multiples may not be comparable across firms if the firms have different size, products, and growth.
- Price multiples for cyclical firms may be greatly affected by economic conditions at a given point in time.
- A stock may appear overvalued by the comparable method but undervalued by a fundamental method or vice versa.
- Different accounting methods can result in price multiples that are not comparable across firms, especially internationally.
- A negative denominator in a price multiple results in a meaningless ratio. The P/E ratio is especially susceptible to this problem.

Advantages of price multiple valuations based on fundamentals:

- They are based on theoretically sound valuation models.
- They correspond to widely accepted value metrics.

Disadvantage of price multiple valuations based on fundamentals:

- Price multiples based on fundamentals will be very sensitive to the inputs (especially the k - g denominator).

Advantages of asset-based models:

- They can provide floor values.
- They are most reliable when the firm has primarily tangible short-term assets, assets with ready market values, or when the firm is being liquidated.
- They are increasingly useful for valuing public firms that report fair values.

Disadvantages of asset-based models:

- Market values are often difficult to obtain.
- Market values are usually different than book values.
- They are inaccurate when a firm has a high proportion of intangible assets or future cash flows not reflected in asset values.
- Assets can be difficult to value during periods of hyperinflation.



### MODULE QUIZ 46.3

1. Which of the following is *least likely* a rationale for using price multiples?
  - A. Price multiples are easily calculated.
  - B. The fundamental P/E ratio is insensitive to its inputs.

- C. The use of forward values in the divisor provides an incorporation of the future.
2. A firm has an expected dividend payout ratio of 60% and an expected future growth rate of 7%. What should the firm's fundamental price-to-earnings (P/E) ratio be if the required rate of return on stocks of this type is 15%?
- A. 5.0×.
  - B. 7.5×.
  - C. 10.0×.
3. Enterprise value is defined as the market value of equity plus:
- A. the face value of debt minus cash and short-term investments.
  - B. the market value of debt minus cash and short-term investments.
  - C. cash and short-term investments minus the market value of debt.
4. Which of the following firms would *most appropriately* be valued using an asset-based model?
- A. An energy exploration firm in financial distress that owns drilling rights for offshore areas.
  - B. A paper firm located in a country that is experiencing high inflation.
  - C. A software firm that invests heavily in research and development and frequently introduces new products.
5. Which type of valuation model is viewed as having the disadvantage of producing results that may not be comparable across firms?
- A. Asset-based models.
  - B. Price multiple models.
  - C. Discounted cash flow models.

## KEY CONCEPTS

### LOS 46.a

An asset is fairly valued if the market price is equal to its estimated intrinsic value, undervalued if the market price is less than its estimated value, and overvalued if the market price is greater than the estimated value.

For security valuation to be profitable, the security must be mispriced now and price must converge to intrinsic value over the investment horizon.

Securities that are followed by many investors are more likely to be fairly valued than securities that are neglected by analysts.

### LOS 46.b

Discounted cash flow models estimate the present value of cash distributed to shareholders (dividend discount models) or the present value of cash available to shareholders after meeting capital expenditures and working capital expenses (free cash flow to equity models).

Multiplier models compare the stock price to earnings, sales, book value, or cash flow. Alternatively, enterprise value is compared to sales or EBITDA.

Asset-based models define a stock's value as the firm's total asset value minus liabilities and preferred stock, on a per-share basis.

### **LOS 46.c**

Regular cash dividends are paid at set intervals. A special dividend is a one-time cash payment to shareholders.

Stock dividends are additional shares of stock. Stock splits divide each existing share into multiple shares. In either case, the value of each share will decrease because the total value of outstanding shares is unchanged. The portion of the company owned by each shareholder is also unchanged.

In a reverse stock split, the number of shares owned by each shareholder is decreased, so total shares outstanding are decreased and the value of a single share is increased.

A share repurchase is a purchase by the company of its outstanding shares. Share repurchases are an alternative to cash dividends as a way to distribute cash to shareholders.

### **LOS 46.d**

Dividend payment chronology:

- Declaration date: The date the board of directors approves payment of the dividend.
- Ex-dividend date: The first day a share of stock trades without the dividend, one or two business days before the holder-of-record date. On the ex-dividend date, the value of each share decreases by the amount of the dividend.
- Holder-of-record date: The date on which share owners who will receive the dividend are identified.
- Payment date. The date the dividend checks are sent to, or payment is transferred to, shareholders.

### **LOS 46.e**

The dividend discount model is based on the rationale that a corporation has an indefinite life, and a stock's value is the present value of its future cash dividends. The most general form of the model is:

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + k_e)^t}$$

Free cash flow to equity (FCFE) can be used instead of dividends. FCFE is the cash remaining after a firm meets all of its debt obligations and provides for necessary capital expenditures. FCFE reflects the firm's capacity for dividends and is useful for firms that currently do not pay a dividend. By using FCFE, an analyst does not need to project the amount and timing of future dividends.

### **LOS 46.f**

Advantages of discounted cash flow models:

- Easy to calculate.
- Widely accepted in the analyst community.
- FCFE model is useful for firms that currently do not pay a dividend.
- Gordon growth model is useful for stable, mature, noncyclical firms.

- Multistage models can be used for firms with nonconstant growth.

Disadvantages of discounted cash flow models:

- Inputs must be forecast.
- Estimates are very sensitive to inputs.
- For the Gordon growth model specifically:
  - Very sensitive to the  $k - g$  denominator.
  - Required return on equity must be greater than the growth rate.
  - Required return on equity and growth rate must remain constant.
  - Firm must pay dividends.

Advantages of price multiples:

- Often useful for predicting stock returns.
- Widely used by analysts.
- Easily calculated and readily available.
- Can be used in time series and cross-sectional comparisons.
- EV/EBITDA multiples are useful when comparing firm values independent of capital structure or when earnings are negative and the P/E ratio cannot be used.

Disadvantages of price multiples:

- P/E ratio based on fundamentals will be very sensitive to the inputs.
- May not be comparable across firms, especially internationally.
- Multiples for cyclical firms may be greatly affected by economic conditions. P/E ratio may be especially inappropriate. The P/S multiple may be more appropriate for cyclical firms.
- A stock may appear overvalued by the comparable method but undervalued by the fundamental method or vice versa.
- Negative denominator results in a meaningless ratio; the P/E ratio is especially susceptible to this problem.
- A potential problem with EV/EBITDA multiples is that the market value of a firm's debt is often not available.

Advantages of asset-based models:

- Can provide floor values.
- Most reliable when the firm has mostly tangible short-term assets, assets with a ready market value, or when the firm is being liquidated.
- May be increasingly useful for valuing public firms if they report fair values.

Disadvantages of asset-based models:

- Market values of assets can be difficult to obtain and are usually different than book values.
- Inaccurate when a firm has a large amount of intangible assets or future cash flows not reflected in asset value.

- Asset values can be difficult to value during periods of hyperinflation.

#### LOS 46.g

Preferred stock typically pays a fixed dividend and does not mature. It is valued as:

$$\text{preferred stock value} = \frac{D_p}{k_p}$$

#### LOS 46.h

The Gordon growth model assumes the growth rate in dividends is constant:

$$V_0 = \frac{D_1}{k_e - g_c}$$

The sustainable growth rate is the rate at which earnings and dividends can continue to grow indefinitely:

$$g = b \times \text{ROE}$$

where:

$b$  = earnings retention rate =  $1 - \text{dividend payout ratio}$

$\text{ROE}$  = return on equity

A firm with high growth over some number of periods followed by a constant growth rate of dividends forever can be valued using a multistage model:

$$\text{value} = \frac{D_1}{(1 + k_e)} + \frac{D_2}{(1 + k_e)^2} + \dots + \frac{D_n}{(1 + k_e)^n} + \frac{P_n}{(1 + k_e)^n}$$

where:

$$P_n = \frac{D_{n+1}}{k_e - g_c}$$

$g_c$  = constant growth rate of dividends

$n$  = number of periods of supernormal growth

#### LOS 46.i

The constant growth model is most appropriate for firms that pay dividends that grow at a constant rate, such as stable and mature firms or noncyclical firms such as utilities and food producers in mature markets.

A 2-stage DDM would be most appropriate for a firm with high current growth that will drop to a stable rate in the future, an older firm that is experiencing a temporary high growth phase, or an older firm with a market share that is decreasing but expected to stabilize.

A 3-stage model would be appropriate for a young firm still in a high growth phase.

#### LOS 46.j

The P/E ratio based on fundamentals is calculated as:

$$\frac{P_0}{E_1} = \frac{D_1/E_1}{k - g}$$

If the subject firm has a higher dividend payout ratio, higher growth rate, and lower required return than its peers, it may be justified in having a higher P/E ratio.

Price multiples are widely used by analysts, are easily calculated and readily available, and can be used in time series and cross-sectional comparisons.

#### **LOS 46.k**

The price-earnings (P/E) ratio is a firm's stock price divided by earnings per share.

The price-sales (P/S) ratio is a firm's stock price divided by sales per share.

The price-book value (P/B) ratio is a firm's stock price divided by book value per share.

The price-cash flow (P/CF) ratio is a firm's stock price divided by cash flow per share. Cash flow may be defined as operating cash flow or free cash flow.

#### **LOS 46.l**

Enterprise value (EV) measures total company value:

$$\text{enterprise value} = \text{market value of common and preferred stock} + \text{market value of debt} - \text{cash and short-term investments}$$

EBITDA is frequently used as the denominator in EV multiples because EV represents total company value, and EBITDA represents earnings available to all investors.

#### **LOS 46.m**

Asset-based models value equity as the market or fair value of assets minus liabilities. These models are most appropriate when a firm's assets are largely tangible and have fair values that can be established easily.

### **ANSWER KEY FOR MODULE QUIZZES**

#### **Module Quiz 46.1**

1. **B** If the analyst is more confident of his input values, he is more likely to conclude that the security is overvalued. The market price is more likely to be correct for a security followed by many analysts and less likely correct when few analysts follow the security. (LOS 46.a)
2. **C** One example of a present value model is valuation based on the present value of future cash flows available to equity holders. (LOS 46.b)
3. **C** Both a 50% stock dividend and a 3-for-2 stock split will increase the number of shares by 50%, while neither will affect value of the company. Therefore, the decrease in the share price should be the same in either case. (LOS 46.c)
4. **B** The chronology of a dividend payout is declaration date, ex-dividend date, holder-of-record date, and payment date. The ex-dividend date is the cutoff date for receiving the dividend: stocks purchased on or after the ex-dividend date will not receive the dividend. (LOS 46.d)

## Module Quiz 46.2

1. A For the constant growth model, the constant growth rate (g) must be less than the required rate of return (k). (LOS 46.e)
2. C The share value is  $7.0 / 0.0775 = \$90.32$ . (LOS 46.g)
3. B  $(\$40 + \$2) / 1.15 = \$36.52$   
(LOS 46.h)
4. B Using the constant growth model,  $\$1(1.05) / (0.10 - 0.05) = \$21.00$ . (LOS 46.h)
5. C  $D_3 = D_2(1 + g) = 1.56 \times 1.05 = \$1.638$   
 $P_2 = \frac{D_3}{k_e - g_c} = \frac{1.638}{0.11 - 0.05} = \$27.30$   
 $\frac{1.25}{1.11} + \frac{1.56 + 27.30}{(1.11)^2} = \$24.55$   
(LOS 46.h)
6. C  $D_1 = \$1.00(1.25) = \$1.25$   
 $D_2 = \$1.25(1.25) = \$1.5625$   
 $D_3 = 1.5625 \times 1.06 = \$1.6563$   
 $P_2 = \frac{1.6563}{0.10 - 0.06} = \$41.41$   
 $\frac{1.25}{1.10} + \frac{1.5625 + 41.41}{(1.10)^2} = \$36.65$   
(LOS 46.h)
7. B The constant growth DDM assumes that the dividend growth rate is constant. The most likely choice here is the bread and snack producer. Auto manufacturers are more likely to be cyclical than to experience constant growth. A biotechnology firm in existence for two years is unlikely to pay a dividend, and if it does, dividend growth is unlikely to be constant. (LOS 46.i)

## Module Quiz 46.3

1. B The fundamental P/E ratio is sensitive to its inputs. It uses the DDM as its framework, and the denominator  $k - g$  in both has a large impact on the calculated P/E or stock value. (LOS 46.j)
2. B Using the earnings multiplier model,  $0.6 / (0.15 - 0.07) = 7.5\times$ . (LOS 46.k)
3. B Enterprise value is market value of equity plus market value of debt minus cash and short-term investments. (LOS 46.l)
4. A The energy exploration firm would be most appropriately valued using an asset-based model. Its near-term cash flows are likely negative, so a forward-looking model is of limited use. Furthermore, it has valuable assets in the form of drilling rights that likely have a readily determined market value. The paper firm would likely not be appropriately valued using an asset-based model because high inflation makes the values of a firm's assets more difficult to estimate. An asset-

based model would not be appropriate to value the software firm because the firm's value largely consists of internally developed intangible assets. (LOS 46.m)

5. **B** Results that may not be comparable across firms are considered a disadvantage of valuation models based on price multiples. (LOS 46.f)

## TOPIC QUIZ: EQUITY INVESTMENTS

*You have now finished the Equity Investments topic section. Please log into your Schweser online dashboard and take the Topic Quiz on this section. The Topic Quiz provides immediate feedback on how effective your study has been for this material. Questions are more exam-like than typical Module Quiz or QBank questions; a score of less than 70% indicates that your study likely needs improvement. These tests are best taken timed; allow 1.5 minutes per question.*

# FORMULAS

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Free cash flow to the firm:

$$FCFF = NI + NCC + [Int \times (1 - \text{tax rate})] - FC_{INV} - WC_{INV}$$

where:

NI = net income

NCC = noncash charges (depreciation and amortization)

Int = cash interest paid

FC<sub>INV</sub> = fixed capital investment (net capital expenditures)

WC<sub>INV</sub> = working capital investment

Or:

$$FCFF = CFO + [Int \times (1 - \text{tax rate})] - FC_{INV}$$

where:

CFO = cash flow from operations

Int = cash interest paid

FC<sub>INV</sub> = fixed capital investment (net capital expenditures)

Free cash flow to equity:

$$FCFE = CFO - FC_{INV} + \text{net borrowing}$$

where:

CFO = cash flow from operations

FC<sub>INV</sub> = fixed capital investment (net capital expenditures)

net borrowing = debt issued - debt repaid

$$\text{cash-flow-to-revenue ratio} = \frac{\text{CFO}}{\text{net revenue}}$$

$$\text{cash-return-on-assets ratio} = \frac{\text{CFO}}{\text{average total assets}}$$

$$\text{cash-return-on-equity ratio} = \frac{\text{CFO}}{\text{average total equity}}$$

$$\text{cash-to-income ratio} = \frac{\text{CFO}}{\text{operating income}}$$

$$\text{cash flow per share} = \frac{\text{CFO} - \text{preferred dividends}}{\text{weighted average number of common shares}}$$

$$\text{debt coverage} = \frac{\text{CFO}}{\text{total debt}}$$

$$\text{interest coverage} = \frac{\text{CFO} + \text{interest paid} + \text{taxes paid}}{\text{interest paid}}$$

$$\text{reinvestment} = \frac{\text{CFO}}{\text{cash paid for long-term assets}}$$

$$\text{debt payment} = \frac{\text{CFO}}{\text{cash long-term debt repayment}}$$

$$\text{dividend payment} = \frac{\text{CFO}}{\text{dividends paid}}$$

$$\text{investing and financing} = \frac{\text{CFO}}{\text{cash outflows from investing and financing activities}}$$

$$\text{average age} = \frac{\text{accumulated depreciation}}{\text{annual depreciation expense}}$$

$$\text{total useful life} = \frac{\text{historical cost (gross cost)}}{\text{annual depreciation expense}}$$

$$\text{remaining useful life} = \frac{\text{ending net PP\&E}}{\text{annual depreciation expense}}$$

$$\text{tax expense} = \text{tax payable} + \Delta \text{DTL} - \Delta \text{DTA}$$

$$\text{effective tax rate} = \frac{\text{income tax expense}}{\text{pretax income}}$$

$$\text{cash tax rate} = \frac{\text{tax paid (cash)}}{\text{pretax income}}$$

$$\text{vertical common-size balance sheet ratios} = \frac{\text{balance sheet account}}{\text{total assets}}$$

vertical common-size income statement ratios =  $\frac{\text{income statement account}}{\text{sales}}$

receivables turnover =  $\frac{\text{annual sales}}{\text{average receivables}}$

days of sales outstanding =  $\frac{365}{\text{receivables turnover}}$

inventory turnover =  $\frac{\text{cost of goods sold}}{\text{average inventory}}$

days of inventory on hand =  $\frac{365}{\text{inventory turnover}}$

payables turnover =  $\frac{\text{cost of goods sold}}{\text{average trade payables}}$

number of days of payables =  $\frac{365}{\text{payables turnover ratio}}$

total asset turnover =  $\frac{\text{revenue}}{\text{average total assets}}$

fixed asset turnover =  $\frac{\text{revenue}}{\text{average net fixed assets}}$

working capital turnover =  $\frac{\text{revenue}}{\text{average working capital}}$

current ratio =  $\frac{\text{current assets}}{\text{current liabilities}}$

quick ratio =  $\frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{current liabilities}}$

cash ratio =  $\frac{\text{cash} + \text{marketable securities}}{\text{current liabilities}}$

defensive interval =  $\frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{average daily expenditures}}$

cash conversion cycle = days' sales outstanding + days of inventory on hand  
– number of days of payables

debt-to-equity =  $\frac{\text{total debt}}{\text{total shareholders' equity}}$

debt-to-capital =  $\frac{\text{total debt}}{\text{total debt} + \text{total shareholders' equity}}$

debt-to-assets =  $\frac{\text{total debt}}{\text{total assets}}$

financial leverage =  $\frac{\text{average total assets}}{\text{average total equity}}$

interest coverage =  $\frac{\text{earnings before interest and taxes}}{\text{interest payments}}$

$$\text{debt-to-EBITDA} = \frac{\text{total debt}}{\text{EBITDA}}$$

$$\text{fixed charge coverage} = \frac{\text{earnings before interest and taxes} + \text{lease payments}}{\text{interest payments} + \text{lease payments}}$$

$$\text{net profit margin} = \frac{\text{net income}}{\text{revenue}}$$

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

$$\text{operating profit margin} = \frac{\text{operating income}}{\text{revenue}} \text{ or } \frac{\text{EBIT}}{\text{revenue}}$$

$$\text{pretax margin} = \frac{\text{EBT}}{\text{revenue}}$$

$$\text{return on assets} = \frac{\text{net income}}{\text{average total assets}}$$

$$\text{operating return on assets} = \frac{\text{operating income}}{\text{average total assets}} \text{ or } \frac{\text{EBIT}}{\text{average total assets}}$$

$$\text{return on invested capital} = \frac{\text{after-tax operating profit}}{\text{average long-term capital}}$$

$$\text{return on equity} = \frac{\text{net income}}{\text{average total equity}}$$

$$\begin{aligned}\text{return on common equity} &= \frac{\text{net income} - \text{preferred dividends}}{\text{average common equity}} \\ &= \frac{\text{net income available to common}}{\text{average common equity}}\end{aligned}$$

Original DuPont decomposition:

$$\text{ROE} = \left( \frac{\text{net income}}{\text{revenue}} \right) \left( \frac{\text{revenue}}{\text{average total assets}} \right) \left( \frac{\text{average total assets}}{\text{average stockholders' equity}} \right)$$

Extended DuPont decomposition:

$$\text{ROE} = \left( \frac{\text{net income}}{\text{EBT}} \right) \left( \frac{\text{EBT}}{\text{EBIT}} \right) \left( \frac{\text{EBIT}}{\text{revenue}} \right) \left( \frac{\text{revenue}}{\text{average assets}} \right) \left( \frac{\text{average assets}}{\text{average equity}} \right)$$

Coefficients of variation:

$$\text{CV sales} = \frac{\text{standard deviation of sales}}{\text{mean sales}}$$

$$\text{CV operating income} = \frac{\text{standard deviation of operating income}}{\text{mean operating income}}$$

$$\text{CV net income} = \frac{\text{standard deviation of net income}}{\text{mean net income}}$$

$$\text{margin call price} = P_0 \left( \frac{1 - \text{initial margin}}{1 - \text{maintenance margin}} \right)$$

where:

$P_0$  = initial purchase price

$$\text{Price-weighted index} = \frac{\text{sum of stock prices}}{\text{number of stocks in index adjusted for splits}}$$

Market capitalization-weighted index =

$$\frac{\text{current total market value of index stocks}}{\text{base year total market value of index stocks}} \times \text{base year index value}$$

$$\text{Equal-weighted index} = (1 + \text{average percentage change in index stocks}) \times \text{initial index value}$$

$$[Q \times (P - VC)] - FC$$

where:

$Q$  = number of units sold

$P$  = price per unit

$VC$  = variable costs

$FC$  = fixed costs

Degree of operating leverage (DOL):  $DOL = \% \Delta \text{ operating profit} / \% \Delta \text{ sales}$

Degree of financial leverage (DFL):  $DFL = \% \Delta \text{ net income} / \% \Delta \text{ operating income}$

$$\text{preferred stock value} = \frac{D_p}{k_p}$$

Constant growth dividend discount model (Gordon growth model):

$$V_0 = \frac{D_1}{k_e - g_c}$$

Sustainable growth rate:

$$g = b \times ROE$$

where:

$b$  = earnings retention rate =  $1 - \text{dividend payout rate}$

$ROE$  = return on equity

Multistage dividend discount model:

$$\text{value} = \frac{D_1}{(1 + k_e)} + \frac{D_2}{(1 + k_e)^2} + \dots + \frac{D_n}{(1 + k_e)^n} + \frac{P_n}{(1 + k_e)^n}$$

where:

$$P_n = \frac{D_{n+1}}{k_e - g_c}$$

$g_c$  = constant growth rate of dividends

$n$  = number of periods of supernormal growth

Justified P/E ratio:

$$\frac{P_0}{E_1} = \frac{D_1/E_1}{k - g}$$

Enterprise value = market value of common and preferred stock + market value of debt – cash and short-term investments

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