

Third Edition

Corporate Valuation

Theory, Evidence & Practice

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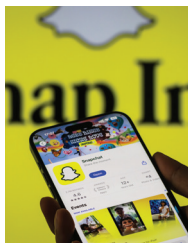
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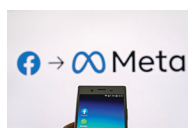
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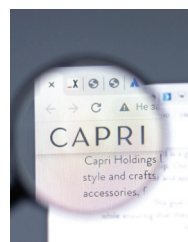
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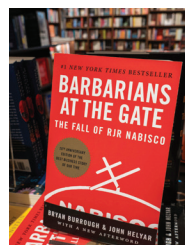
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To my sons Mike, Matt, and Jeff, and especially to my wife, Tina, for her support and encouragement throughout the writing of this book.

— RWH

To my patient and understanding wife, Jennifer, my parents, my sister Betty, my children Jason, Kimberly, Kate, and Phillip, and my many wonderful grandchildren.

— MEZ

As a global academic publisher, Sage is driven by the belief that research and education are critical in shaping society. Our mission is building bridges to knowledge—supporting the development of ideas into scholarship that is certified, taught, and applied in the real world.

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Preface

Welcome to the third edition of *Corporate Valuation: Theory, Evidence & Practice*. We wrote this book to equip our students as well as practitioners—many of whom are our former students—with the current knowledge used to value companies, parts of companies, and the securities issued by companies. Our goal is to provide current conceptual and theoretical valuation frameworks and translate those frameworks into practical approaches for valuing companies. We present the research and descriptive data underpinning these frameworks and use detailed examples to demonstrate how to implement them, often using data from real companies.

“*Corporate Valuation: Theory, Evidence & Practice* has been the industry standard on valuation for over two decades, well before it was widely available. The corporate valuation course based on this book is one of the few unstated requirements for graduates of The Wharton School that hope to enter into the field of finance. Having hired dozens of Wharton alumni who have learned valuation from this book, I cannot imagine a more thorough guide or a better reference to learn valuation.”

Ben Frost
Chair of Investment Banking
Goldman Sachs

TARGET AUDIENCE

Corporate Valuation: Theory, Evidence & Practice is intended as a college textbook for both graduate and undergraduate courses in valuation. Given the detailed approach, it is also a useful book for practicing professionals. We have been using this material in both valuation-based finance and accounting M.B.A. classes at Chicago Booth and Wharton, as well as in undergraduate finance classes at Wharton, for many years. Although primarily serving as a text in courses that teach valuation, the book can also serve as a background book for case-based courses that include cases on valuation, leveraged buyouts, and mergers and acquisitions. The book can also be used as a “field guide” for those who engage in valuation work. We know that many of our former students refer to our writings in their work involving valuation and security analysis for years after they graduate from our respective institutions.

“This is more than a textbook. It’s a vital resource for anyone wanting a comprehensive understanding of the financial theory underlying corporate valuation, the mechanics of analyzing financial statements and forecasting cash flows, and a practical framework for assembling this information into a rigorous valuation of the firm. The real world illustrations are superb, and the explanations supporting the methods are clear and comprehensive. Students will find themselves coming back to this book for insights long after the course is completed.”

Wayne Guay
Yageo Professor of Accounting
The Wharton School, University of Pennsylvania

INNOVATIVE, DETAILED, AND PRACTICAL PEDAGOGY

In teaching valuation, we found that students generally lacked the detailed knowledge required to value a company. Although other finance textbooks cover these topics, they do so at a fairly low level of detail and generally do not cover the relevant finance and accounting complexities required to perform valuations. As such, students who use these textbooks typically struggle in the workplace because they either lack the requisite knowledge or fail to understand how to integrate the accounting information with the appropriate finance theory. We integrate the relevant accounting topics with the appropriate finance theory, and demonstrate, using step-by-step examples, how to implement the valuation frameworks we discuss. The book is organized so that instructors can choose not to assign certain chapters or sections of chapters and omit some of these details. In addition, we incorporate relevant empirical evidence and theory from prior studies as well as our own work.

“This book contains everything one needs to know to properly value a company. It covers the financial theory of investment analysis, the accounting notions needed to understand, analyze, and forecast financial statements, and many techniques for creating a financial model yielding a rigorous estimate of firm value. It does all that while also providing readers with interesting anecdotes and detailed real-world examples. It is excellent both as the main text for a valuation course, and as the primary reference for practitioners on Wall Street.”

Vincent Glode
Pasi M. Hamalainen
Professor of Finance
The Wharton School, University of Pennsylvania

Overview of the Structure of the Book

The book consists of six parts. Part I (Chapters 1 through 4) presents an overview of valuation issues and topics, how valuation is used in practice, and the basic tools needed to value a company. These tools include analyzing financial statements, measuring performance, understanding and measuring cash flows, and creating a financial model. Part II (Chapters 5 through 7) discusses the discounted cash flow (DCF) valuation model, including the residual income valuation model. This part of the book demonstrates the equivalence of the alternative forms of the DCF valuation model and when each of the forms is more appropriate to use. Part III (Chapters 8 through 11) discusses how to measure the equity, unlevered, debt, weighted average, and other costs of capital used in the valuation. Part IV (Chapter 12) discusses how to value and measure the cost of capital for warrants, options, and other equity-linked securities. Part V (Chapters 13 and 14) discusses the conceptual framework and practical application of the market multiple valuation method. Finally, Part VI (Chapters 15 through 17) applies and extends these valuation frameworks to specific settings such as highly leveraged transactions, mergers and acquisitions, and cross-border valuations.

Steps in the Valuation Process

In Chapter 1, we provide a top-level overview of the steps in a valuation process used to value a company. These overview steps include analyzing the competitive landscape, analyzing the company and its potential competitive advantage, creating a financial model, measuring the costs of capital, market multiple valuation, and alternative valuation approaches. In the relevant

subsequent chapters, we provide detailed steps for each of these overview steps discussed in Chapter 1. For example, in Chapter 4, we provide a detailed step-by-step process for developing a financial model. These step-by-step process guides are included in many subsequent chapters. We show an example of this step-by-step process from Exhibit 15.8 for leveraged buyout transactions.

EXHIBIT 15.8 Steps in Assessing the Investment Value of Leveraged and Management Buyout Transactions

1. Establish an initial purchase price for the LBO target (for example, based on recent premiums paid in comparable transactions)
2. Develop the target's initial post-LBO capital structure, including the types and terms for the securities to be issued based on market conditions and the buyer's risk preferences
3. Develop a financial model to forecast the post-LBO operations of the target through the expected exit date and incorporate the proposed capital structure into the financial model (see Chapter 4)
4. Forecast all capital structure factors based on the company's capital structure (type of financing, amount of financing, and amount of interest) based on an assumed debt rating, assumed deal terms, and market conditions
5. Assess the target's debt capacity based on the target's expected post-LBO debt rating and ability to service the debt
6. Iterate steps 1 through 5 until the assumed deal terms and the debt capacity (based on the target's post-LBO debt rating and ability to service the debt) align
7. Measure the internal rate of return (IRR) for each equity investor (as well as debt with equity-option features) based on different exit years and exit valuations
8. Set a new price and/or capital structure and iterate steps 1 through 7 until the LBO transaction IRRs meet or exceed the minimum IRR hurdle rate set by the various investors
9. Value the firm and equity using the weighted average cost of capital method to determine the resulting implied exit multiples and IRRs
10. Use the adjusted present value method to value the post-LBO firm and evaluate the investment based on its overall NPV and cost of equity

Real Companies and Detailed Examples Incorporated Throughout

The understanding of valuation and how it plays a role in business decisions is essential to the success of any business and its decision makers. Throughout each chapter, we include real company data and examples to engage students and provide an understanding of how the theory and conceptual frameworks are used in practice. Each chapter contains excerpts and summaries from company financial statements, SEC filings, and new articles illustrating how the topics in the chapter apply to real companies using the Valuation in Practice notes as well as an opening vignette. In addition, each chapter contains one or more detailed examples demonstrating a step-by-step application of the theory and conceptual frameworks discussed in the chapter, which provide an important bridge to help students understand how to apply the concepts. Many of these detailed examples use information from real companies; for example, we use the Xerox Corporation and Affiliated Computer Services, Inc. merger to demonstrate a step-by-step application of the concepts discussed in Chapter 16 on mergers and acquisitions (Exhibit 16.26 is an example of an exhibit detailing a valuation in the context of a real-world acquisition).

EXHIBIT 16.26 Xerox Corporation—Post-Merger Common Shares Outstanding

Shares and Options Outstanding	
Xerox—Number of Shares and Options Outstanding (millions)	
Common shares	869.08
Restricted stock units and performance shares	6.45
Convertible securities	1.99
Total Xerox shares outstanding	<u>877.52</u>
Total number of Xerox options	<u>28.4</u>
ACS—Number of Shares and Options Outstanding	
Class A	91.04
Class B	6.60
Total ACS shares outstanding	97.64
× ACS/Xerox exchange ratio	4.935
Total number of ACS converted shares	<u>481.86</u>
ACS options	14.4
Option exchange ratio	7.085
Total number of ACS converted options	<u>102.1</u>

The following table lists the real companies discussed in the text by chapter:

Chapter 1	Apple Inc. Altria, Inc. and Kraft Foods Spinoff BMC Software, Inc. Daimler-Benz and Chrysler Merger FMC Corporation	The Gillette Company H. J. Heinz Company Snap, Inc. SpaceX, Inc. Xerox Corporation
Chapter 2	Advanced Micro Devices, Inc. Alphabet, Inc. (Google) Apple Inc. Cisco Systems, Inc. Dell Inc. Delta Airlines, Inc. Fort Howard Corporation The Fresh Market, Inc. The Gap, Inc. The Home Depot, Inc.	Kroger Co. Main Street Restaurant Group Nike, Inc. Pinnacle Entertainment, Inc. Samsonite Corporation SpaceX, Inc. The Sherwin-Williams Company Water Pik Technologies, Inc. Whole Foods Market Inc.
Chapter 3	Alcoa, Inc. Alphabet, Inc. (Google) Amazon.com, Inc. Darden Restaurants, Inc.	E*Trade Financial Corporation Meta Platforms, Inc. (Facebook) Starbucks Corporation Zillow Group, Inc.
Chapter 4	Alphabet Inc. (Google) Darden Restaurants, Inc. Encana Corporation The Gap, Inc.	Goldcorp Inc. Integra Life Sciences Holdings Corp. Starbucks Corporation Yahoo! Inc.

Chapter 5	Apple Inc. Danaher Corporation Emerging Communications Inc.	Euro Disney S.C.A. Nobel Biocare United Photovoltaics Group Limited
Chapter 6	Equity One, Inc. LinkedIn Corporation Microsoft Corp. The BVA Group LLC Cover-All Technologies Inc. Majesco	Micronas Semiconductor Holding AG Monsanto Company Regency Centers Corporation Syngenta AG TDK Corporation Yahoo! Inc.
Chapter 7	Ball Corporation Crane Co. HSBC Investment Bank plc Morgan Stanley Dean Witter	Rexam PLC Samsung SDI Whole Foods Market, Inc.
Chapter 8	Amazon.com, Inc. Apple Inc. Berna Biotech SA Boeing Company Braemar Hotels & Resorts Inc. Crucell N.V. Dimensional Fund Advisors The Home Depot, Inc. Honeywell International, Inc. Hyatt Corporation Knight Transportation, Inc.	Laureate Education, Inc. LifeWatch Ltd. McDonald's Corporation McClatchy Media Company Nichi-Iko Pharmaceutical Co., Ltd. Oracle Systems Corporation Sagent Pharmaceuticals, Inc. Swift Transportation Company Tesla, Inc. Walmart Inc. Various companies in the Hotel Industry
Chapter 9	Advanced Micro Devices Inc. Alcoa Inc. American Axle & Manufacturing Capri Holdings Limited Gap, Inc.	Intel Corporation Lumen Technologies Inc. Mattel Inc. Washington Mutual, Inc.
Chapter 10	Advanced Micro Devices, Inc. LATAM Airlines Group, S.A.	Philip Morris International, Inc. TAM S.A.
Chapter 11	Antero Resources Corporation Delta Airlines, Inc.	Six Flags Entertainment Corporation
Chapter 12	Alcoa Inc. Alphabet, Inc. (Google) The Fresh Market, Inc. KapStone Paper and Packaging Corp.	Synergy Pharmaceuticals Inc. Yahoo! Inc. Yelp Inc.
Chapter 13	AbbVie Inc. Altera Corporation Intel Corporation Microsoft Corporation	PepsiCo, Inc. Tesla, Inc. Other companies in the Auto Industry
Chapter 14	Calix, Inc. Coca Cola Company Covidien plc Genco Shipping & Trading Limited	Medtronic Merck & Co., Inc. Microsoft Corporation UAL Corporation (United Airlines)
Chapter 15	Electronic Arts FMC Corporation H. J. Heinz Company Kinder Morgan Inc.	The Kraft Heinz Company MetLife vs. RJR Nabisco RJR Nabisco, Inc.

Chapter 16	Affiliated Computer Services, Inc. (ACS) Autonomy Corporation plc Baker Hughes Incorporated Chrysler Corporation Daimler-Benz, AG Halliburton Company Hewlett-Packard Company Jos. A. Bank Clothiers, Inc. LAN Airlines S.A. and TAM S.A. Merger LATAM Airlines Group S.A.	Medivation, Inc. The Men's Wearhouse Inc. PeopleSoft, Inc. Oracle Corporation Pfizer Inc. Sanofi S.A. SIRIUS Satellite Radio TAM S.A. Xerox Corporation XM Satellite Radio
Chapter 17	Caraco Pharmaceutical Laboratories Alphabet, Inc. (Google) Johnson & Johnson Merck & Co. Inc.	Skechers U.S.A. Inc. Sun Pharmaceutical Industries Limited Synthes, Inc.

Learning Objectives, Vignettes, and Chapter Organizational Charts

At the beginning of every chapter, we present learning objectives for that chapter, a small vignette of a real-world example that applies to the content of the chapter, and an organizational chart of the chapter. Thus, even before reading the introduction to the chapter, the reader has a sense of the content of the chapter, its importance, and how the chapter will be organized, which makes it easier to learn the material that follows.

Example Learning Objectives

After mastering the material in this chapter, you will be able to:

1. Adjust the value of the firm and its equity for the value created from financing (5.1)
2. Measure firm and equity value using the adjusted present value and weighted average cost of capital valuation models (5.2–5.3)
3. Measure value using the equity free cash flow and dividend valuation models (5.4–5.5)
4. Understand how to measure expected cash flows and risk-adjusted discount rates (5.6)

Example Vignette

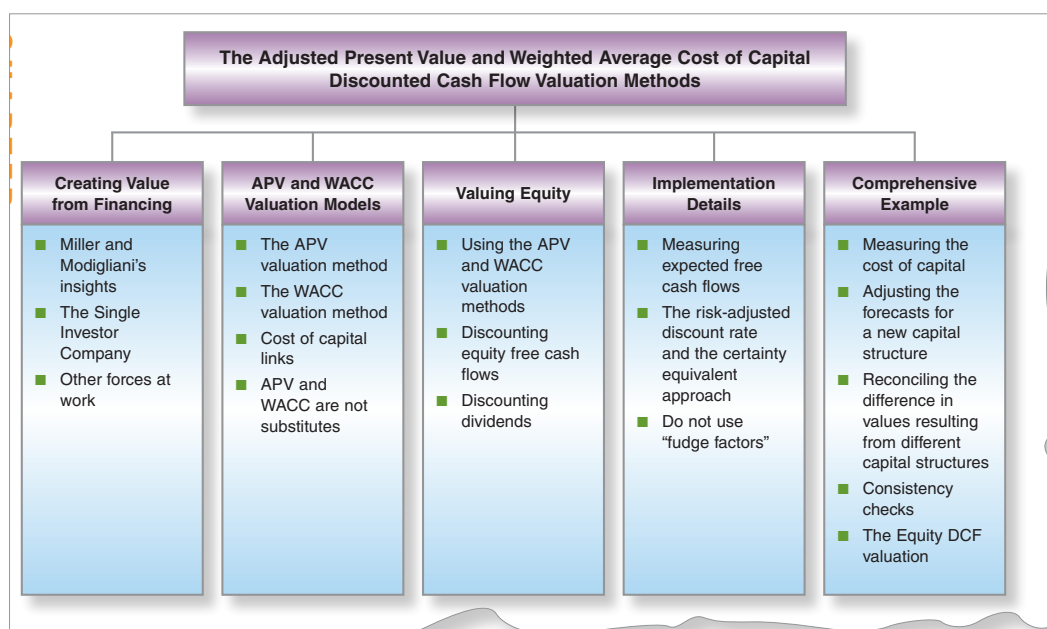
Emerging Communications' valuation using discounted cash flow valuation models—Emerging Communications Inc. (EmCom) owned various subsidiaries whose businesses provided local telephone service, sold and leased telecommunications equipment, and provided cellular telephone service in the U.S. Virgin Islands. EmCom's Chair and CEO, who already owned a majority of the company's shares, began to acquire EmCom's remaining shares in order to take the company private. The CEO arranged various types of debt financing for the transaction. In order to negotiate a deal price with the CEO, EmCom's Board of Directors created a special committee drawn from EmCom's Board of Directors. The special committee negotiated a \$10.25 price per share. EmCom's Board approved the \$10.25 bid and EmCom gave notice to its shareholders of a special meeting to vote on the sale. EmCom's shareholders approved the transaction.¹ According to Delaware law—the state in which the company was incorporated—shareholders not wishing to participate in the transaction can exercise their appraisal rights by petitioning the court to assess the fair value of their stock. Some of EmCom's minority shareholders opted to exercise their appraisal rights under Delaware law. The court concluded that the fair value of EmCom's shares was \$38.05 per share (\$27.80 per share higher than the deal price) based on a weighted average cost of capital valuation method. According to Bloomberg, Emerging Communications went out of business in 2012 through a Chapter 11 liquidation filing under bankruptcy.

EMERGING COMMUNICATIONS INC.

from EmCom's Board of Directors. The special committee negotiated a \$10.25 price per share. EmCom's Board approved the \$10.25 bid and EmCom gave notice to its shareholders of a special meeting to vote on the sale. EmCom's shareholders approved the transaction.¹ According to Delaware law—the state in which the company was incorporated—shareholders not wishing to participate in the transaction can exercise their appraisal rights by petitioning the court to assess the fair value of their stock. Some of EmCom's minority shareholders opted to exercise their appraisal rights under Delaware law. The court concluded that the fair value of EmCom's shares was \$38.05 per share (\$27.80 per share higher than the deal price) based on a weighted average cost of capital valuation method. According to Bloomberg, Emerging Communications went out of business in 2012 through a Chapter 11 liquidation filing under bankruptcy.

In this chapter, we explore the intricacies of the weighted average cost of capital and adjusted present value discounted cash flow valuation methods and demonstrate how the two methods relate to each other and result in identical valuations if implemented consistently.

Example Chapter Organizational Chart



Valuation Keys

Each chapter contains numerous boxed summaries of key concepts and tools called Valuation Keys. The Valuation Keys help focus the reader on the key issue or issues in each section of the chapter.



Valuation Key 13.4

In addition to risk and growth factors, a company's income tax, depreciation, and operating cost structure, as well as its working capital and capital expenditure requirements, are potentially relevant determinants of a company's market multiple, depending on the market multiple and the specific valuation. A determinant that is excluded from the calculation of a market multiple's value driver (denominator) is more likely to be relevant for assessing comparability (for example, income tax cost structure is more likely to be relevant for EBIT, EBITDA, and revenue multiples than unlevered earnings multiples). Of course, all else equal, we prefer multiples that are not sensitive to numerous determinants as it makes the choice of comparable companies easier.

Review Exercises with Solutions Throughout Each Chapter and End-of-Chapter Problems

Applying theory and conceptual frameworks to realistic data is challenging for most students, and it is especially challenging for students with less business experience or previous exposure to finance, management, and other valuation-related business courses. To reinforce concepts presented in each section of the chapter, we include review exercises that allow students to apply the topic discussed in each section. The solutions to the review exercises appear at the end of each chapter. In addition, each chapter contains additional end-of-chapter exercises and problems instructors can assign separately.

Example Review Exercise and Solution**REVIEW EXERCISE 16.1****Valuing Synergies—LATAM Airlines Group**

Use the following information (taken from the offering memorandum) to measure the value of the synergies for the LAN and TAM merger discussed in Valuation in Practice 16.5. After the completion of the proposed combination, the breakdown of the expected range of annual pre-tax synergies was estimated to be as follows (realized in full in the fourth year after the merger):

- Increased revenues—\$225 million to \$260 million from the combination of passenger networks and \$120 million to \$125 million from the combination of cargo services.
- Cost savings—\$15 million to \$25 million from the consolidation of frequent flyer programs; \$100 million to \$135 million from the coordination of airport and procurement activities; \$20 million to \$25 million from the coordination and improved efficiency of maintenance operations; and \$120 million to \$130 million from the convergence of information technology systems, the increased efficiency of combined sales and distribution processes, and the increased efficiency in corporate overhead costs.

LAN and TAM expected the one-time merger costs—including banking, consulting, and legal advisory fees—to be between \$170 million and \$200 million. LAN expected a reduction of approximately \$150 million in working

Solution for Review Exercise 16.1: Valuing Synergies—LATAM Airlines Group

Weighted Average Cost of Capital Valuation of Synergies:	10.00%	g= -10.00%				
Tax rate =	30.0%					
(\$ in millions)	Low	High	Midpoint			
Passenger revenue	\$225	\$260	\$243			
Cargo revenue	120	125	123			
	<u>\$345</u>	<u>\$385</u>	<u>\$365</u>			
Frequent flyer program consolidation	\$ 15	\$ 25	\$ 20			
Airport/procurement	100	135	118			
Maintenance	20	25	23			
Information technology and other	120	130	125			
	<u>\$255</u>	<u>\$315</u>	<u>\$285</u>			
	<u>\$600</u>	<u>\$700</u>	<u>\$650</u>			
Reduced investment in working capital	\$150	\$150	\$150			
Integration costs and fees	\$170	\$200	\$185			
First-year synergies	\$171	\$200	\$185	28.5%		
(\$ in millions)	2012	2013	2014	2015	2016	CV 2016
Cumulative percentage of synergies achieved		28.5%	50.0%	80.0%	100.0%	
Pre-tax revenue synergies		\$103.9	\$182.5	\$292.0	\$365.0	\$ 328.5
Pre-tax cost synergies		81.1	142.5	228.0	285.0	256.5
Integration costs and fees	-\$185.0					
Less: taxes on synergies and costs	55.5	-55.5	-97.5	-156.0	-195.0	-175.5
Reduced investment in working capital savings		150.0				
After-tax costs, fees, synergies and other	-\$129.5	\$279.5	\$227.5	\$364.0	\$455.0	\$ 409.5
Discount factor for continuing value						5.000
Unlevered free cash flow and CV	-\$129.5	\$279.5	\$227.5	\$364.0	\$455.0	\$2,047.5
Discount factor	0.953	0.867	0.788	0.716	0.651	0.651
Present value	-\$123.5	\$242.3	\$179.3	\$260.8	\$296.3	\$1,333.4
Value of synergies	<u>\$2,188.5</u>					

Exhibit may contain small rounding errors

FLEXIBLE STRUCTURE

The curricula, instructor preferences, and course lengths vary across schools. Accordingly, to the extent possible, we designed many of the chapters in *Corporate Valuation: Theory, Evidence & Practice* so that they can be taught independently of one another. This design provides flexibility and allows instructors to omit certain chapters in a course. Given the nature of the topics covered in the book, however, some of the chapters are interrelated, and certain concepts in a chapter not included in the curriculum would need to be covered by the instructor separately without assigning the entire chapter. We use this approach at Chicago because we have a quarter rather than a semester course schedule. Also, instructors may wish to supplement the course with cases, which might require omitting certain chapters.

Flexibility for Courses of Varying Lengths

Given differing preferences and needs, we provide the following table of possible course designs. In the semester course, faculty members can cover all 17 chapters in the book (Wharton curriculum). In the quarter course, however, covering the entire book is not practicable. For quarter courses, we outline two alternative approaches—one that focuses more on the details underpinning valuation, omitting the transaction and cross-border valuation chapters, and another that covers the valuation topics in less detail and includes the transaction and cross-border valuation chapters (Chicago curriculum). We also present these two versions of the curriculum for the shorter six-week and five-day courses. The book is also used in Wharton's Executive MBA program in a half-semester format which also includes cases, so the book is flexible in how it can be used.

Chapter and Topic	15-Week Semester-Course	10-Week Valuation Focused	10-Week Transaction Focused	6-Week Valuation Focused Mini-Course	6-Week Transaction Focused Mini-Course	5-Day Valuation Focused Mini-Course	5-Day Transaction Focused Mini-Course
Chapter 1 Introduction	Week 1	Week 1 Less Detail on Financial Ratios	Week 1	Week 1 Overview of Basic Concepts	Week 1 Overview of Basic Concepts	Day 1 Overview of Basic Concepts	Day 1 Overview of Basic Concepts
Chapter 2 Financial Ratios	Weeks 1 and 2						
Chapter 3 Free Cash Flows	Week 2	Week 2	Week 2 Less Detail on Free Cash Flows	Optional	Optional	Optional	Optional
Chapter 4 Financial Modeling	Week 3	Week 3					
Chapter 5 Discounted Cash Flow Valuation	Weeks 4 and 5	Weeks 3 and 4	Weeks 3 and 4	Weeks 2 and 3	Week 2	Days 2 and 3	Day 2
Chapter 6 Continuing (Terminal) Value	Week 5	Week 4	Week 4 or Optional	Week 3	Optional	Day 3	Optional
Chapter 7 Excess (Residual) Earnings Valuation	Week 6	Week 5	Week 4 or Optional	Week 4	Optional	Day 4	Optional
Chapter 8 Equity Cost of Capital	Week 7	Week 6	Optional	Optional	Optional	Optional	Optional
Chapter 9 Non-Equity Costs of Capital	Week 8	Week 7	Optional	Optional	Optional	Optional	Optional
Chapter 10 Levering and Unlevering	Week 9	Week 8	Week 5	Week 5	Optional	Optional	Optional
Chapter 11 Weighted Average Cost of Capital	Week 10				Optional	Optional	Optional

Chapter and Topic	15-Week Semester-Course	10-Week Valuation Focused	10-Week Transaction Focused	6-Week Valuation Focused Mini-Course	6-Week Transaction Focused Mini-Course	5-Day Valuation Focused Mini-Course	5-Day Transaction Focused Mini-Course
Chapter 12 Option Pricing Model Applications	Week 11	Week 9	Week 6	Optional	Optional	Optional	Optional
Chapter 13 Market Multiple Valuation I	Week 12	Week 10	Week 7	Week 6	Week 3	Day 5	Day 3 or Optional
Chapter 14 Market Multiple Valuation II							
Chapter 15 Leveraged Buyouts	Week 13	Optional	Week 8	Optional	Week 4	Optional	Day 3 or Optional
Chapter 16 Mergers and Acquisitions	Week 14	Optional	Week 9	Optional	Week 5	Optional	Day 4
Chapter 17 Cross-Border Valuation	Week 15	Optional	Week 10	Optional	Week 6	Optional	Day 5

VALUATION FROM A PRACTICAL PERSPECTIVE

Naturally, it is not possible for a textbook or any other book to discuss which of the specific valuation frameworks and applications apply to every valuation context that might arise. Each company and valuation context will have specific and potentially unique facts and circumstances that require the valuation expert to choose the frameworks and implement them in a way that is appropriate for the specific valuation context. The chapters in this book are meant to provide a guide to understanding the alternative frameworks and ways they can be implemented. Valuation experts must use their informed judgments to choose the specific valuation frameworks to use in a valuation and how to best implement them based on the facts and circumstances for the specific valuation.

The third edition of the book contains many useful updates and extensions.

- **Updated all the descriptive data and empirical analyses:** We updated all of the descriptive data and empirical analyses and added additional empirical analysis. For example, in Chapter 8, we updated the industry beta estimates, individual company beta and cost of equity estimates, market and government bond returns, and market risk premiums. In Chapter 9, we updated the distribution of balance sheet financing, corporate bond ratings, default recovery rates, default rates, and developed new and updated statistical credit rating and financial distress models. In Chapter 15, we added descriptive information about private equity transactions, and in Chapter 16 we updated the descriptive data for M&A deal flow.
- **2025 One Big Beautiful Bill Act (OBBBA):** We include discussions of the OBBBA throughout the book and changes from the 2017 Tax Cuts and Jobs Act (TCJA), which impacts the tax deductibility of interest, the taxation of U.S. multinationals and more.
- **Changes in accounting rules:** We updated the chapters for various changes in accounting rules that affect how we value firms. For example, we discuss the change in accounting for leases and provide detailed examples of the effect of the change in accounting on financial analysis (Chapter 2), how to measure free cash flows (Chapter 3), and other chapters. The new leasing standard also impacts the information available to estimate the unlevered and weighted average cost of capital which we discuss in detail in Chapter 11.
- **Edited and reorganized certain chapters:** We reorganized and edited certain chapters and parts of chapters based on input from students. For example, we reorganized and edited Chapter 9 (cost of debt), which now includes how to use option pricing theory to estimate the cost of debt, and added more examples. We also reorganized and edited Chapter 17 (valuing business across borders) and included more examples.
- **Additional and new examples:** We added additional examples in various chapters. For example, in Chapters 2 and 3, we have a detailed example using The Home Depot, Inc. and in Chapter 8 we have detailed beta and cost of equity estimates for Apple Inc., The Home

Depot, Inc., Amazon.com, Inc., and Tesla, Inc., and discuss numerous real-world issues to watch out for in estimating the equity cost of capital.

- **Additional companies:** Throughout the book we updated and added vignettes and valuation in practice examples to provide more bridges from the concepts in the texts to applications for actual companies. (See the list of companies by chapter provided above.)
- **Additional problems:** We added additional problems in certain chapters. For example, in Chapter 9, we added problems using option pricing theory to estimate the cost of debt and to apply the updated statistical credit rating and financial distress models to Lumen Technologies, Inc. and Mattel Inc.

SUPPLEMENTS

For Instructors

Solutions Manual Created by the authors and contains solutions to each of the problems at the end of the chapters in Excel spreadsheets.

PowerPoint Presentations Created and classroom tested by the authors, the PowerPoint slides outline key elements of each chapter and provide additional examples not used in the text-book. Because most of the examples in the PowerPoint presentations are different from those used in the book, instructors are not just repeating what is in the book.

Spreadsheets We provide author-created Excel spreadsheets for the underlying examples in the PowerPoint presentations. This allows instructors to see exactly how the spreadsheets are created and would also allow instructors to create other examples if they so desired.

For Students

Example, Review Exercise, and Problem Data We provide Excel spreadsheets of “hard-coded” data for chapter examples, review exercises, and end-of-chapter problems. We also provide hard-coded solutions to the chapter examples and review exercises. These hard-coded solutions provide students with the template used as well as the data for the problems, and make it easier to solve the problems, as students do not have to input the raw data into an Excel file.

In some cases, the exhibits in the book have small rounding errors because we do not show enough significant digits in order to avoid the clutter of multiple significant digits. When that occurs, the following phrase appears at the bottom of the exhibit: “Exhibit may contain small rounding errors.” The Excel spreadsheets provide more significant digits for students who want to refer to them.

Option Pricing Spreadsheets Chapters 9 and 12 include applications of option pricing theory to plain vanilla options, warrants, employee stock options, convertible debt, financial distress prediction and estimating the cost of debt. We provide Excel files that contain models and examples for these applications.

Credit Rating and Financial Distress Prediction Model Excel Spreadsheets We provide Excel spreadsheets containing the statistical prediction models and examples for the credit rating prediction model and financial distress prediction model in Chapter 9.

ACKNOWLEDGMENTS

We would especially like to thank Jennifer J. Jones, former faculty member at The University of Chicago Booth School of Business, for the countless hours she has contributed to all three editions of the book by helping us review the chapters, examples, solutions, and galleys. Her devotion to detail and to this project has been incredible, and it is fair to say that the book would not be as good as it is, and we might even still be working on it, without her efforts—and for that, we owe her an enormous amount of gratitude.

We would also like to thank our former students at Chicago and Wharton who have used this material in various forms over the years. They have provided valuable feedback and advice that has shaped the content of this book. In addition, we would like to thank Professor Vincent Glode, Professor Wayne Guay, and Professor Michael Roberts at Wharton, for their insights on the book when teaching the corporate valuation class at Wharton. We also thank Jennifer Blouin at Wharton for her valuable insights on the U.S. tax code, as well as Adam Kolasinski at Texas A&M for his detailed comments on the book. We would also like to thank Keith Bockus, Senior Consultant at Econic Partners, LLC, for his many years of feedback and advice on the content in the book, as well as Kevin Cuddy, Erik Himan, Zawadi Lemayian, Caitlin McCarthy, and Pavel Nikolov, all at Econic Partners LLC, and Renee McMahon and Steven O'Neil, both at Charles River Associates.

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<i>RWH</i>	<i>MEZ</i>
Philadelphia, PA	Chicago, IL

Third Edition

Corporate Valuation

After mastering the material in this chapter, you will be able to:

1. Explain the different concepts of value (1.1–1.2)
2. Understand the principles underpinning the commonly used valuation methods (1.3)
3. Explain how the different valuation models measure value (1.4–1.6)
4. Describe the ways managers and investors use valuation models (1.7)
5. Outline the steps used in the valuation process (1.8)



Cheng Xin/Getty Images

Introduction to Valuation

SNAP INC.

Snap Inc.'s (formerly Snapchat Inc.) primary product is an app called Snapchat. Snapchat, which launched in 2011, is a very popular photo- and video-messaging (free) app.¹ Snap was expected to go public (have an initial public offering) in March 2017. Goodwater Capital analyzed Snap's valuation in February 2017, when Snap was expected to have an offering price in the \$14–\$16 per share range (fully diluted market capitalization range of \$19.9 billion to \$22.8 billion).² As part of the analysis of Snap's potential value, Goodwater included illustrative forecasts for Snap from 2017 through 2027, which appear in the following table. (For now, ignore the column titled Equation 1.1; we discuss that equation in Section 1.3.)

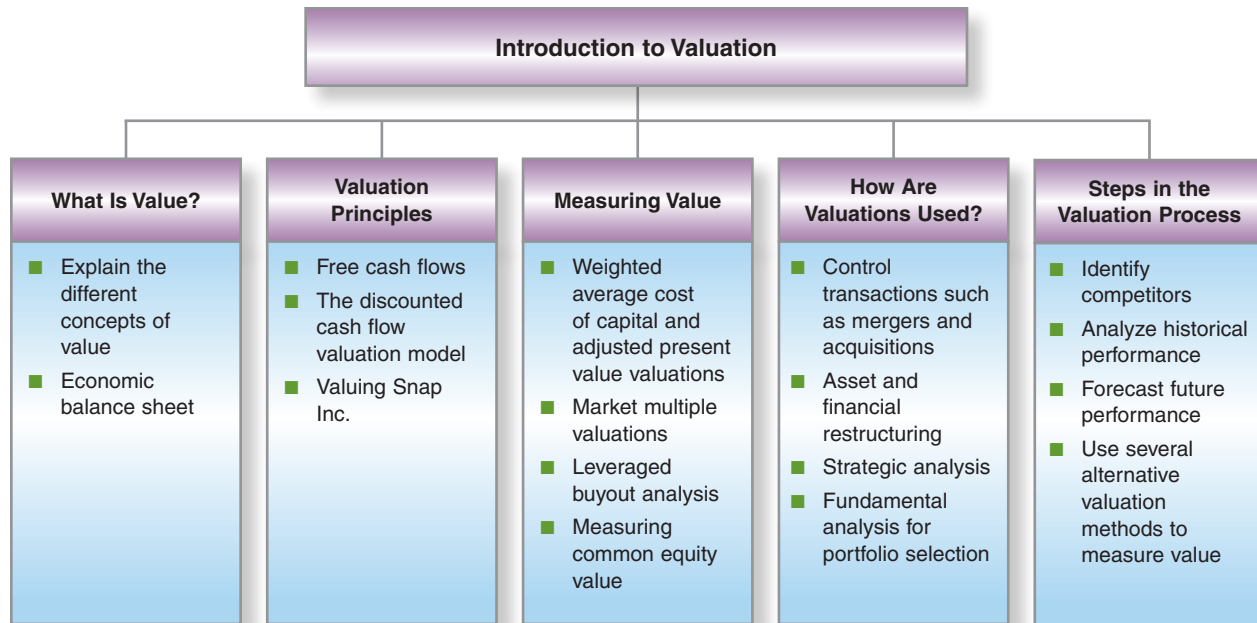
(in millions of \$)*	Equation 1.1	2015A	2016A	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Revenue		\$ 59	\$404	\$1,104	\$1,942	\$2,754	\$3,453	\$4,321	\$5,387	\$6,682	\$8,237	\$10,085	\$12,263	\$14,811
EBITDA**		-\$366	-\$491	-\$ 616	-\$ 340	\$ 144	\$ 626	\$1,035	\$1,578	\$2,284	\$3,185	\$ 4,315	\$ 5,650	\$ 7,280
Earnings before interest and taxes	EBIT	-\$382	-\$520	-\$ 695	-\$ 485	-\$ 70	\$ 347	\$ 686	\$1,142	\$1,744	\$2,519	\$ 3,499	\$ 4,659	\$ 6,083
Income taxes	-TAX	-8	-7	-1	-1	-1	1	172	285	436	630	874	1,165	1,521
EBIT – Income tax	EBIT – TAX	-\$374	-\$513	-\$ 694	-\$ 484	-\$ 69	\$ 346	\$ 514	\$ 857	\$1,308	\$1,889	\$ 2,625	\$ 3,494	\$ 4,562
Depreciation and amortization	+NCEXP	15	29	79	145	214	279	349	436	540	666	815	992	1,198
Required cash	-ΔRC	-2	-15	-5	-9	-12	-16	-19	-24	-30	-37	-45	-55	-67
Non-cash operating working capital	-ΔWCO	-15	-152	-50	-87	-124	-155	-194	-243	-301	-371	-454	-552	-666
Required investments	-CAPEX	-19	-66	-110	-194	-275	-345	-432	-539	-668	-824	-1,009	-1,226	-1,481
Unlevered free cash flow	FCF	-\$395	-\$717	-\$ 779	-\$ 629	-\$ 266	\$ 109	\$ 217	\$ 487	\$ 849	\$1,323	\$ 1,932	\$ 2,653	\$ 3,546
Annual Percentage Change:														
Revenue			584.7%	173.3%	75.9%	41.8%	25.4%	25.1%	24.7%	24.0%	23.3%	22.4%	21.6%	20.8%
EBITDA**			34.2%	25.5%	-44.8%		334.7%	65.3%	52.5%	44.7%	39.4%	35.5%	30.9%	28.8%
Earnings before interest and taxes			36.1%	33.7%	-30.2%	-85.6%		97.7%	66.5%	52.7%	44.4%	38.9%	33.2%	30.6%
Tax-effected EBIT			37.2%	35.3%	-30.3%	-85.7%		48.6%	66.7%	52.6%	44.4%	39.0%	33.1%	30.6%
Unlevered free cash flow			81.8%	8.7%	-19.3%	-57.7%		98.8%	124.3%	74.3%	55.8%	46.0%	37.4%	33.6%
Margins:														
EBITDA to revenue		-620.3%	-121.5%	-55.8%	-17.5%	5.2%	18.1%	24.0%	29.3%	34.2%	38.7%	42.8%	46.1%	49.2%
EBIT to revenue		-647.5%	-128.7%	-63.0%	-25.0%	-2.5%	10.0%	15.9%	21.2%	26.1%	30.6%	34.7%	38.0%	41.1%
Free cash flow to revenue		-668.6%	-177.5%	-70.6%	-32.4%	-9.7%	3.2%	5.0%	9.0%	12.7%	16.1%	19.2%	21.6%	23.9%

** EBITDA = Earnings Before Interest, Taxes, Depreciation, and Amortization

The chapters in this book provide detailed discussions of the conceptual frameworks and tools needed to value a company such as Snap as well as other privately held and publicly traded companies. The chapters provide conceptual frameworks and the tools to create and analyze forecasts, measure a company's riskiness and costs of capital, and value the company using alternative valuation models such as the discounted cash flow model, the residual income model, the market multiple model, and the leveraged buyout model. The chapters also provide tools to analyze merger and acquisition transactions and to address the valuation issues that arise when valuing a company across borders. We use the above information for Snap later in this chapter to illustrate how to value a company.

¹ See Snap Inc.'s S-1 Registration Statement filed with the U.S. SEC on February 2, 2017.

² Goodwater Capital invests in consumer technology companies. See "Understanding Snapchat—The Next Facebook or Another Twitter?," available on June 25, 2018, at <http://www.goodwatercap.com/thesis/understanding-snapchat>.



INTRODUCTION

Managers and investors place big bets and take large risks based on the valuation models discussed in this book. They are willing to make those investments and take those risks because they expect to earn sufficient cash in the future from these investments to create value for their companies or superior returns for their investment portfolios. Managers, for example, who acquire other companies, and other investors decide whether or not to make an investment by comparing their assessment of the value—or valuation—of the future cash flows they expect to earn from an investment to the amount they must invest. They select investments for which their valuation of the future cash flows is sufficiently greater than the amount they must invest. The valuation models discussed in this book provide the conceptual frameworks and tools to conduct these analyses.

Since valuation analyses serve as the basis for many decisions managers and investors make every day, all managers and investors benefit from understanding valuation frameworks, how valuation models work, and how to implement those valuation models appropriately. In this book, we present well-accepted methods and valuation models that managers and investors commonly use to measure value. While managers and investors use these valuation models to measure the value of many different types of investments and as the basis of many different decisions, our focus is on measuring the value of a firm and its common equity. We also discuss ways to value certain securities a firm may issue to raise financial capital. Finally, while we do not discuss project valuation directly, many of the valuation methods and tools presented in this book can be used to assess the value of a company's specific investment projects.

In this chapter, you will gain a general understanding of the primary valuation models. Further, you will gain an understanding of the general components of a firm's value. In addition, you will see the various ways that managers and investors use valuation models. For example, the managers of Daimler (now Mercedes-Benz Group AG) and Chrysler (now owned by Stellantis) agreed to merge the two auto manufacturers based in part on the advice of their financial advisors who relied on the models discussed in this book (see Valuation in Practice 1.1). Finally, you will gain an appreciation of the overall valuation process.

1.1 WHAT DO WE MEAN BY “THE VALUE OF A COMPANY”?

LO1 Explain the different concepts of value

Various terms are used to indicate the value of a company, for example, **fair market value**, **market value**, **fair value**, **intrinsic value**, and **fundamental value** to name a few. A widely used description of fair market value of a company is the cash equivalent value at which a willing and unrelated buyer would agree to buy

and a willing and unrelated seller would agree to sell the company, when neither party is compelled to act, and when both parties have reasonable knowledge of the relevant available information.³

Valuation in Practice 1.1

The Daimler-Benz—Chrysler Merger In November 1998, Daimler-Benz, AG (Daimler) merged with Chrysler Corporation (Chrysler). The merger of Daimler and Chrysler resulted in the formation of a new German company, DaimlerChrysler, AG (DaimlerChrysler). The process started in mid-January 1998, when Mr. Jurgen E. Schrempp, Chairman of Daimler, and Mr. Robert J. Eaton, Chairman and Chief Executive Officer of Chrysler, met and began discussions about a possible merger between the two companies. By late April of that year, they agreed to merge in a **stock-for-stock transaction**. Daimler agreed to an exchange ratio that resulted in a 28%, or more than \$7 billion, premium to the Chrysler shareholders.

On the day before they announced the merger, Daimler's market capitalization (or market cap) was over \$52.5 billion and Chrysler's market cap was over \$26.5 billion, with a combined market cap of over \$79 billion. The initial market reaction to the merger announcement was positive. Chrysler's market cap increased by more than \$7.5 billion and Daimler's market cap increased by more than \$4.5 billion, for a combined increase of more than \$12 billion (or 15%).

Mr. Schrempp and Mr. Eaton and their respective boards decided to place their bets, in part, based on the advice of their financial advisors. Credit Suisse First Boston was Chrysler's financial advisor in connection with this merger and the financial advisor for Daimler-Benz was Goldman Sachs. Both financial advisors provided a fairness opinion to their respective clients indicating that the price paid in the merger was fair, and both used the valuation models we discuss in this book as a basis for their conclusions. Of course, we now know that this merger did not work as well as implied by the market's initial reaction to the announcement, as Daimler sold Chrysler in 2007 for more than a \$25 billion loss.

Source: See Annex C and Annex D in the DaimlerChrysler AG SEC Form F-4 (Registration Statement). DaimlerChrysler's post-merger financial performance has not yet met pre-merger expectations.

This definition suggests some important characteristics about the valuation context—"arm's length," time-frame constraints, information set, and specific use. For example, a willing and unrelated buyer and seller suggests that the transaction is "arm's length"; that is, it does not include "side payments" or other remuneration (economic or other) beyond the transaction price paid by the buyer to the seller. Neither party being compelled to act suggests a time-frame context—that is, the time frame for the parties to identify and negotiate with each other is such that, whatever it happens to be, it does not affect the price at which a transaction would take place. This component of the definition suggests the transaction is not forced such as might be compelled by a court or a government agency or that might be necessary if the seller is in financial distress or has liquidity issues that it must address quickly. The definition also indicates the importance of the availability of information—that is, the value is based on an information set that is assumed to contain all relevant and available information. Lastly, part of the relevant information is the specific use of the assets being purchased.

In most valuations, the company is valued as an ongoing business (**ongoing value** or **going-concern value**). Certain valuation contexts, however, can value the company presuming that the company will not be operated any longer, **liquidation value (forced and orderly)**, or that the company will be broken up into pieces and the pieces will be operated as separate entities, **breakup value**. Liquidation value is used when the company's assets, either collectively or in parts or individually, are going to be sold or liquidated. Forced liquidation suggests a valuation context in which the time frame to sell the company is sufficiently short such that the company will be sold for less than it would have been sold for given more time, sometimes called a **fire sale** of the asset. Orderly liquidation suggests that the time frame to sell the company does not affect the price at which the company is sold. Breakup value is the value of selling off the different parts of a company—for example, a **conglomerate** selling off all or some of the individual companies it owns.

³ This definition has been adopted by the U.S. Internal Revenue Service to define Fair Market Value: "The fair market value of any interest of a decedent in a business, whether a partnership or a proprietorship, is the net amount which a willing purchaser whether an individual or a corporation, would pay for the interest to a willing seller, neither being under any compulsion to buy or to sell and both having reasonable knowledge of relevant facts." U.S. Internal Revenue Service, 26 CFR 20.2031-3 – Valuation of Interests in Businesses.

Of course, there is not just one universal opinion on the value of a company. Different investors often have differences of opinion regarding the best way to use the company's assets, or they may have different expectations regarding the company's future prospects even if they do agree on the best use of the assets, or they have different assessments of the riskiness of the company's expected cash flows. Naturally, buyers and sellers need not be in exact agreement over the value of a company when they transact. The buyer typically believes the value (to the buyer) is higher than the price paid for it and the seller often believes the value is lower than the price at which it is sold. Naturally, transactions are more likely to occur when the buyer believes a company is worth more (to the buyer) than the seller believes it is worth (to the seller). Nevertheless, valuation models approximate the observed market value of the company so long as the inputs used reflect both a specific valuation context and the information and expectations of the buyers and sellers engaged in market transactions.

1.2 THE ECONOMIC BALANCE SHEET: RESOURCES EQUAL CLAIMS ON RESOURCES

The value of the firm and the value of the securities it issues are related in a very fundamental way. A company is a legal entity, which is essentially a collection of contracts.⁴ One of those contracts must be with the owners of the company (shareholders, which could be individuals or another company), because a company cannot own itself. For example, articles of incorporation, corporate bylaws, shareholders agreement (optional), and stock certificates (optional in most states) are the contracts a corporation has with its common equity owners. In almost all cases, the common equity owners of a company have a **residual interest** in the company's assets; that is, the common equity owners get the value that remains after all other contracts are settled. As a result, the value of a company's resources must be equal to the value of the contractual claims on its resources.

$$\text{Value of Resources} = \text{Value of Claims on Resources}$$

$$\text{Value of the Firm} = \text{Value of Non-Equity Claims} + \text{Value of Common Equity (Residual Interest)}$$

From this relation, it follows that a change in the value created by a company must be equal to the change in the value of the company's securities (we use the Greek letter delta, Δ , to signify the change in a variable). Said another way, the dollar return on a company's resources must be equal to the dollar return on the claims on its resources.

$$\Delta \text{Value Firm} = \Delta \text{Value Non-Equity Claims} + \Delta \text{Value Common Equity}$$

$$\$ \text{Return Firm} = \$ \text{Return Non-Equity Claims} + \$ \text{Return Common Equity}$$

We use several forms of these relations to develop various aspects of the valuation models presented throughout this book. It is sometimes useful to depict this relation in more detail using an **economic balance sheet**.

Example Economic Balance Sheet

Exhibit 1.1 is an example of an economic balance sheet. The first point to note about this exhibit is that the value of the company's resources (or the value of the firm) is equal to the value of the claims on its resources (or the value of its securities). This is a useful relation because information available about the securities that a company issues can be used to assess the company's value and cost of capital. The **cost of capital** is the expected rate of return required by investors to invest in a specific investment. Conceptually, it is the opportunity cost of investing in a specific investment that has a certain level of risk. If we invest in an investment, we give up the opportunity to invest in alternative investments; thus, the cost of capital is the market determined return we would expect to earn by investing in alternative investments of equal risk. The cost of capital is particularly relevant in valuation because we use the (after-tax) cost of capital of an investment—also called the **risk-adjusted discount rate**, **required rate of return**, **expected rate of return**, and **hurdle rate**—to discount an investment's expected cash flows in order to measure the value of the investment.

⁴ See Coase (1937) for an important discussion about why firms exist; Coase, R., "The Nature of the Firm," *Economica* 4 (1937), pp. 386–405.

EXHIBIT 1.1 Economic Balance Sheet for a Hypothetical Company

HYPOTHETICAL COMPANY Economic Balance Sheet As of 31 December, Year 5	
Resources (Assets)	Market Value
Value of the unlevered (all equity-financed) business operations without excess assets	\$ 8,500
Value of the excess assets	500
Value of the unlevered firm	\$ 9,000
Value created from financing	1,000
Value of the firm	<u>\$10,000</u>
Claims on Resources	Market Value
Value of debt	\$ 3,000
Value of preferred stock	2,000
Value of common equity	5,000
Value of securities issued	<u>\$10,000</u>

Resources (Assets). The value of a company's resources has two basic components—the **value of the unlevered firm** and the **value created from financing**. The value of the unlevered firm is what the company would be worth if it was entirely financed with common equity but had made all of the same investment decisions. It is essentially the value of the company's operating assets plus the value of any excess assets it might hold. The value created from financing arises when a company is able to raise capital at a cost of capital that is less than the market-determined cost of capital, for example, because of some tax advantage or subsidy. In many tax jurisdictions, payments to **debtholders** in the form of interest are tax deductible at the corporate level whereas payments or flows to **equityholders** are not tax deductible. When a taxing authority allows a company to deduct interest expense to calculate taxable income, the company's debtholders receive the interest payment but the cost to the company is the after-tax amount of interest. As a result, companies have a potential tax advantage of debt relative to other forms of financing, such as equity.

The economic balance sheet does not typically show the value of all the individual components that make up the value of the unlevered firm, but we are able to break it into two components: the value of the company's business operations on an unlevered basis and the value of its excess assets. The value of a company's business operations is the value of the company's ongoing businesses, exclusive of any value created from financing and any value in assets that are not needed for the business. The value of the company's business operations is not the sum of the individual values of the assets that the company needs to operate its businesses when considered separately. Rather, it is the value of those assets when valued together as an ongoing business based on the company's strategy and management's implementation of that strategy. These assets include monetary assets (such as cash and receivables required for the business), physical assets (such as inventory and property, plant, and equipment), intangible assets (such as intellectual property or a superior R&D capability), and the **value of growth opportunities** (also called the **present value of growth opportunities**). Thus, the value of the business operations includes any expected future value creation resulting from anticipated investments. The latter are not assets already-in-place, but they are part of the value of a company.

The value of the company's **excess assets** includes all resources that are not needed to operate the specific business being valued. Excess assets include **excess cash** and marketable securities (sometimes referred to as cash and cash equivalents); land, buildings, equipment, and patents not needed to run the business; **net pension assets**; and any other asset that is not needed to operate the business based on the company's strategy. Generally, we value excess assets separately and isolate them from our valuation analysis of the company's business.

Claims on Resources. In the bottom section of Exhibit 1.1, Claims on Resources, we show that the value of the firm is equal to the sum of the value of a company's securities. We use a simple capital structure in this exhibit: debt, preferred stock, and common equity. The claims on the company's resources consist of all of the securities issued by the company to raise capital. Keep in mind that companies can

Valuation in Practice 1.2

Apple Inc.'s⁵ (Apple) Excess Cash As shown in Exhibit P1.2 (see Problem 1.7), as of the end of fiscal year 2011, Apple had over \$116 billion in assets, of which \$81 billion (70%) was composed of cash, cash equivalents, and marketable securities ("cash"). Apple had no debt at this time. It was clear that most of the "cash" was an excess asset (excess cash), which is why financial analysts and other market participants began to lobby Apple to begin to distribute its excess cash to its shareholders. In 2012, Apple began a "return of capital" program and began to pay dividends and repurchase its shares. From 2012 through 2016, Apple's return of capital program distributed over \$200 billion to its shareholders. In spite of its \$200 billion return of capital program, as of the end of its first fiscal quarter in 2017 (quarter ended December 31, 2016), Apple reported total assets of \$331 billion, of which \$246 billion (74%) was composed of cash, cash equivalents, and marketable securities. Over this period, however, Apple borrowed \$77 billion, so its net cash position without debt was \$169 billion (67% of its assets with net cash).

In order to value Apple, we would first estimate its actual cash needs for operating the company and its excess cash; in other words, estimate the amount of "cash" Apple needs to implement its current long-term strategy. Estimating required cash is complex for most companies (see Chapters 3 and 4). Part of the analysis to estimate Apple's excess cash requires that we understand why Apple borrowed \$77 billion, when it appeared to have so much excess cash on its balance sheet. Is that "cash" really excess cash? It turns out that of the \$246 billion in "cash" as of December 31, 2016, over 90% (\$230 billion) is from profits of its overseas operations which would be taxed by the U.S. if it was paid (repatriated or upstreamed) to Apple's parent company in the U.S. Apple's CEO stated that the U.S. tax rate would be around 40% (federal and state taxes) on its overseas "cash" if repatriated (based on current U.S. income tax rates) and said it has no plans to do so until U.S. tax rates are reduced. In December 2017, the passage of the Tax Cuts and Jobs Act of 2017 reduced the U.S. federal tax rate to 21%. In addition, companies are required to pay a tax on earnings that have not been previously repatriated back to the U.S. at a 15.5% tax rate on liquid assets (cash and marketable securities) and an 8% tax rate on non-liquid assets as of January 1, 2018. Companies are given 8 years to pay the taxes on these past overseas earnings. On January 18, 2018, Apple announced that it would pay a tax of approximately \$38 billion on its overseas cash.

issue different kinds of debt, preferred and common equity, so each of these categories can actually be composed of multiple securities.

All companies have at least one type of claim, called **common equity** (or **equity**). (We use the term *equity* interchangeably with the term *common equity* throughout this book.) The investors who own these securities have a residual interest in the company's resources and almost always control the company. They generally elect the board of directors, which hires and compensates management. Companies can have more than one type of common equity that has different rights, such as different voting rights as well as different dividend rights. Another claim on the resources of the company is the debt that is outstanding. Companies can have different types of debt with varying seniority and differing terms. Debt has seniority over the other claims shown in the economic balance sheet. Most, but not all forms of debt instruments represent a fixed claim on the company's resources.

Companies can also issue another form of security, called **preferred stock**, that typically (but not always) also has a fixed claim on the company's resources. Preferred stock is generally junior to the company's debt instruments, but it is generally senior to the common equity. A company can also issue various classes of preferred stock. In most tax jurisdictions, the dividends paid on preferred stock are not generally tax deductible. In addition, companies can issue debt and preferred stock that are convertible into common equity at the option of the holder. Companies can also have other types of securities, such as contingent claims like **employee stock options** and **stock warrants**, or other debt-like claims, such as **pension liabilities**.

You might be wondering why the value of the company's non-interest-bearing operating liabilities (such as accounts payable or taxes payable) does not show up in the Claims on Resources section of the

⁵ Apple designs, manufactures, and markets personal computers and related software, services, peripherals, and networking solutions worldwide as well as portable digital music players and related accessories and services, including online sale of third-party audio and video products. See <http://investor.apple.com/>.

economic balance sheet. **Operating liabilities** result when a company does not have to pay cash for its operating expenses in the same period in which it receives the good or service provided to it. These liabilities are presented on a company's accounting balance sheet as current liabilities (such as accounts payable and other payables), as well as non-current liabilities. From a valuation perspective, we do not consider any of these liabilities as debt but consider them non-interest-bearing operating liabilities. The reason the non-interest-bearing operating liabilities do not appear in the economic balance sheet is that in the normal process of performing a valuation on a going-concern basis, the non-interest-bearing operating liabilities of the company are implicitly netted against the value of the company's assets in the valuation models used to determine the value of the unlevered assets. Since non-interest-bearing operating liabilities are netted out in measuring the resources of the company, none of the claims shown on the economic balance sheet is a non-interest-bearing operating liability. However, since non-interest-bearing operating liabilities have a legal claim on the assets of a company, they do affect the valuation of the company, which we will discuss later in Chapters 3 through 5.

Why is it that in the course of a valuation the **non-interest-bearing liabilities** are implicitly netted out against the value of the company's assets in determining the value of the company's unlevered assets? Because financing costs related to non-interest-bearing operating liabilities are embedded in the company's operating expenses, we do not have an easy way to disentangle the financing cost from the actual operating expense. When a company buys a product or service **on account** from a vendor, the vendor charges the company for the product or service plus an implicit financing charge for not paying at the time the good or service is received. Hence, the financing charge is embedded in the cost of the product or service and cannot be separated from the value of the operations. At this point, we don't discuss how this netting takes place in the various types of valuation methods used, but we will return to this topic when we discuss each type of valuation method in subsequent chapters.

Valuation Key 1.1

The economic balance sheet portrays the value of the resources or assets of the firm considered as a whole, as well as the value of the claims the company has issued. The economic balance sheet shows the value of a company's collective resources and the values of the various claims on its resources (securities issued) at a specific point in time. Naturally, the value of the company's resources or assets is equal to the value of the claims on those resources. This is a fundamental relationship widely used in the valuation frameworks and tools we discuss in the book.



The Economic Balance Sheet Does Not Equal the Accounting Balance Sheet

The economic balance sheet is not like the balance sheets companies publish in their **annual reports** or **quarterly reports**, which are **accounting balance sheets** (unless we indicate otherwise, we use the term **balance sheet** to mean the **accounting balance sheet** prepared by a company for its annual or quarterly report). The economic balance sheet shows the *market* value of a company's collective resources and the market values of the various claims on its resources (securities issued) at a specific point in time. Accountants prepare the accounting balance sheet using specific rules (**Generally Accepted Accounting Principles, GAAP**, or **International Financial Reporting Standards, IFRS**), which do not, for the most part, purport to measure the market value of a company's resources or claims on its resources. Accountants tend to be conservative in the way they record the assets and liabilities on balance sheets and other **financial statements**; they will, more often than not, recognize losses before they are realized but not recognize gains until they are realized. The result is an accounting system that ignores some important assets that add to the company's value. As a result, the economic balance sheet will generally have a higher value for the company's resources, and therefore a higher value for the claims on its resources, than observed on an accounting balance sheet. Most of this difference in value benefits the company's residual value claimants (common equityholders or shareholders). We observe that the ratio of the market value of equity to the **book value** of equity is, on average, greater than one, which is consistent with these differences. But note that not all companies have market-to-book ratios that are greater than one (see Chapter 13).

REVIEW EXERCISE 1.1

The Market Value Company Economic Balance Sheet

Prepare an economic balance sheet for The Market Value Company as of Year 0 using the following information and the financial statements provided. The company's share price is \$12.08 and it has 1,200 shares outstanding. Its debt is trading at a premium, indicating that its market value is equal to 102% of its book value. The company has land valued at \$3,000 that is not necessary to operate the business. Based on the amount and type of debt financing, the company creates \$3,800 in value from financing.

THE MARKET VALUE COMPANY Income Statement and Balance Sheet Forecasts				
	Year -1	Year 0	Year -1	Year 0
Balance Sheet—Assets			Balance Sheet—Liabilities & Equity	
Cash balance	\$ 171.4	\$ 188.5	Accounts payable	\$ 122.8 \$ 135.1
Accounts receivable	571.2	628.3	Other current operating liabilities	119.9 131.9
Inventory	286.5	315.2	Total current liabilities	\$ 242.7 \$ 267.0
Total current assets	\$1,029.1	\$1,132.0	Debt	4,800.0 5,200.0
Net property, plant, and equipment . . .	7,539.4	8,567.5	Total liabilities	\$5,042.7 \$5,467.0
Total assets	<u>\$8,568.5</u>	<u>\$9,699.5</u>	Common stock	\$1,802.4 \$1,802.4
			Retained earnings	1,723.3 2,430.0
Income Statement			Total shareholders' equity	\$3,525.7 \$4,232.4
Revenue	\$3,427.0	\$3,769.7	Total liabilities and equities	<u>\$8,568.5</u> <u>\$9,699.5</u>
Cost of goods sold	-1,473.6	-1,621.0		
Gross margin	\$1,953.4	\$2,148.7		
Selling, general, and administrative . . .	-479.8	-527.8		
Operating income	\$1,473.6	\$1,621.0		
Interest expense	-307.0	-384.0		
Income before taxes	\$1,166.6	\$1,237.0		
Income tax expense	-443.3	-470.0		
Net income	<u>\$ 723.3</u>	<u>\$ 766.9</u>		

Exhibit may contain small rounding errors

Solution on pages 34–35.

1.3 VALUATION PRINCIPLES

LO2 Understand the principles underpinning the commonly used valuation methods

An asset has value to an investor because the investor believes the asset will generate cash flows in the future. The value of an asset depends on the magnitude, timing, and risk of the cash flows the investor expects it to generate. Holding everything else constant, the value of an asset increases if the magnitude of its expected cash flows increases, if its expected cash flows arrive sooner, or if its risk (risk-adjusted discount rate) decreases. As we discuss below, the **discounted cash flow (DCF) valuation model** directly results from these valuation principles.



Valuation Key 1.2

The value of an asset depends on the magnitude, timing, and risk of the cash flows (called free cash flows) the investor expects it to generate. The discounted cash flow (DCF) valuation model directly results from these valuation principles.

Introduction to Measuring Free Cash Flows

The DCF model measures the value of an asset as the sum of the expected cash flows the asset generates after adjusting each expected cash flow for its timing and risk. In the context of the valuation of

Valuation Key 1.3

Free cash flows are the cash flows that could be distributed to all of the company's investors after it makes all necessary investments, but without consideration of the taxes saved from any interest expense that arises from debt in its capital structure. They are the free cash flows of the company if it was entirely equity financed.



companies, we refer to those cash flows as **free cash flows** or **free cash flows of the unlevered firm** or **unlevered free cash flows**. Free cash flows are the cash flows generated by the company after the collection of its revenues, payment of its expenses, and after making its investments, including investments in working capital. They are the cash flows the company would generate if it was entirely financed with equity. We use the word “free” to describe these cash flows not because they were costless to generate, but because the company is “free” (or able) to distribute these flows to its investors without interfering with the execution of its strategy.

To measure free cash flows, we begin with earnings before interest and taxes, **EBIT**, and deduct income taxes. The income taxes deducted, **TAX**, are the income taxes the company would pay if it had no **interest deductions** (interest expense that is deductible for income tax purposes). The next adjustment is to convert the company's EBIT to a cash flow measure, as EBIT is not a cash flow number because EBIT includes non-cash expenses, non-cash revenues, and other accruals. To convert EBIT to cash flow, we add back any **non-cash expenses or losses (NCEXP)**, for example, depreciation, and subtract any **non-cash revenues or gains (NCREV)**. We also subtract investments, which include any increase in the **required cash balance (ΔRC)**, any increase in **non-cash required operating working capital (ΔWCO)**, for example, inventory), **capital expenditures (CAPEX)**, and any other required investments for the business. Non-cash required operating working capital does not include any items related to financing costs (such as interest) or income taxes. We show this calculation in Equation 1.1

$$FCF = EBIT - TAX + NCEXP - NCREV - \Delta RC - \Delta WCO - CAPEX \quad (1.1)$$

This is the most basic calculation of free cash flows. Naturally, as a company's assets, capital structure, economic transactions, and income tax situations become more complex, the calculation of free cash flows becomes more complex as well. We discuss Snap Inc. (Snap) in the opening vignette. Recall that as part of Goodwater Capital's analysis of Snap's potential value, Goodwater included illustrative forecasts for Snap from 2017 through 2027, which appear in the table in the opening vignette. In the second column of the forecasts, we show each component of the condensed free cash flow formula in Equation 1.1. Snap's free cash flow forecast for 2020 is equal to \$109 million.

$$\begin{aligned} FCF &= EBIT - TAX + NCEXP - NCREV - \Delta RC - \Delta WCO - CAPEX \\ \$109 &= \$347 - \$1 + \$279 - \$0 - \$16 - \$155 - \$345 \end{aligned}$$

Snap's 2020 EBIT forecast is \$347 million. Snap is expected to have an income tax expense of only \$1 million in 2020 because Snap is expected to use its net operating losses from previous years (net operating loss carryforward, see Chapter 3) to offset its taxable income.⁶ Snap's free cash flow in 2020 is \$109 million even though its EBIT minus income taxes is more than three times that amount, \$346 million. The reason why Snap's free cash flow is less than its earnings is that its required investments in cash (\$16 million), working capital (\$155 million), and capital expenditures (\$345 million) are larger than its non-cash expense, depreciation, and amortization (\$279 million). We observe this effect in all subsequent years because the forecasts have Snap growing at more than 20% in every year, which requires large investments to support that growth (see Chapters 4 and 6).

⁶ The Tax Cuts and Jobs Act of 2017 set limitations on the extent to which net operating losses can reduce taxable income in any one year. Those limitations do not apply to Snap's NOLs because they arose prior to 12/31/17. We discuss this issue in more detail in Chapter 3.

REVIEW EXERCISE 1.2

The Market Value Company Unlevered Free Cash Flow

Use the information in Review Exercise 1.1 to measure the unlevered free cash flow for The Market Value Company for Year 0. The company has \$500 in depreciation expense embedded within its cost of goods sold. This is the only depreciation the company records. The company holds no excess cash so the change in cash is its required cash. The tax rate is 38%.

Solution on page 35.

The Discounted Cash Flow Valuation Model

The DCF model adjusts expected free cash flows by using **time value of money principles** to discount each expected free cash flow to the date of the valuation, using a risk-adjusted discount rate that reflects the risk of the asset. The DCF model provides a useful framework to convert the sometimes abstract and qualitative strategic concepts (strategic fit, competitive advantage, market power) into quantitative measures that affect value. This framework involves answering three overarching questions: How does the strategic action affect the magnitude of the free cash flows? How does the strategic action affect the timing of the free cash flows? How does the strategic action affect the underlying risk of the free cash flows?

Since a company does not have a contractually finite life but can exist forever, the DCF model normally discounts a company's free cash flows to infinity. The DCF model to measure the value of the firm, $V_{F,0}$, simplified for an all-equity financed company with a constant (risk-adjusted) cost of capital, r_{UA} , which is termed the **unlevered cost of capital**, is:

$$V_{F,0} = \frac{FCF_1}{(1+r_{UA})^1} + \frac{FCF_2}{(1+r_{UA})^2} + \dots + \frac{FCF_\infty}{(1+r_{UA})^\infty} = \sum_{t=1}^{\infty} \frac{FCF_t}{(1+r_{UA})^t}$$

The value of the firm is measured at a particular date, which is as of the end of Period 0 in the above formula. Unless we believe the company will liquidate or otherwise go out of business, the assumption that a company has an infinite life complicates our DCF calculations, for it is not possible to forecast and then discount an infinite series of cash flows unless we make a simplifying assumption about the time series of the expected cash flows. The way we typically solve this problem is to develop detailed forecasts for a company's expected cash flows for some finite period of time, say 10 years. Then, we measure the value of the firm at the end of that finite period. We call the value at the end of the finite period of time the company's **continuing value (CV)**; other terms used for this concept are **terminal value**, **residual value**, and **horizon value**. The way we typically implement the infinite forecast horizon is to construct detailed forecasts for the company for C years and measure the continuing value of the firm, $CV_{F,C}$, as of the end of Year C .

The continuing value represents the value of the company as of the end of Year C . Using a continuing value in our DCF model as of the end of Year C , our DCF model becomes

$$V_{F,0} = \sum_{t=1}^C \frac{FCF_t}{(1+r_{UA})^t} + \frac{CV_{F,C}}{(1+r_{UA})^C} \quad (1.2)$$

A common way we can measure a company's continuing value is to assume the company's free cash flows grow at a constant rate, g , after the continuing value date and that the discount rate remains constant as well. We call this assumption a **constant growth perpetuity** assumption. As long as the growth rate is constant and less than the constant discount rate, the infinite series present value calculation summarizes to the constant growth perpetuity formula⁷:

$$CV_{F,C} = FCF_{C+1} \times \frac{1}{(r_{UA} - g)} \quad (1.3)$$

⁷This type of constant growth perpetuity valuation model for discounting dividends is called the Gordon growth model; see Gordon, Myron J., *The Investment, Financing, and Valuation of the Corporation* (Richard D. Irwin, 1962).

Substituting the above continuing value into the DCF model we get our widely accepted DCF model with a constant growth perpetuity continuing value:

$$V_{F,0} = \sum_{t=1}^C \frac{FCF_t}{(1+r_{UA})^t} + \frac{FCF_{C+1}}{(r_{UA}-g)} \times \frac{1}{(1+r_{UA})^C} \quad (1.4)$$

Illustration of the Discounted Cash Flow Valuation Using Snap Inc.

Recall from the opening vignette that Snap was expected to go public in March 2017, and Goodwater Capital analyzed Snap's valuation in February 2017, when Snap was expected to have an offering price in the \$14–\$16 per share range (fully diluted market capitalization range of \$19.9 billion to \$22.8 billion). As part of the analysis of Snap's potential value, Goodwater included illustrative forecasts for Snap from 2017 through 2027, which appear in the table in the opening vignette and which we use in this illustration of the discounted cash flow valuation.

Anyone interested in owning Snap's stock is naturally interested in Snap's value. Forecasts like those provided by Goodwater are helpful to investors because Snap's value results from the timing, magnitude, and riskiness of Snap's free cash flows. Snap presented two years of historical performance data prior to going public. While its revenues grew by over 600% over those two years (from \$59 million to \$404 million), its earnings (for example, earnings before interest, taxes, depreciation and amortization, EBITDA) were negative in both years, and they were more negative in 2016 than they were in 2015 (–\$366 million versus –\$491 million). Because of its investments in working capital and long-term investments, Snap's free cash flows were even more negative than its EBITDA, –\$395 million in 2015 and –\$717 million in 2016.

Why did Goodwater Capital expect Snap to have an offering price of \$14–\$16 per share implying a fully diluted market capitalization range of \$19.9 billion to \$22.8 billion? According to the Goodwater Capital forecasts, they expected Snap's performance—for example, EBITDA and free cash flows—to turn positive within a few years and then grow quickly. According to these forecasts, Goodwater Capital expected Snap to have high revenue growth (growing from \$404 million in 2016 to \$14.8 billion in 2027, which is a compound annual growth rate of over 35%). In addition, after a few years of negative EBITDA and negative free cash flows, Goodwater expected Snap's EBITDA to turn positive and then steadily grow to \$7.3 billion by 2027, and its free cash flows to steadily grow to \$3.5 billion, by 2027. Apparently, Goodwater perceived that Snap's positive free cash flows in the later years more than offset its negative free cash flows in the early years resulting in a fully diluted market capitalization with a range of \$19.9 billion to \$22.8 billion.

In order to value Snap using the DCF valuation model in Equation 1.4, we need expected free cash flows for a finite number of years, Snap's cost of capital (or discount rate), and a perpetual growth rate. We already have free cash flow forecasts for 11 years, 2017 through 2027. Around the time of the initial public offering, analysts used a cost of capital in the 9% to 11% range and a perpetual growth rate in the 2.5% to 3.5% range. For our valuation, we will initially use a 10% discount rate and a 3% perpetual growth rate. Using the DCF valuation model in Equation 1.4, Snap's value is \$21.5 billion.

$$V_{\text{Snap, 2016}} = \frac{-\$779}{1.1} + \frac{-\$629}{1.1^2} + \frac{-\$266}{1.1^3} + \frac{\$109}{1.1^4} + \frac{\$217}{1.1^5} + \frac{\$487}{1.1^6} + \frac{\$849}{1.1^7} + \frac{\$1,323}{1.1^8} + \frac{\$1,932}{1.1^9} + \frac{\$2,653}{1.1^{10}} + \frac{\$3,546}{(0.1-0.03)} \times \frac{1}{1.1^{10}} = \$21,481 \text{ million}$$

On a fully diluted basis, Snap has 1.424 billion share equivalents outstanding. Based on 1.424 billion shares, the above valuation implies a share price of \$15.09 (\$15.09 = \$21,481/1,424), which is roughly in the middle of the expected range of offer prices of \$14 to \$16. In Exhibit 1.2, we present the above calculations in a typical spreadsheet format.

It turned out that the expected \$14–\$16 initial offering price was too low. Snap's stock went public (initial public offering) in March 2017 at an offering price of \$17 per share (fully diluted market capitalization of \$24.2 billion), but even that offering price did not reflect the market's valuation of Snap. Once Snap's stock started trading publicly after the initial public offering, its opening price was \$24 per share (fully diluted market capitalization of \$34.3 billion), more than 40% higher than the \$17 offering price. One month after Snap's initial public offering, Snap's stock

EXHIBIT 1.2 Discounted Cash Flow Valuation of Snap Inc.

(in millions of \$)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Unlevered free cash flow for continuing value . . .												\$ 3,546
Discount factor for continuing value												14.29
Unlevered free cash flow		-\$779	-\$629	-\$266	\$109	\$217	\$487	\$849	\$1,323	\$1,932	\$2,653	\$50,656
Discount factor		0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386	0.386
Present value		-\$709	-\$520	-\$200	\$ 75	\$135	\$275	\$436	\$ 617	\$ 819	\$1,023	\$19,530
Firm value	\$21,481											
Fully diluted shares	1,424											
Price per share	\$ 15.09											

was still trading above the \$17 offering price. Its stock price after one month of trading was over \$22 per share (fully diluted market capitalization of \$31.3 billion), more than 29% higher than the \$17 offering price.

The market apparently ended up with a different assessment of the timing, magnitude, and riskiness of Snap's free cash flows than we used in the above \$21.5 billion valuation. While the DCF valuation model in Equation 1.4 is fairly straightforward to calculate, the inputs and analyses that underpin the inputs in that valuation model are not. The DCF valuation model (and our basic valuation principles) tell us that in order to justify the market's higher value of Snap, its free cash flows either need to arrive sooner, or be larger, or have less risk.

One way Snap's value could be higher than our \$21.5 billion estimate is if Snap can break even on a free cash flow basis sooner than expected in the above forecasts. In the above forecasts, Snap's free cash flows are negative for the next three years (2017 through 2019). If instead, Snap breaks even on a free cash flow basis in 2018 (that is, the 2018 free cash flow is \$0 instead of -\$629 million), and the dollar change in all future free cash flows remain as reported in the original forecasts, Snap's share price increases from \$15.09 to \$19.83. Another way Snap's value increases is if Snap has a higher perpetual growth rate. Increasing Snap's perpetual growth rate from 3% to 3.5% increases Snap's share price from \$15.09 to \$16.14. Combining these two changes increases Snap's share price from \$15.09 to \$21.07. A third way Snap's value increases is if Snap's cost of capital (discount rate) is lower, say, 9.5%, instead of 10% (lower risk assessment). Decreasing Snap's cost of capital (discount rate) from 10% to 9.5% increases Snap's share price from \$15.09 to \$16.91. However, combining all three of these changes increases Snap's share price from \$15.09 to \$23.54, which is in the range of Snap's opening stock price once it began trading publicly. We present this valuation in Exhibit 1.3.

EXHIBIT 1.3 Adjusted Discounted Cash Flow Valuation of Snap Inc.

(in millions of \$)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Unlevered free cash flow for continuing value												\$ 4,175
Discount factor for continuing value												16.67
Unlevered free cash flow		-\$779	\$0	\$363	\$738	\$846	\$1,116	\$1,478	\$1,952	\$2,561	\$3,282	\$69,582
Discount factor		0.913	0.834	0.762	0.696	0.635	0.580	0.530	0.484	0.442	0.404	0.404
Present value		-\$712	\$0	\$276	\$514	\$538	\$ 648	\$ 783	\$ 944	\$1,131	\$1,324	\$28,077
Firm value	\$33,524											
Fully diluted shares	1,424											
Price per share	\$ 23.54											

Dollar change in original free cash flow forecasts . . .				\$363	\$375	\$108	\$ 270	\$ 362	\$ 474	\$ 608	\$ 722	\$ 893
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Another way our original DCF valuation would increase is if the free cash flow forecast we used to measure Snap's continuing value is too low. A reason why its free cash forecast may be too low is that the company was still growing at more than 20% in that year. High growth requires larger investments than would be required in subsequent years with the same scale of operations after it made the investments necessary to support that scale of operations. Analyzing this potential effect is beyond the scope of our discussion in this chapter (see Chapter 6).⁸

⁸ In December of 2017, Snap's stock was trading in the \$14 to \$16 range, consistent with the initial expected offering price.

Naturally, while these sensitivity analyses are potentially useful, any meaningful valuation or sensitivity analysis is based on sound conceptual frameworks and analysis, which first requires an understanding of DCF-based valuation models (discussed in Chapters 5 to 7). Developing the inputs used in DCF-based valuation models also requires sound conceptual frameworks and analysis. For example, the 11 years of forecasts are based on a financial model. Analyzing a financial model includes an analysis of the company's historical performance and performance relative to comparable companies, which identifies the key forecast drivers and the magnitude of the key forecast drivers used to develop the forecasts, as well as overall performance measures used to evaluate the forecasts (discussed in Chapters 2 through 4). Similarly, the perpetual growth rate input is based on an analysis of the last year of the free cash flow forecasts, an assessment of macroeconomic forecasts, as well as analyzing comparable companies (Chapter 6). Lastly, assessing the riskiness of a company's assets and its equity requires asset pricing models and analysis based on those models (discussed in Chapters 8 through 12).

REVIEW EXERCISE 1.3

Valuation of Unlevered Free Cash Flows

A company has expected free cash flows of \$100.2 million, \$114.0 million, and \$120.8 million in the next three years. Afterward, the free cash flows will grow in perpetuity by 2% annually. Measure the value of this company as of today using a 12% discount rate.

Solution on page 36.

1.4 MEASURING THE VALUE OF THE FIRM

So far we have discussed the general valuation principles and how they relate to the discounted cash flow model, ignoring any value from financing. In this section we discuss two alternative DCF models and other valuation models commonly used to value companies. All of the valuation models discussed in the book can be used in a variety of different contexts and in most industries. When valuing companies, we are most often interested in the value of the common equity and the value of the firm. The models we discuss in this section are commonly used valuation models for valuing the firm. In the following section we discuss how we value common equity.

L03 Explain how the different valuation models measure value

Two Forms of the Discounted Cash Flow (DCF) Valuation Model

The DCF valuation model is one of the most commonly used valuation methods. In a 1998 survey of large corporations and financial advisors, Bruner et al. report that 96% of corporations use the DCF valuation method to evaluate investment opportunities and 100% of financial advisors do so.⁹ As discussed in the prior section, the value of an investment according to the DCF model is the discounted (or present) value of the expected cash flows of the investment, where the discount rate is the risk-adjusted rate of return, and where the time value of money framework is used to adjust for the timing of the cash flows. The inputs for the DCF model are the magnitude and the timing of the expected cash flows and the risk-adjusted discount rate.

The two DCF methods used to measure the value of the firm are the **adjusted present value method (APV)** and the **weighted average cost of capital method (WACC)**. The latter is sometimes referred to as the **adjusted cost of capital method** for reasons we explain later. Ignoring excess assets, a company derives its value from two broad sources: the value of the company's operations (**unlevered firm value**) and the value that results from the way the company chooses to finance itself (**value from financing**). Both the APV and WACC methods value the company based on the combined value of the company's operations and the value created from financing. While the two methods take somewhat different paths to measure value, both methods yield the same value if consistently implemented. The difference between the two methods is how the methods incorporate the value created from financing in the value of the firm. The APV method incorporates the value from financing directly, via forecasts of cash flows that are

⁹ See Bruner, R., K. Eades, R. Harris, and R. Higgins, "Best Practices in Estimating the Cost of Capital: Survey and Synthesis," *Financial Practice and Education* (Spring/Summer 1998), pp. 13–28.

attributable to financing choices. The WACC method incorporates the value from financing indirectly, through an adjustment to the discount rate, which is why it is also called the **adjusted cost of capital method**.

You are probably wondering why there are two DCF methods if they yield the same answer. As it turns out, the APV and WACC methods are not substitutes. Given the information available and the valuation assumptions made, only one of the two methods is the more appropriate starting point for a particular valuation analysis. We will come back to this issue in detail when we discuss the DCF methods in Chapter 5. The cash flows used to value the firm (the combined value of the debt, preferred equity, and common equity) are the free cash flows of the unlevered firm (free cash flows) for both DCF valuation methods. The risk-adjusted discounted rate is not the same for the two methods. The risk-adjusted discount rate used to discount the free cash flows reflects the overall riskiness of the company's operations, the unlevered cost of capital, but in the case of the WACC method, we adjust that discount rate to incorporate the potential benefit of a company's capital structure (typically, from the tax deductibility of interest), which is referred to as the weighted average cost of capital.

Instead of performing a going-concern valuation, which is most common, some valuations assume that a company will liquidate as soon as it is practical to do so or after it operates for some period of time. In a liquidation, one assumes that the assets of the company are sold in the most advantageous manner in order to pay off all of its liabilities (including any preferred stock), its other contractual obligations, and any costs associated with closing the business (e.g., employee severance packages, costs of plant closings). To the extent that any cash remains after all of that, the cash is distributed to the equityholders. An orderly liquidation that tries to maximize value usually takes some time to achieve, and the resulting cash flows from the liquidation can be incorporated into a DCF model.

The Discounted Excess Flow Valuation Models

The **discounted excess flow** valuation model has various forms, which are algebraically equivalent to the DCF valuation model. The most basic form is the **excess cash flow** method. In this method, we discount free cash flows in excess of the required free cash flows that are based on the required rate of return and amount of capital invested. The intuition for this model is quite simple. Suppose a company begins by investing \$100,000 in land, the required rate of return for the risk of the business is 10%, and this is the only investment the company makes. In this case, the required unlevered cash flow that would result in the value of this company that is equal to the initial investment of \$100,000 (called a zero net present value [zero NPV] investment) is \$10,000 ($\$10,000 = \$100,000 \times 10\%$) per year in perpetuity. If the company generates an expected annual unlevered cash flow of \$10,000 per year and distributes it entirely to its claimholders, it is simply worth the \$100,000 investment, creating no additional value above the initial investment. If, however, the company generates an expected annual unlevered cash flow of more than \$10,000 a year, the value created is the discounted value of the distribution above \$10,000 per year. The value of the company in this case is the \$100,000 invested plus the discounted value of the distribution above \$10,000 per year. For example, if the company was expected to generate \$12,000 per year that it would distribute to its investors, the value of the company would be equal to \$120,000, which we could measure as the discounted value of the cash flows (DCF valuation method) or as the initial investment plus the discounted value of the cash flow above the required return [$\$120,000 = \$12,000/0.1 = \$100,000 + (\$12,000 - \$10,000)/0.1$].

Another form of this model, called the **excess earnings** or **residual income** valuation model, uses financial accounting information to discount excess accounting earnings. Other forms of the model adjust a company's financial statements in an attempt to refine excess earnings to approximate **excess economic earnings** instead of excess accounting earnings. The accounting-based excess flow models are algebraically equivalent to the DCF model, and therefore the valuation principles we discussed previously are preserved in the excess flow valuation models. Excess flow valuation models are discussed in Chapter 7.

Market Multiple Valuation Models

Market multiple valuation models are used extensively by investment bankers and other valuation experts. Bruner et al. (1998) report that 100% of financial advisors use market multiple methods based on publicly traded comparable companies as well as comparable transactions in their valuation work. A market multiple is a ratio of the value of a firm or its equity scaled by a measure of the firm's

performance or scale of operations (value driver). One way to think of a market multiple is the price the market is willing to pay for each dollar of the multiple's denominator (performance measure). The specific forms of market multiples used by managers and investors is extensive. Some of the more common market multiples for valuing the firm are the market value of the firm to **earnings before interest and taxes (EBIT)**; the market value of the firm to **earnings before interest, taxes, depreciation, and amortization (EBITDA)**; the market value of the firm to sales; and the market value of the firm to total assets or invested capital. For the numerator of a market multiple, analysts and investment bankers often subtract "cash" from the market value of the firm, which is called enterprise value. Thus, it is not uncommon to hear investment bankers refer to multiples such as enterprise value to EBITDA, which is the ratio of a company's enterprise value to EBITDA.

To use the **market multiple valuation method** (also called **price multiple, comparable company, or twin company valuation method**), we first identify a characteristic of the company that we believe is a primary determinant or driver of the company's value. Then, we identify a set of companies that are comparable to the company we are valuing for which we can observe the same value driver as well as each company's value. For each comparable company, we calculate its market multiple by dividing its value by its value driver (for example, divide the market value of the firm by EBIT, called an EBIT multiple). From the multiples of the comparable companies, we choose the appropriate multiple for the company we are valuing. Then, we multiply that multiple by the value driver (in this case EBIT) of the company we are valuing to obtain its estimated value.

The market value estimates in these multiples are typically obtained from prices of publicly traded companies or from prices paid in **control transactions** (such as a merger or tender offer) or possibly from prices of **initial public offerings (IPOs)**. For example, in considering the value of a company being acquired, financial advisors also analyze the market multiple based on transaction prices of comparable companies that have recently been acquired. Or when valuing a company for an initial public offering, the financial advisors also use prices of comparable companies that have recently gone public to measure market multiples. Market multiples based on control transactions or IPO transactions are typically referred to as **comparable transactions multiples** or **comparable deals multiples**. Irrespective of the source of the values of the comparable companies, valuation using multiples relies on the assumption that the prices used in measuring the multiples are appropriate indicators of value for the underlying companies.

The intuition underpinning market multiple valuation models is the notion of the law of one price. That is, if two assets are identical in terms of the magnitude, timing, and riskiness of their cash flows, they should sell for the same price. Further, if two assets are identical in terms of the timing and riskiness of their cash flows, but the cash flows of one asset are exactly two times as large as the cash flows of the other asset in every period, then that asset should sell for twice as much. For example, when using the EBIT multiple, we assume that the value of a company is directly proportional to current earnings before deducting interest or taxes (EBIT). If the value of one firm is \$10,000 and its EBIT is \$1,000, then the market multiple approach assumes that another firm that is identical in all other relevant respects, except its EBIT is \$2,000, will have a value of \$20,000. While market multiple valuation is simple to understand, it is quite difficult to implement. The key implementation issues are selecting comparable companies and adjusting the inputs to calculate the multiples so they are aligned with the company being valued. These issues are discussed extensively in Chapters 13 and 14.

Assuming that the values used in calculating the multiples are based on the valuation principles discussed previously and do not misrepresent market values, a market multiple valuation method preserves those valuation principles.

Valuation in Practice 1.3

BMC Software Inc.¹⁰ Leveraged Buyout (Going Private) Transaction Large private equity transactions are often led by one or two private equity investment funds with other funds co-investing smaller amounts. BMC Software Inc. (BMC) is such an example. In May 2013, BMC agreed to be taken private by a group of private equity investors led by Bain Capital Fund X, L.P. and Golden Gate Capital Opportunity Fund, L.P. The total funds required to complete the transaction and pay related fees and expenses were expected to be approximately \$8.7 billion. BMC had \$1.4 billion of excess cash that could be used to fund part of the deal, resulting in required funding from debt and equity investors of approximately \$7.3 billion.

continued

¹⁰ See the BMC Software Inc. proxy statement filed with the U.S. SEC on May 24, 2013.

continued from previous page

The private equity investors committed up to \$1.25 billion in equity and arranged and expected to use debt financing for the remainder. Barclays Bank PLC, Credit Suisse AG Cayman Islands Branch, and Royal Bank of Canada (and in some cases, certain of their affiliates), provided commitments for the full amount of the debt financing subject to various terms and conditions. Under the debt commitment letter, the lenders committed to provide up to an aggregate principal amount of \$6.23 billion in debt financing, consisting of a \$4.2 billion senior secured term loan facility, a \$350 million senior secured revolving credit facility, and a \$1.68 billion senior unsecured bridge facility. The transaction closed in September 2013. At the time, it was one of the largest and most highly leveraged transactions since 2008.

Leveraged Buyout Valuation Models

Another typical technique used by investment bankers when measuring the value of a company that is put up for sale is to consider whether that company is a candidate for a **leveraged buyout (LBO)** or **private equity** transaction. An LBO is a form of transaction in which a group of private investors acquires the company using extensive debt financing. The ability of a company to support an LBO transaction depends on such characteristics as the magnitude of the expected cash flows, the stability of those cash flows, the extent to which the company already has debt outstanding, and the current condition of the credit markets. A typical LBO analysis makes assumptions about the cash flows a company can generate, the expected post-LBO capital structure, and the required rates of return for various capital providers (bank debt, senior subordinated debt, junior subordinated debt, preferred stockholders, and common stockholders). The analysis then measures the maximum price of the buyout that provides those rates of return to the various capital providers. The maximum price the LBO analysis generates is another indication of value, in this case, conditional on a particular transaction. Conditional on this particular form of transaction, the analysis preserves the valuation principles discussed previously regarding the magnitude, timing, and riskiness of the cash flows. The intricacies of leveraged buyout models are detailed in Chapter 15.



Valuation Key 1.4

The most common methods used to value the firm (the combined value of the debt, preferred equity, common equity, and other potential claims) are the DCF method, the discounted excess flow method (algebraically equivalent to the DCF method), the market multiple valuation method, and LBO analysis.

1.5 MEASURING THE VALUE OF THE FIRM'S EQUITY

The most common way to measure the value of the common equity is to first value the firm using any of the methods previously discussed and then to subtract the value of all of the non-common equity claims, such as debt and preferred stock, warrants and employee stock options, etc. As we discussed previously, operating working capital liabilities such as accounts payable are not included as part of debt because the cost (or value) of these liabilities is implicitly netted out in valuing the company's operations through the way we calculate free cash flows. For example, operating liabilities such as accounts payable and taxes payable are not subtracted because they are already factored into the valuation through the free cash flow forecasts. However, the value of interest-bearing debt, as well as the value of pension liabilities, environmental liabilities, potential settlements from lawsuits, and other liabilities are all subtracted from the value of the firm if they are not factored into the valuation through the free cash flow forecasts.

In most cases, the value of the non-equity claims—subtracted from the value of the firm to measure the value of the common equity—is an estimate of the market value of those securities. In some situations, however, we do not use market values. Consider a control transaction where a company (the acquirer) is acquiring a firm (the target) and assume the debt of the target has a provision that prohibits control transactions if any of the debt is still outstanding. In that situation, the acquirer would have to retire the debt in order to complete the acquisition. If the debt also required that it could only be retired at a premium to its face value prior to its maturity or some other specific date in the future

(a **call premium**), then the value that would be subtracted from the value of the firm would not be the market value of the debt, but rather would be the amount that would have to be paid to call the debt and retire it.

Occasionally, a valuation will be conducted when a liquidation of the business is being contemplated. In a liquidation analysis, we basically appraise the individual assets and perhaps some businesses that can be sold separately. Thus, a liquidation analysis may not involve a DCF valuation but rather just an appraisal of individual assets. Of course, if we can sell a business intact, that would likely call for a DCF valuation of that business. From the value of the individual appraised assets, we subtract the value of the working capital liabilities as well as the amount needed to retire any debt or preferred stock (unless a working capital liability, debt, or preferred stock is transferred to the buyer of any businesses or assets sold). The value of the equity is what remains after subtracting off the appropriate working capital liabilities, debt, and preferred stock.

Another way to value common equity is to use a discounted cash flow method that values the common equity directly. This method discounts the equity free cash flows at the equity cost of capital. The **free cash flows of the equity (equity free cash flow)** are equal to the free cash flows of the unlevered firm adjusted for all cash flows to and from non-equity claims, such as debt and preferred stock issuances or retirements, interest (after-tax), and preferred dividends. As we will see in Chapter 5, using a discounted equity free cash flow model that values the equity directly is difficult to implement precisely. Hence, this technique is often reserved for special situations such as valuing financial institutions, which have very high financial leverage.

Certain market multiples value the common equity directly. Instead of valuing the firm or enterprise value using a market multiple such as the EBIT or EBITDA multiple and then subtracting the value of the non-common equity claims, we value the equity directly using a common equity-based multiple. For example, a **P/E multiple** or **price-to-earnings ratio**, defined as price per common share divided by earnings available to common equityholders per share, is one such multiple that values the common equity directly. Another is the **market-to-book ratio**, defined as the market value of the equity to the book value of the equity.

Valuation Key 1.5

The value of a firm's equity can be measured in various ways. The most common method is to value the firm and subtract the value of the non-common equity claims. Another common technique is to use a common equity based multiple such as a P/E multiple. In certain valuations, for example, valuations of financial institutions, the value of the equity is measured directly by discounting equity free cash flows or using a common equity-based market multiple.



1.6 REAL OPTIONS IN VALUATION

The option pricing framework is another valuation method used in certain situations. Option pricing recognizes that the holder of an asset is not always compelled to act, but instead acts only if it is in the holder's best interest to do so. For example, the holder of a **call option** has the right to buy a specific asset at a specified price, called the **exercise price**, for a certain time period. Thus, if the value of the asset is above the exercise price at the time the call option is about to expire, then the holder of the call will be better off exercising the call and buying the asset at the exercise price. Of course, if the value of the asset is below the exercise price of the call, and if the holder of the call wants to purchase the asset, then the holder will buy the asset in the open market and will not exercise the call. Since it is cheaper to buy the asset in the open market than by exercising the call option, the call will not be exercised.

Early work on the potential applications of option pricing methods recognized that the common equity of a levered firm is similar to a call option on the firm, where the exercise price is equal to the amount owed to the debtholders.¹¹ In other words, the equityholders have the right to "buy back" the firm from the debtholders by paying off the debtholders, if they choose to do so. If the amount necessary to pay off the debt is greater than or equal to the value of the firm, it is not in the interest of the equityholders to buy the firm back, and they simply do not pay off the debtholders. Obviously, if the value of the

¹¹ For a discussion of how options are valued and why equity in a firm with debt is like a call option, see Black and Scholes (1973); Black, F., and M. Scholes, "The Pricing of Options and Corporate Liabilities," *Journal of Political Economy* 91 (May–June 1973), pp. 637–654.

company's assets is higher than the amount owed the debtholders, the equityholders are made better off by paying off the debtholders the amount owed.

More recently, managers and investors have recognized that certain investments that companies make have embedded options, so-called **real options**. These include the option to delay investing, the option to expand, the option to abandon, the option to invest, and the option to purchase, among others. DCF valuation models can incorporate certain limited types of optionality correctly; however, companies (for example, startups) or projects with multiple stages of development and multiple decision points to decide whether to continue to invest, or abandon or sell, are not easily valued by DCF models. Market multiple valuation is also difficult because it is typically difficult to identify comparable companies or products with the same optionality and payoffs.

Pharmaceutical companies often use real option valuation to make product decisions because the product (drug) development has such a long investment horizon with multiple decision points during the investment horizon to either continue the investment, change the investment, abandon the investment, or sell it. For example, the product development cycle of a new drug begins with primary scientific research. If successful and the research results in a candidate drug, the research is patented. This is the company's first major decision point to either continue to develop the drug or abandon or sell the research (or patent). The company makes that decision based on the value of the alternatives. If the company decides to continue to develop the drug, the candidate drug is then developed into a specific formula and tested for safety, quality, and stability (pre-clinical testing). After pre-clinical testing, the company has another major decision point to either begin clinical trials, or abandon or sell the intellectual property. Typical testing for human consumption requires multiple (often three) clinical trials and takes several years to complete. The company has a major decision point after the completion of each clinical trial. If the clinical trials are ultimately successful, the company can apply for regulatory approval for one or more specific forms of the drug (for example, oral or injectable) as well as for a specific condition (some drugs ultimately can treat more than one condition). This is another option as the company does not have to seek approval for all forms and conditions at the same time.

Options can be valued in a variety of ways. The specific method that is most appropriate in a given situation is related to the type and quality of information that is available. Financial options, where there is typically a wealth of relevant data, are often valued using models such as the **Black-Scholes Option Pricing Model** and the **Binomial Option Pricing Model**. These models are also used to measure the value of real options in the context of operating decisions. However, in some cases the required data for those models is not readily available and the effect of real options on value is approximated through a DCF model that explicitly considers the options that are embedded in an investment.



Valuation Key 1.6

Certain companies (for example, startups) or projects that have multiple stages of development and multiple decision points that allow management to decide whether to continue to invest, abandon, or sell, have embedded real options. DCF valuation models, and to some extent market multiples, can incorporate certain limited types of optionality correctly. However, companies or projects like this are often best valued using option model valuation tools if the necessary data is available to use those tools.

1.7 HOW MANAGERS AND INVESTORS USE VALUATION MODELS

LO4 Describe the ways managers and investors use valuation models

A valuation analysis, based on the valuation models we discuss in this book, is an important input into the decisions managers and investors make about transactions that involve the sale, purchase, investment, or disinvestment of an entire business or a portion of a business. In addition, these same models are used for non-transactional analyses such as making smaller investment decisions or helping set the strategic direction of a company. Managers of large multinational companies, midsized companies, and private corporations all rely on these models to make investment and strategic decisions. Even

governments rely on valuation models to make decisions. In this section, we discuss the various ways managers, investors, and others rely on valuation analyses to make important decisions.

Valuation in Practice 1.4

The Kraft/Heinz Merger In February 2013, H. J. Heinz Company agreed to be taken private by Berkshire Hathaway and 3G Capital for \$28.75 billion, funded by a combination of common equity, preferred stock (with attached warrants), and debt.¹² The transaction closed in June 2013. Post-LBO Heinz quickly improved its performance, mostly through cost cutting and other increased efficiency initiatives. Less than two years later, in March 2015, Kraft Food Group and Heinz signed a definitive merger agreement to merge to form the Kraft Heinz Company.¹³ The terms of the deal were that Kraft shareholders would own 49% of the Kraft Heinz Company and receive a \$16.50 cash payment (dividend), which was funded by Heinz shareholders Berkshire Hathaway and 3G Capital. Management expected the merger to be accretive to earnings (i.e., increase earnings) by 2017 from expected synergies of \$1.5 billion annually beginning in 2017. This merger resulted in Heinz's equity becoming publicly traded again, allowing for an eventual exit for Berkshire Hathaway and 3G Capital.

The financial advisors in this deal used the discounted cash flow and market multiple valuation methods we discuss in this book.

Control Transactions

Control transaction is a term used to describe any transaction that results in a change of control of a company.¹⁴ A control transaction does not have to involve the sale of the entire company. It could involve the sale of an equity interest (a large block of common stock) so the buyer has sufficient control to make the company's business decisions, or it could involve the sale of only a portion of a company's business. Valuation models are used in these transactions to measure the value of the acquired entity, based on the strategy in place before the transaction (from the perspective of the seller) as well as the value based on the intended strategy after the transaction (from the perspective of the buyer). The parties involved in a potential transaction use these valuations to help negotiate a price.

If a company can use another company's assets more effectively, the company may decide to acquire some or all of the assets of that other company (via an **asset purchase, acquisition, or merger**). **Mergers and acquisitions (M&As)** is a term that describes transactions in which one company acquires or merges with another company. Acquisitions can entail the purchase of a subset of a company's assets, of all of the company's assets, or of all a company's common stock. After the transaction, the two companies can remain separate legal entities or they can merge into one legal entity. The valuation conducted in an M&A transaction includes the expected standalone cash flows of the target, plus any expected cost or revenue synergies resulting from the transaction. Thus, the relevant cash flow forecasts used in a DCF model would include additional revenues expected to be generated (revenue synergies) and any anticipated reductions in costs (cost synergies) associated with the transaction. The cash flow forecasts may also embed changes in the strategic direction of the enterprise that a new owner might make.

Certain activist investors, such as Carl Icahn, look for companies that are performing poorly relative to their potential and then take a significant stake in the company (see Valuation in Practice 1.6). In many cases, that stake is not a controlling interest. Following that, they often attempt to secure one or more seats on the board of directors in order to try to force management to change the company's operations. Since such investment strategies have inherent uncertainties in being able to get managers to change the operations of the company, investors do not take activist positions like this unless they believe the

¹² See the H. J. Heinz Company proxy statement filed with the U.S. SEC on March 27, 2013.

¹³ See the Kraft-Heinz Investor Presentation, dated March 25, 2015, and available June 25, 2018, <http://ir.kraftheinzcompany.com/static-files/44b6766d-efb8-4735-9a4c-9071d8418c79>.

¹⁴ See the discussion of the issues and an overview of the early research in this area by Jensen and Ruback (1983); Jensen, M. C., and R. S. Ruback, "The Market for Corporate Control: The Scientific Evidence," *Journal of Financial Economics* 11 (1983), pp. 5–50.

value-creation opportunities are substantial. These value-creation opportunities are evaluated using the valuation methods we discuss in this book.

Sometimes companies attempt an unsolicited acquisition of another company (called a **hostile takeover**). These attempts don't always work out as planned, however. For example, in 2013, the CEO of Jos. A. Bank made an unsolicited bid to acquire another smaller men's retail clothing chain, Men's Wearhouse. The CEO of Men's Wearhouse told investors that the Jos. A. Bank offer was much too low and was an "opportunistic attempt to exploit a temporary dislocation in the Men's Wearhouse stock price." Instead of negotiating to be acquired, Men's Wearhouse first made presentations to its investors explaining why it was undervalued in the market and that the offer from Jos. A. Bank was too low. The battle between the two companies continued, and eventually, Men's Wearhouse made an unsolicited bid to acquire Jos. A. Bank and won the battle.¹⁵

Highly leveraged transactions include leveraged buyouts (LBOs) and **management buyouts (MBOs)**, both of which are **change-of-control** transactions, in which control of the entity shifts. LBOs are transactions in which a group of private investors uses extensive debt financing to purchase an entire company or a part of it, such as a division. The company becomes privately held, because its common stock is no longer publicly traded. MBOs are transactions in which the managers of the company comprise part of the group of private investors, which is not uncommon.¹⁶ Valuation models in support of LBOs and MBOs usually embed the benefits of being private, and the cost savings, tax savings, and working capital reductions associated with running the organization more efficiently. The benefits may also include changes in the strategy of the company.

When companies are bought and sold, it is common for some type of financial advisor, such as an investment bank, to aid in the process. Not only do financial advisors help perform valuations, they play a variety of other roles, such as holding an auction or auction-like process for a company being sold, advising on potential acquirers, helping obtain and evaluate offers, arranging financing, aiding with negotiation tactics, and more.

One of the paramount concerns for a board of directors in any change-of-control transaction, particularly in the U.S., is the potential legal liability associated with not using reasonable business judgment and not basing the decision on relevant available information. The business judgment rule, as it is generally applied in courts, protects the board of directors from legal liability (but not from someone filing a lawsuit) if the directors make a decision with adequate information, on an informed basis, and unmotivated by personal incentives that conflict with the incentives of other shareholders. When making business decisions that involve the sale of an entire business, one role of valuation models for the seller is to assist the board in deciding whether to accept a bid and to protect the board from legal liability by providing the board with adequate information and demonstrating that it is exercising reasonable business judgment.

In almost all change-of-control transactions of publicly traded companies, a consultant, typically an investment bank or other valuation specialist, issues an opinion (**fairness opinion**) that indicates whether the price offered in the transaction is fair, from a financial perspective, to the common equityholders and sometimes to other investors as well. While not formally required by U.S. law, since the groundbreaking *Van Gorkom* ruling, detailed in Valuation in Practice 1.5, almost all change-of-control transactions involving the sale of a publicly traded company will have a fairness opinion. The valuation expert's judgment on the fairness of the price is based on many of the valuation techniques discussed previously in this chapter.

In rendering a fairness opinion, it is typical to perform a discounted cash flow valuation, a market multiple valuation based on comparable companies, a market multiple valuation based on comparable transactions, and sometimes an analysis of the value that would result from an LBO transaction. An investment banker may also base a fairness opinion, in part, on the process that was used to sell a company and whether there were other bids. In addition, if the company being bought and sold is a public company, it is common to examine the trading range of the company's stock price over some recent historical period and to examine the target prices for the company's stock as reported in various

¹⁵ Gelles, David, "Once Suitor, Jos. A. Bank Is a Target for Men's Wearhouse," *New York Times*, November 26, 2013, available June 25, 2018, at https://dealbook.nytimes.com/2013/11/26/mens-wearhouse-offers-to-buy-jos-a-bank/?_r=0

¹⁶ See Jensen (1986) and Kaplan (1989); Jensen, M. C., "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers," *American Economic Review* 2 (1986), pp. 323–329; Kaplan, S. N., "The Effects of Management Buyouts on Operating Performance and Value," *Journal of Financial Economics* 24 (1989), pp. 217–254.

Valuation in Practice 1.5

The Van Gorkom Case A fairness opinion is essentially a letter from an independent valuation specialist that tells the board of directors that the price of a proposed transaction is fair. The use of “fairness opinions” has its origins in a Delaware Supreme Court ruling in *Smith v. Van Gorkom* in 1985. Smith was a shareholder of Trans Union, and Van Gorkom was the company’s chief executive officer. The lawsuit involved the sale of a company, Trans Union, to a private buyer in 1980. Trans Union’s stock was trading below \$38 during the year before the sale. Mr. Van Gorkom negotiated a price of \$55 with a private buyer, and the buyer gave the company’s board of directors three days to accept or decline the offer. Mr. Van Gorkom did not consult the board during the short negotiations process.

Mr. Van Gorkom called for a special board meeting, and after a few hours, the board of directors approved the sale of the company and recommended that shareholders accept the offer. The court ruled that the board of directors of Trans Union did not make its decision to sell the company with sufficient information and that the board of directors was not sufficiently informed about the value of the company. In its ruling, the court also noted the lack of a report by an expert consultant, and the board was held liable for not exercising reasonable business judgment in considering this transaction. Since this ruling, the board of directors in virtually any sale of a public company obtains a fairness opinion.

analyst reports. The financial advisor generally makes a presentation to the board of directors concerning the valuation, so the board can come to a conclusion as to whether to proceed with the transaction. Between 1994 and 2003, 95% of the deals whose value was at least \$10 million had at least one fairness opinion on the target side, and 70% of the same deals had one or more opinions on the acquirer side.¹⁷

Asset and Financial Restructuring Activities

Companies undertake a variety of asset and financial restructuring activities to increase the value of the firm and maximize shareholder value. **Asset restructuring activities** involve the sale of assets, businesses, or the stock of subsidiaries. **Financial restructuring activities** involve large changes in a company’s capital structure. Management sometimes undertakes these activities proactively and sometimes reactively, such as in response to the threat of a takeover. In a **proactive restructuring** activity designed to maximize shareholder value, management uses valuation models to better understand the economic consequences of a restructuring decision. In **reactive restructuring**, a response to a corporate raider or a threat of a **hostile bid**, management uses valuation models to analyze the economic consequences of the offer as well as the economic consequences of alternative defenses and strategies. In these cases, management will try to demonstrate that its actions will increase the per-share value of the company above the amount of the hostile bid.

Asset Restructuring Activities. A company can create value if another company can better use some of its assets, if it can use another company’s assets better, or if combining the assets of two companies creates value (synergies). If another company can use a company’s assets better (best and highest value use), the company should **divest** (sell off) some of those assets (**asset sale** or **divestiture**).¹⁸ Asset restructuring activities can be of various types. One type of restructuring activity is **corporate downsizing**. The goal of corporate downsizing is to reduce the size of, or eliminate, certain businesses or business activities that are not profitable or less profitable than they may potentially be.

¹⁷ See Kisgen, D., J. Qian, and W. Song, “Are Fairness Opinions Fair? The Case of Mergers and Acquisitions,” *Journal of Financial Economics* (February 2009), pp. 179–207.

¹⁸ Scholarly research shows that, on average, the stock market perceives divestitures as value increasing; see, for example, Klein, L., “The Timing and Substance of Divestiture Announcements: Individual, Simultaneous and Cumulative Effects,” *Journal of Finance* (July 1986), pp. 685–696.

One way to downsize is by means of **asset sales**, in which a company simply sells some of its assets. For example, a company may sell a manufacturing plant or a patent that it believes a buyer can use more profitably. Another way to downsize is to sell an entire business in a transaction called a **divestiture**. In these transactions, the seller must evaluate the value to potential buyers and attempt to capture as much of the value added by the buyer as possible. The seller must also value the entity being sold as it currently operates it so that it may know whether the bids received will in fact create value for the shareholders relative to continuing to operate the asset or business. In other words, is there a bid for the assets being sold that exceeds the value of those assets if the seller were to continue to operate them? The more potential buyers with whom the seller can negotiate, the more of these benefits the seller can generally capture.

Valuation in Practice 1.6

Xerox Corporation Splits into Two Companies As you will read in Chapter 16, in 2010, Xerox acquired Affiliated Computer Services, Inc. (ACS)—a business processing outsourcing company—for around \$6.5 billion (consideration was a combination of cash and Xerox stock). In 2009, ACS reported \$6.5 billion in revenues and Xerox reported \$15.1 billion in revenues. Xerox revenues peaked in 2011 at \$22.6 billion but steadily declined each year through 2015 with revenues of \$18 billion. After activist investor Carl Icahn's investment company purchased a block of Xerox stock, he lobbied Xerox to split into two companies. On January 29, 2016, Xerox announced that after a strategic review of the company's portfolio and capital allocation options, the Xerox Corporation Board unanimously approved management's plan to separate Xerox into two independent publicly traded companies:¹⁹

The Document Technology company will continue to be a global leader in document management and document outsourcing with approximately \$11 billion in 2015 revenue. . . .

The Business Process Outsourcing (BPO) company will be an industry leader that helps clients improve the flow of work by leveraging its expertise in managing transaction-intensive processes and applying innovations to automate and simplify business processes. With approximately \$7 billion in 2015 revenue . . .

Separation Rationale

Today's market realities require greater agility and flexibility, the ability to innovate and adapt technology to address clients' fast evolving needs, and a more focused and efficient approach to operations and capital allocation. As a result, it has become increasingly clear that the Document Technology and BPO businesses serve distinct client needs, have different growth drivers, and require customized operating models and capital structures. Thus, the separation of the two businesses will enhance their competitive positions and create significant value creation opportunities, including:

- Enhanced strategic and operational focus. . . .
- Simplification of organizational structure and resources. . . .
- Distinct and clear financial profiles. . . .
- Compelling equity investment cases. As standalone companies, both companies will offer distinct and compelling investment propositions with differentiated financial profiles, growth drivers and business prospects.

Liquidation is an extreme form of asset restructuring in which a company dissolves either a single business or the entire company by selling off all of the assets and paying off any liabilities and any costs of liquidation. If the entire company is liquidated, any remaining cash is distributed to the stockholders. The decision to liquidate is based on a determination that the company is worth more liquidated than operating as a going concern. Again, management has to value the company as a going concern and compare that value to the liquidation value of the company. The stock market generally reacts positively to news of asset

¹⁹ See Xerox Corporation for 8-K filing with the U.S. SEC dated January 29, 2017.

sales, divestitures, and liquidations.²⁰ The reason for this is that the assets being sold or divested are generally more valuable to a buyer than to the selling company; and in turn, the selling company captures some of that value. In addition, companies that are liquidated are generally quite unprofitable and the shareholders are better off receiving the liquidation proceeds than having the company continue to operate unprofitably, which dissipates any remaining resources.

Other asset restructuring activities involve a company issuing stock in the public markets for one of its subsidiaries. In **spin-offs**, a company distributes shares of a subsidiary (a separate legal entity) to existing shareholders on a pro-rata basis. The subsidiary then becomes a new standalone company that is publicly traded and operates independently of the parent company. A related restructuring activity is an **equity carve-out**. Equity carve-outs involve the *initial public offering* of the stock of a subsidiary. The parent company takes a subsidiary public and retains some of the ownership, but unlike a spin-off, an equity carve-out allows the parent company to retain control over the subsidiary. The average excess stock return to the parent company when it announces transactions of this sort is generally positive.²¹ In many cases, the shares of the subsidiary had not been publicly traded, so there is now an active market for the shares of the subsidiary, which provides the potential for using equity and option grants as an incentive for employees. It also provides some financial flexibility to the company. Many spin-offs occur when the subsidiary's business is not part of the parent's core business.

Valuation in Practice 1.7

Altria Group, Inc. Spins Off Kraft Foods Altria Group, Inc. (Altria), the parent company of Philip Morris, USA, the largest cigarette maker in the United States, also owned 88.9% of the common stock of Kraft Foods, Inc. (Kraft), itself a public company. On March 30, 2007, after legal wrangling that took several years, Altria successfully spun off its shares of Kraft to its (Altria's) shareholders on a pro-rata basis in a tax-free transaction. When Altria announced the spin-off, it stated the following in its press release:

The separation of Altria and Kraft will benefit both parties and achieve the following benefits:

- Enhance Kraft's ability to make acquisitions, including by using Kraft stock as acquisition currency, to compete more effectively in the food industry;
- Allow management of Altria and Kraft to focus more effectively on their respective business and improve Kraft's ability to recruit and retain management and independent directors.
- Provide greater aggregate debt capacity to both Altria and Kraft; and
- Permit Altria and Kraft to target their respective shareholder bases more effectively and improve capital allocation within the company.

Source: See Altria Group, Inc. press release dated March 30, 2007, "Altria, Group, Inc. to Spin-off Kraft Foods, Inc.," <http://investor.altria.com/phoenix.zhtml?c=80855&p=irol-newsArticle&ID=956368>, available on June 25, 2018.

Financial Restructuring Activities. Financial restructuring activities (sometimes referred to as financial engineering) include such actions as issuing debt and repurchasing the company's shares, both of which can increase the company's financial leverage. Financial restructuring can also entail the

²⁰ The value of the common stock of selling companies announcing asset sales or divestitures increases approximately 2%, and there is even a greater positive reaction for companies announcing their liquidation. The latter are a peculiar group of companies. For research in this area, see Hite, Owers, and Rogers (1987) and Kose and Ofek (1995); Hite, G. L., J. E. Owers, and R. C. Rogers, "The Market of Interfirm Assets Sales: Partial Sell-Offs and Total Liquidations," *Journal of Financial Economics* 18 (1987), pp. 229–252; Kose, J., and E. Ofek, "Asset Sales and Increase in Focus," *Journal of Financial Economics* 37 (1995), pp. 105–126.

²¹ For spin-offs, see the early research by Schipper and Smith (1983); Schipper, K., and A. Smith, "Effects of Recontracting on Shareholder Wealth: The Case of Voluntary Spin-offs," *Journal of Financial Economics* 12 (1983), pp. 437–467. For research that examines why spin-offs appear to create value for the parent company, see Daley, Mehrota, and Sivakumar (1997); Daley, V., V. Mehrota, and R. Sivakumar, "Corporate Focus and Value Creation: Evidence from Spinoffs," *Journal of Financial Economics* 45 (1997), pp. 257–281. For equity carve-outs, see the early research by Schipper and Smith (1986); Schipper, K., and A. Smith, "Equity Carve-Outs and Seasoned Equity Offerings," *Journal of Financial Economics* 15 (1986), pp. 153–186. For research that investigates the information effects of equity carve-outs, see Slovin, Sushka, and Ferraro (1995); Slovin, M., M. Sushka, and S. Ferraro, "A Comparison of the Information Conveyed by Equity Carveouts, Spinoffs, and Asset Sell-Offs," *Journal of Financial Economics* 37 (1995), pp. 89–104.

repayment of debt or an exchange offer where equity is issued for debt, reducing the company's financial leverage. Financial restructuring might lead to the issuance of certain securities that have tax advantages; it might be used as a defensive tactic to thwart a hostile takeover; or it might change who has control of a company.

We often observe a company undertaking financial restructuring activities at the same time it is undergoing asset restructuring activities; the circumstances that resulted in the need to restructure the company's assets might also result in a need for the company to adjust its capital structure. An asset restructuring can also create an opportunity for a company to change its capital structure. On the other hand, a company may have to undergo asset restructuring because it changed its financing (capital structure) strategy. The role of valuation models in financial restructuring is to measure the effects of the restructuring on the value of the firm and to provide a long-term plan for the company's **financial architecture**. Once these valuations are performed, management is in a much better position to make the appropriate value-creation decision.

One type of financial restructuring is a debt recapitalization. The goal of a **debt recapitalization (debt recap)** is to increase the value of the firm by getting better financial terms, such as lower interest rates; more potential tax benefits associated with a more highly leveraged position; and potential benefits from better management incentives associated with higher debt levels. Why might a large amount of debt improve the efficiency of a company's operations? For some firms, a large debt overhang can be an incentive for managers to operate the firm efficiently because it forces them to generate the cash flows necessary to pay off the debt. A debt recap can also be very effective in creating value in situations where investors believe managers have been using the company's cash flows to invest in negative net present value projects.²² In this case, the company issues a large amount of debt and pays the proceeds out to shareholders in the form of a special dividend or share repurchase at the time the debt is issued. This forces management to stop investing in negative net present value projects, for it paid out the present value of the expected cash flows to shareholders up front and is now forced to use the cash flows generated by the business to service the debt. Debt recaps can serve as an effective commitment device to stop wasting resources.

Valuation in Practice 1.8

FMC's Debt Recapitalization FMC Corporation (FMC) is a diversified global chemical company operating in three business segments—agricultural products, specialty chemicals, and industrial chemicals. FMC was one of the first companies to undergo a debt recapitalization. In February 1986, FMC's board of directors approved a financial restructuring of the company. The plan did not treat all shareholders in the same way. Management wanted a larger percentage of the company's stock after the debt recapitalization for both itself and its employee benefit plans. Public shareholders were to receive \$70 per share and one new share for each old share.

FMC planned on issuing \$1.7 billion in debt to finance the debt recapitalization. The company actually issued more debt and paid more to the shareholders to get them to approve the plan, and it reduced \$187 million of excess funding in its pension plans as part of the financing. The cash distribution paid by FMC to its shareholders resulted in FMC having a negative net worth (shareholders' equity) of more than \$507 million by the end of 1986.

FMC provides us with an example of a successful debt recapitalization. By the end of 1990, FMC had reduced its debt level substantially and had a positive net worth (book value). FMC outperformed the S&P 500 for almost 10 years following its debt recapitalization.

Source: "FMC Corporation Board Approves Recapitalization Plan," *Wall Street Journal* (February 24, 1986); for the company's announcement of this event and the information we discuss in this paragraph, see Rudin (1987); Rudin, B., "Pension Surplus Lightens FMC Debt Load," *Crain's Chicago Business* (October 26, 1987), p. 38. For a discussion of FMC's post-debt recapitalization performance, see "FMC Corp: It Learns That There Can Be Life After Leverage," *Barron's* vol. 70, no. 18 (April 30, 1990), pp. 41–42.

Another type of financial restructuring is a stock repurchase. **Stock repurchases** are a form of dividend because cash is distributed to the shareholders if they sell their stock back to the company. The stock repurchase does not harm shareholders who do not sell their stock as long as the company does not overpay for the stock it repurchases. If the company has more cash and cash flows than profitable investment

²² See Jensen (1986); Jensen, M. C., "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers," *American Economic Review* 2 (1986), pp. 323–329.

opportunities, that cash may be more valuable to the shareholders if the managers distribute it back to shareholders rather than retaining it. An announced stock repurchase plan that buys back the corporation's shares systematically over time can create value for shareholders if the likely alternative is one in which management will reinvest operating cash flows in negative NPV projects. Of course, if the managers have great investment opportunities (positive NPV projects), stockholders would rather have management reinvest the cash instead of paying it out. Managers typically value their companies when contemplating a stock repurchase to see how their valuation compares to the company's market valuation. Managers are more likely to engage in share repurchases when they believe their shares are undervalued. If management feels the company's shares are undervalued, the company may repurchase shares even if the company does not have available cash or cash flow by issuing additional debt. On average, companies that announce leverage-increasing restructuring activities experience positive excess stock returns. Companies that announce leverage-decreasing restructuring activities, on average, experience negative excess stock returns.²³

Raising Capital

The ability to raise capital is a characteristic of any capitalism-based economy.²⁴ A company has a variety of different sources from which it can access capital. Capital can be raised from both private and public sources, and capital can be raised in the form of debt, equity, or a security that is a hybrid of the two, such as convertible debt. For example, a company can raise debt capital from private sources (such as a loan from a bank or consortium of banks), or it can raise private equity capital (such as **preferred** or **common stock** from different types of **private equity** investors). Private equity providers include **venture capitalists**, **angel investors**, **LBO sponsors**, and **mezzanine financing funds**. Of course, companies can also issue debt, preferred stock, or equity in the public markets.

The role of valuation models is important when a company raises long-term capital, particularly with equity instruments or instruments that are part debt and part equity. Similar to their role in financial restructuring activities, valuation models measure the effects of raising capital on the value of the firm and, more importantly, serve as a basis for determining the price of the new capital. Valuations help ensure that a firm does not issue new securities below their fair value, which would harm the company's existing claimholders.

Venture capital funds are a source of private equity (both common and preferred) and sometimes debt. The security issued in most venture capital investments is convertible preferred stock with voting rights so the venture capital fund shares in the residual value of the company but also has seniority (priority) over the common shareholders. Companies typically go to venture capital funds for capital when the company is young. For even younger companies, angel investors are more likely to be the very initial sources of funding. Both angel investors and venture capitalists demand very high expected rates of return, so they are an expensive source of capital. However, since angel investors and venture capitalists generally invest in very risky ventures, it is not surprising that these investors demand high expected rates of return. Venture capital funds are typically short lived, so the venture capitalist who raises the fund usually wants to exit investments the fund makes within five years. The two most common ways for the venture capital fund to exit an investment are to sell the company to another investor (typically a company in the same line of business, called a **strategic investor**, or another investment fund, called a **financial investor**) or to have the company issue stock in public markets, called **going public**.

LBO funds are another form of private equity. Many LBO transactions involve public companies or subsidiaries of public companies that are taken private. However, LBO transactions can also involve companies that are already private. As discussed previously, LBO transactions are financed with extensive amounts of debt. The amount of debt in a particular transaction will be a function of the credit market conditions at the time of the transaction, the magnitude and stability of the company's cash flows, and the quality of the company's assets and management team.

²³ For research on these topics, see Dann and Mikkelsen (1984), Masulis (1980, 1981), and Vermaelen (1981); Dann, L. Y., and W. H. Mikkelsen, "Convertible Debt Issuance, Capital Structure Change and Financing-Related Information: Some New Evidence," *Journal of Financial Economics* vol. 13, no. 2 (1984), pp. 157–186; Masulis, R. W., "The Effects of Capital Structure Change on Security Prices: A Study of Exchange Offers," *Journal of Financial Economics* vol. 8, no. 2 (1980), pp. 139–177; Masulis, R. W., "The Impact of Capital Structure Change on Firm Value: Some Estimates," *Journal of Finance* vol. 38, no. 1 (1983), pp. 107–126; Vermaelen, T., "Common Stock Repurchases and Market Signaling: An Empirical Study," *Journal of Financial Economics* vol. 9, no. 2 (1981), pp. 138–183.

²⁴ Rajan and Zingales (2003) discuss this issue thoroughly in Rajan, R., and L. Zingales, *Saving Capitalism from the Capitalists: Unleashing the Power of Financial Markets to Create Wealth and Spread Opportunity*, Crown Publications (2003).

Valuation in Practice 1.9

SpaceX, a Potential \$1.5 Trillion Initial Public Offering SpaceX is expected to “go public” in mid-2026 at a \$1.5 trillion valuation. About SpaceX’s IPO and valuation, PitchBook Data, Inc. stated:

At nearly 95x our 2025 revenue estimate of \$16 billion, the valuation is rich but not irrational. Our sum-of-the-parts analysis places fair value between \$1.1 trillion and \$1.7 trillion, with the IPO target sitting within that range. Benchmarked against high-growth large-cap peers, SpaceX’s profile warrants a premium multiple, with around 50% EBITDA margins and around a 50% three-year revenue CAGR in addition to multiple compounding growth vectors.

Source: Franco Granda, “SpaceX Initiation Report: When Venus and Jupiter Align,” PitchBook Data, Inc., March 2, 2026.

An **initial public offering (IPO)** occurs when a company issues stock in publicly traded markets for the first time. If the company is issuing new shares of stock, the offering is called a **primary offering**, and the company receives the proceeds of the transaction. If the company’s initial investors are selling some or all of their stock (such as a venture capital fund or management), the offering is called a **secondary offering**, and in this case, the proceeds of the offering go to the selling shareholders. Another type of secondary offering is when a company with publicly traded stock has another stock offering (also called a **seasoned offering**). Regardless of whether this is a primary or secondary offering (or a combination of both), shareholders want to make sure that they are receiving fair value for giving up some of their proportionate ownership in the enterprise. In addition to a source of capital, going public provides a source of liquidity for a company’s stock. Highly liquid stock can sometimes act like a form of currency for a company, which can be valuable to its investors as well as to employees who have **employee stock options** or hold other equity claims on the company. Valuation models naturally play a role in setting prices any time a company goes public. The **underwriters** shop the issue to various investors to assess the demand for the shares at various prices. The assessed supply and demand determine the final price at which the company issues its shares. Historically, the issue price undervalues the shares by, on average, close to 19%, as measured by the price one day after the issue. Over the longer term, however, IPO stocks do not perform as well as a control group of stocks. We observe these results for both U.S. and non-U.S. IPOs.²⁵

Strategic Analysis and Value-Based Management

Companies use a strategic process to continually revise existing strategies and to develop new strategies, strategic plans, and tactics. They execute their strategic plans and tactics to create value. Valuation models use forecasts from alternative strategic plans and other information to measure the effect of different strategies on the value of the firm. Companies can use valuation models to make many decisions beyond strategic decisions, such as deciding whether to invest in certain projects.

Strategic analysis attempts to identify a company’s value-maximizing business strategy. The process involves evaluating the businesses that a firm does or can operate and how it can best organize itself to compete in those respective markets. One element of strategic analysis is to perform a valuation analysis of the feasible alternative strategic initiatives to determine which of the alternative business strategies creates the most shareholder value. Managers then look at the valuation implications of the various strategies as well as the risks inherent in each in order to determine the best path for the company to pursue.

Value-based management is one of many terms that describes how a company can operate all aspects of its business and make all management decisions based on the effect its decisions have on shareholder value. Value-based management systems attempt to provide managers with incentives to maximize shareholder value.²⁶ The distinguishing feature of a value-based management process is its more formalized and rigorous analysis of the valuation effects of a multitude of decisions and its direct compensation

²⁵ See Ritter and Welch (2002) for a review of the research on IPOs; Ritter, J. R., and I. Welch, “A Review of IPO Activity, Pricing, and Allocations,” *Journal of Finance* vol. LVII, no. 4 (August 2002), pp. 1795–1828.

²⁶ See Martin and Petty (2000) for a detailed discussion of value-based management; Martin, J. D., and J. W. Petty, *Value Based Management: The Corporate Response to the Shareholder Revolution*, Harvard Business School Press (2000).

of management based on the value created.²⁷ A requirement for a value-based management process is a valuation model that is based on the company's specific inputs and outputs. This requirement provides a distinct role for valuation models.

Contracts Between a Company and Its Investors and Employees

A company begins with a contract between the company and its shareholders and perhaps just between the founders at the outset. A company has contracts with every type of investor from whom it raises capital, which could be another company, some other legal entity, or a single individual. Companies also have contracts with their employees. Many of these contracts, especially the contracts of a privately held company, require a valuation of the company to be conducted from time to time.

Privately held companies often have a buy/sell agreement. The buy/sell agreement identifies the conditions under which the equity of the company can be bought or sold and at what price; or it delineates the method used to measure this price. Similarly, privately held companies with an employee stock ownership plan (ESOP) or some type of stock option or incentive compensation plan (based on the value of the firm) must conduct a valuation of the company, usually annually, so employees leaving the company can receive the value of their holdings in the ESOP or the value of their stock options. Even publicly traded companies sometimes provide incentives for division managers with compensation schemes based on the value of the separate divisions, which implies that valuations of the separate divisions must be conducted from time to time. Sometimes publicly traded companies create a **special purpose entity (SPE)** in order to isolate certain assets for securitization or self-insurance, to manage risk, or to allocate capital. These SPEs often require a valuation of certain claims or assets of a company.²⁸

Regulatory and Legal Uses of Valuation

Governments sometimes sell off government-owned businesses in the process of **privatization**. Governments use valuation models to assess the value of the government-owned businesses to be sold. Regulatory agencies regularly set allowed rates of return in regulated industries based on a company's cost of capital. Sometimes income tax authorities, such as the Internal Revenue Service (IRS) or state taxing authorities in the U.S., base the amount of taxes owed by a taxpayer on the value of assets. This occurs when someone dies and an estate must pay taxes on the value of the decedent's estate at the time of death. The U.S. IRS also requires a valuation of assets when assets are transferred from one taxpayer to another. The taxpayers can be companies or individuals. Sometimes in an acquisition, a company will be forced to divest of certain assets in order to cure an antitrust issue with an antitrust enforcement agency. In this case, the company will use valuation models to find the cure that maximizes the value of the entity post-transaction.

Courts also rely on valuations when ruling on damages in lawsuits that involve companies. In many of these cases, damages equal the loss in firm value that results from the alleged actions of the defendant. Lawsuits in which damage assessments are likely to rely on a valuation model include those involving patent infringements, theft of trade secrets, business disparagement, breach of contract, appraisal of the value of a merger, and misrepresentation in the purchase of a business or security, among many others.

Identifying Over- and Undervalued Securities

Some investors use valuation models to measure a company's **fundamental value** based on their expectations of the business. They then compare the fundamental value to the price of the company on the stock market in order to identify whether the company is undervalued or overvalued. These investors then take portfolio positions that they hope will yield superior returns. Sometimes these investors are individual investors, investment funds, or other companies. For example, in April 2017, after purchasing a substantial equity interest, Mr. Daniel Lewis, the Managing Partner of Orange Capital, LLC, sent a letter to the

²⁷ While we discuss strategy development as a step-by-step linear process, it is actually a dynamic, continually evolving process.

²⁸ See Culp and Niskanen (2003), especially Chapter II-1, for a discussion of SPEs and the use and alleged misuse of SPEs by Enron Corporation; Culp, C., and W. A. Niskanen, editors, *Public Policy Implications of the Enron Failure*, CATO Institute (2003).

CEO of Pinnacle Entertainment outlining the case for Pinnacle to split into two companies to increase share value, which it subsequently did.

Whether an investor can “beat the market”—that is, earn returns on a portfolio that exceed the returns the market would expect for that portfolio given its risk—depends on how good that individual’s valuations are relative to the market’s valuations and whether the market subsequently learns information that is consistent with the investor’s insights.²⁹ While we do not discuss portfolio management in this book, the valuation methods we discuss can be used in investment management in order to determine what companies to buy, sell, or sell short. At present, billions of dollars are invested in U.S. investment funds alone that base their portfolio decisions on the valuation models we present in this book.

1.8 AN OVERVIEW OF THE VALUATION PROCESS

LO5 Outline the steps used in the valuation process

Conducting a valuation analysis involves a process that includes completing a series of specific steps. Some of these steps must be completed in a certain order, while others need not be. The process varies somewhat as a function of the type of company as well as the reason for performing the valuation. Here, we describe one approach to organizing the steps in a valuation, which we summarize in this section and in Exhibit 1.4.

EXHIBIT 1.4 An Overview of the Steps in a Typical Company Valuation

- 1 Identify the company’s direct, indirect, and potential competitors as well as any other potential comparable or peer companies (Chapter 2)
- 2 Analyze historical performance, strategy, and sources of competitive advantage (Chapter 2)
- 3 Calculate the value of the firm and equity using one of the forms of the discounted cash flow valuation model or excess flow model (Chapters 5–7), which includes:
 - Forecast financial statements and free cash flows (Chapters 3 and 4)
 - Measure the business risk of the company and costs of capital (Chapters 8–12)
- 4 Calculate the value of the firm and its common equity using market multiple valuation methods (Chapter 13–14)
 - Using publicly traded companies
 - Using comparable transactions (if applicable)
- 5 Consider alternative valuation methods such as a leveraged buyout analysis (Chapter 15)

An early step in any valuation is identifying the company’s key competitors as well as any other potential comparable or peer companies (Chapter 2). This step entails identifying the firm’s lines of business and then identifying both key competitors and potential competitors for each line of business. Potential competitors include firms that sell similar products in a different geographic area—but could potentially enter the company’s geographic area—and companies that might choose to enter a particular line of business. In addition, other firms selling products that the company is thinking of selling are also potential competitors. Finally, firms that sell products that are quite different but have some of the same functionality (e.g., oil and propane gas) may be key competitors as well.

In the second step, we analyze the past performance of the company and its competitors using historical financial information, for example, using the information in the companies’ financial statements and relevant market data (Chapter 2). We also identify the strategy of the company and its competitors in an effort to establish the sources of competitive advantage for each company. As part of this analysis, we assess whether or not the potential sources of competitive advantage are detectable in the historical data. Once the sources of competitive advantage are identified, we assess the extent to which that competitive advantage is sustainable, and—if it is sustainable—for how long.

In the third step, we measure the value of the firm using one of the forms of the DCF valuation model or excess flow model (Chapters 5 through 7). For both the DCF and excess flow methods, we decide which form of DCF model is the best form to use (for example, the WACC DCF model versus the APV DCF model). We usually measure the continuing value using the cash flow perpetuity model or, in some valuation contexts, we may use a market multiple valuation. Once we analyze the historical performance and sustainability of any identified competitive advantage, we create forecasts of the financial statements

²⁹ See Fama (1994, 1998) for a discussion of the **efficient markets hypothesis**; Fama, G., “Efficient Markets: II,” Fiftieth Anniversary Invited Paper, *Journal of Finance* 46 (December 1991), pp. 1575–1617; Fama, G., “Market Efficiency, Long-Term Returns, and Behavioral Finance,” *Journal of Financial Economics* 49 (September 1998), pp. 283–306.

and free cash flows and test the reasonableness of those forecasts (Chapters 3 and 4). These forecasts take economic and industry-specific trends into consideration. To the extent the company has important embedded options to consider, the forecasts consider how to embed those option-like features or how to measure the value of these features separately. As part of this valuation, we also measure the company's business risk and costs of capital (Chapters 8 through 12). Estimating the company's cost of capital normally relies on data from the company and from relevant comparable companies. Estimating the company's equity cost of capital normally includes implementing a model of how assets are priced, such as the **Capital Asset Pricing Model (CAPM)**, and how the company's financial structure affects its cost of capital (Chapters 8 and 10). This step includes collecting data on the company being valued and its comparables, choosing an asset pricing model, and implementing the asset pricing model. As part of this process we typically use the companies' costs of non-common equity capital such as the cost of capital for debt, preferred stock, and possibly stock options (Chapters 9 and 12). If using the WACC method, we also measure the weighted average cost of capital (Chapter 11). If the valuation is for a cross-border transaction or is of a multinational company, we make the adjustments to the valuation process described in Chapter 17.

Next, in step four, we measure the company's value using a market multiple valuation method (Chapters 13 and 14). This step involves choosing comparable companies appropriate for both the method and the company being valued, choosing the specific multiples to use, adjusting the financial statements of the companies (if the multiples are based on information in the financial statements), measuring the multiples—both numerator and denominator—for each comparable company, choosing the value or range of values for each multiple, and using the multiples to measure the value of the company and its common equity. If there is potential value in the options available to the company, that option value has to be added to the market multiple valuation, or we have to choose comparable companies with the same options in order to embed that value in the measured multiples.

We also consider whether any other valuation methods are appropriate to use. For example, we might consider the value of the firm in an LBO transaction (Chapter 15). In this analysis, we use our projections of cash flows that the company would generate if it did an LBO, determine the most advantageous capital structure possible given credit market conditions and characteristics of the company, and value the company as an LBO transaction based on the required rates of return for its different claimholders. Alternatively, we might consider breaking up or liquidating the company.

The valuation models we discuss in this book are well-accepted and widely-used. However, not all of the valuation models may apply in every circumstance, and the implementation of a valuation model may differ for different companies or at different times for the same company. The choice of the valuation models used and the implementation of the valuation models depend on the valuation context for a specific valuation.

SUMMARY AND KEY CONCEPTS

This chapter has provided an overview of the valuation process and the basic valuation models that are commonly used, including discounted cash flow, discounted excess flow, market multiples, LBO transaction analysis, and the option pricing framework. In addition, we have discussed the economic balance sheet and the sources of value for a company, including the value of its operations, excess assets, and the value from financing.

We discussed a variety of contexts in which valuations are used to analyze and make decisions regarding transactions and to make various types of internal decisions. Further, we have discussed how managers use these valuation methods in their decisions.

This book explores all of the valuation methods discussed in this chapter in detail and gives specific guidance on how to obtain the relevant data necessary in order to implement the models discussed.

ADDITIONAL READING AND REFERENCES

Coase, R., "The Nature of the Firm," *Economica* 4 (1937), pp. 386–405.

Jensen, M. C., "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers," *American Economic Review* 2 (1986), pp. 323–329.

EXERCISES AND PROBLEMS

- P1.1 Economic Balance Sheet—The Second Market Value Company:** Prepare an economic balance sheet for The Second Market Value Company as of Year 0 using the following information and the financial statements provided in Exhibit P1.1. The company's share price is \$8.00 and it has 500 shares outstanding. Its debt is trading at a discount, indicating that its market value is equal to 95% of its book value. The company has land valued at \$2,000 that is not necessary to operate the business. Based on the amount and type of debt financing, the company creates \$2,200 in value from financing.

EXHIBIT P1.1 The Second Market Value Company Financial Statements					
	Year -1	Year 0		Year -1	Year 0
Balance Sheet—Assets:			Balance Sheet—Liabilities & Equity:		
Cash balance	\$ 210.0	\$ 230.0	Accounts payable	\$ 150.0	\$ 160.0
Accounts receivable	690.0	720.0	Other current operating liabilities	140.0	160.0
Inventory	340.0	360.0	Total current liabilities	\$ 290.0	\$ 320.0
Total current assets	\$1,240.0	\$1,310.0	Debt	4,000.0	4,500.0
Net property, plant, and equipment	6,030.0	6,220.0	Total liabilities	\$4,290.0	\$4,820.0
Total assets	\$7,270.0	\$7,530.0	Common stock	2,160.0	2,160.0
			Retained earnings	820.0	550.0
			Total shareholders equity	\$2,980.0	\$2,710.0
			Total liabilities and equities	\$7,270.0	\$7,530.0
Income Statement:					
Revenue	\$2,340.0	\$2,580.0			
Cost of goods sold	-510.0	-580.0			
Gross margin	\$1,830.0	\$2,000.0			
Selling, general, and administrative	-370.0	-460.0			
Operating income	\$1,460.0	\$1,540.0			
Interest expense	-530.0	-560.0			
Income before taxes	\$ 930.0	\$ 980.0			
Income tax expense	-372.0	-392.0			
Net income	\$ 558.0	\$ 588.0			

- P1.2 Unlevered Free Cash Flows—The Second Market Value Company:** Prepare an unlevered free cash flow schedule for The Second Market Value Company as of Year 0 using the information in the previous problem and the financial statements provided in Exhibit P1.1. Note that the company has \$500 of depreciation which is part of Cost of Goods Sold and Selling, General, and Administrative. The tax rate is 40%. The company holds no excess cash so the change in cash is the change in its required cash.
- P1.3 Basic DCF Valuation #1:** A company has expected free cash flows of \$1.45 million, \$2.93 million, and \$3.2 million in the next three years. Beginning in Year 4, the expected cash flows will grow by 3% in perpetuity. Measure the value of this company as of today using both a 10% and 12% discount rate.
- P1.4 Basic DCF Valuation #2:** A company has expected free cash flows of \$1.45 million, \$2.93 million, and \$3.2 million in the next three years. Beginning in Year 4, the expected cash flows will grow (or decrease) by -5% in perpetuity. Measure the value of this company as of today using both a 10% and 12% discount rate.
- P1.5 Comparison of DCF Valuations:** Compare and discuss the valuations in the previous two problems.
- P1.6 Basic DCF Valuation #3:** A company has expected cash flows of \$1.85 million, \$2.25 million, and \$2.92 million in the next three years. For Years 4 through 10, the free cash flows will grow by 6% annually. Beginning in Year 11, the expected cash flows will grow by 3% in perpetuity. Measure the value of this company as of today using both a 10% and 12% discount rate.
- P1.7 DCF Valuation—Apple Inc.:** Develop a DCF valuation model for Apple Inc. (Apple) using the following information and the financial information in Exhibit P1.2, which includes summary historical financial statements and free cash flows (2010 and 2011) and 11 years of forecasts (2012 through 2022). Use free cash flow forecasts for 11 years (2012 through 2022), a constant growth rate of 2.5% for free cash flows generated in perpetuity after 2022, and a risk-adjusted discount rate of 12.5%. Use the free cash flow forecast for 2022

and constant perpetual growth rate of 2.5% to measure the continuing value of the firm as of the end of 2021. Apple has excess assets it does not need for its operations totaling \$70.745 billion. These excess assets include excess cash (\$15.127 billion) and long-term securities (\$55.618 billion). For simplicity, assume that there is no tax that would be levied on Apple's excess assets if Apple were to distribute them to its shareholders. The free cash flow forecasts exclude any effects from Apple's excess assets.

P1.8 Economic Balance Sheet—Apple Inc.: Review Apple Inc.'s (Apple) financial statements in Exhibit P1.2 and its excess assets and valuation from P1.7. Prepare an economic balance sheet for Apple similar to the economic balance sheet in Exhibit 1.1. Discuss potential reasons for the differences between the values on the economic balance sheet and Apple's financial statements.

EXHIBIT P1.2 Apple Inc. Historical and Selected Financial Statement and Free Cash Flow Forecasts

APPLE INC. Income Statement Forecasts (for the years ended September 30)													
(\$ in millions)	A2010	A2011	F2012	F2013	F2014	F2015	F2016	F2017	F2018	F2019	F2020	F2021	F2022
Revenue	\$65,225	\$108,249	\$121,239	\$132,473	\$141,952	\$149,796	\$156,187	\$161,333	\$165,438	\$169,574	\$173,813	\$178,159	\$182,613
Cost of goods sold	-39,541	-64,431	-72,830	-79,579	-85,273	-89,985	-93,825	-96,916	-99,382	-101,866	-104,413	-107,023	-109,699
Gross margin	\$25,684	\$43,818	\$48,409	\$52,894	\$56,679	\$59,811	\$62,363	\$64,418	\$66,057	\$67,708	\$69,401	\$71,136	\$72,914
Research and development	-1,782	-2,429	-3,016	-3,296	-3,532	-3,727	-3,886	-4,014	-4,116	-4,219	-4,324	-4,433	-4,543
Selling, general, and administrative	-5,517	-7,599	-9,383	-10,252	-10,986	-11,593	-12,088	-12,486	-12,804	-13,124	-13,452	-13,788	-14,133
Operating income	\$18,385	\$33,790	\$36,009	\$39,346	\$42,161	\$44,491	\$46,389	\$47,918	\$49,137	\$50,365	\$51,624	\$52,915	\$54,238
Other income and expense	155	415	0	0	0	0	0	0	0	0	0	0	0
Income before taxes	\$18,540	\$34,205	\$36,009	\$39,346	\$42,161	\$44,491	\$46,389	\$47,918	\$49,137	\$50,365	\$51,624	\$52,915	\$54,238
Income tax expense	-4,527	-8,283	-9,002	-9,836	-10,540	-11,123	-11,597	-11,979	-12,284	-12,591	-12,906	-13,229	-13,559
Net income	\$14,013	\$25,922	\$27,007	\$29,509	\$31,621	\$33,368	\$34,792	\$35,938	\$36,853	\$37,774	\$38,718	\$39,686	\$40,678

APPLE INC. Balance Sheet Forecasts (for the years ended September 30)													
(\$ in millions)	A2010	A2011	F2012	F2013	F2014	F2015	F2016	F2017	F2018	F2019	F2020	F2021	F2022
Cash and marketable securities	\$25,620	\$25,952	\$12,124	\$13,247	\$14,195	\$14,980	\$15,619	\$16,133	\$16,544	\$16,957	\$17,381	\$17,816	\$18,261
Accounts receivable	5,510	5,369	8,128	8,881	9,516	10,042	10,470	10,815	11,091	11,368	11,652	11,943	12,242
Inventory	1,051	776	1,406	1,537	1,647	1,738	1,812	1,872	1,919	1,967	2,016	2,067	2,118
Other current assets	9,497	12,891	16,045	17,532	18,787	19,825	20,671	21,352	21,895	22,442	23,003	23,578	24,168
Total current assets	\$41,678	\$44,988	\$37,703	\$41,197	\$44,145	\$46,584	\$48,572	\$50,172	\$51,449	\$52,735	\$54,053	\$55,405	\$56,790
Property, plant and equipment	\$7,234	\$11,768	\$17,089	\$23,167	\$29,964	\$37,437	\$45,541	\$54,234	\$63,480	\$68,762	\$73,850	\$78,440	\$82,579
Accumulated depreciation	-2,466	-3,991	-6,135	-9,114	-12,983	-17,787	-23,557	-30,317	-38,078	-42,315	-46,178	-49,962	-53,274
Property, plant and equipment (net)	\$4,768	\$7,777	\$10,953	\$14,053	\$16,981	\$19,650	\$21,983	\$23,918	\$25,402	\$26,447	\$27,672	\$28,478	\$29,304
Long-term marketable securities	\$25,391	\$55,618	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Intangible assets	1,083	4,432	4,964	5,424	5,812	6,133	6,395	6,605	6,773	6,943	7,116	7,294	7,477
Other assets	2,263	3,556	4,095	4,474	4,794	5,059	5,275	5,449	5,587	5,727	5,870	6,017	6,167
Total assets	\$75,183	\$116,371	\$57,715	\$65,148	\$71,732	\$77,426	\$82,225	\$86,144	\$89,211	\$91,851	\$94,712	\$97,194	\$99,738
Accounts payable	\$12,015	\$14,632	\$16,754	\$18,179	\$19,473	\$20,544	\$21,415	\$22,117	\$22,677	\$23,243	\$23,825	\$24,420	\$25,031
Accrued expenses and other	8,707	13,338	15,561	17,003	18,220	19,227	20,047	20,708	21,235	21,765	22,310	22,867	23,439
Total current liabilities	\$20,722	\$27,970	\$32,316	\$35,183	\$37,693	\$39,770	\$41,463	\$42,825	\$43,911	\$45,009	\$46,134	\$47,288	\$48,470
Non-current liabilities	6,670	11,786	12,799	13,985	14,986	15,814	16,489	17,032	17,465	17,902	18,349	18,808	19,278
Total liabilities	\$27,392	\$39,756	\$45,115	\$49,168	\$52,679	\$55,584	\$57,951	\$59,857	\$61,377	\$62,911	\$64,484	\$66,096	\$67,748
Common stock (and other)	\$10,622	\$13,774	\$13,774	\$13,774	\$13,774	\$13,774	\$13,774	\$13,774	\$13,774	\$13,774	\$13,774	\$13,774	\$13,774
Retained earnings	37,169	62,841	-1,174	2,206	5,279	8,068	10,499	12,513	14,060	15,166	16,454	17,324	18,216
Total shareholders equity	\$47,791	\$76,615	\$12,600	\$15,980	\$19,053	\$21,842	\$24,273	\$26,287	\$27,834	\$28,940	\$30,228	\$31,098	\$31,990
Total liabilities and equities	\$75,183	\$116,371	\$57,715	\$65,148	\$71,732	\$77,426	\$82,225	\$86,144	\$89,211	\$91,851	\$94,712	\$97,194	\$99,738

APPLE INC. Free Cash Flow Forecasts (for the years ended September 30)													
(\$ in millions)	A2010	A2011	F2012	F2013	F2014	F2015	F2016	F2017	F2018	F2019	F2020	F2021	F2022
Earnings before interest and taxes (EBIT)	\$18,540	\$34,205	\$36,009	\$39,346	\$42,161	\$44,491	\$46,389	\$47,918	\$49,137	\$50,365	\$51,624	\$52,915	\$54,238
- Income taxes paid on EBIT	-4,527	-8,283	-9,002	-9,836	-10,540	-11,123	-11,597	-11,979	-12,284	-12,591	-12,906	-13,229	-13,559
Earnings before interest and after taxes	\$14,013	\$25,922	\$27,007	\$29,509	\$31,621	\$33,368	\$34,792	\$35,938	\$36,853	\$37,774	\$38,718	\$39,686	\$40,678
+ Depreciation expense	1,027	1,814	2,144	2,978	3,869	4,804	5,771	6,759	7,762	8,771	9,183	9,863	10,110
+/- Working capital and other changes	3,555	9,793	-1,723	1,303	1,191	985	803	646	515	522	535	549	562
- Change in required cash	-4,302	-4,302	-1,299	-1,123	-948	-784	-639	-515	-410	-414	-424	-435	-445
Unlevered cash flow from operations	\$14,293	\$33,227	\$26,129	\$32,668	\$35,734	\$38,373	\$40,726	\$42,829	\$44,719	\$46,653	\$48,013	\$49,663	\$50,905
- Capital expenditures (net)	-2,779	-7,955	-5,852	-6,538	-7,185	-7,794	-8,365	-8,904	-9,414	-9,985	-10,582	-10,847	-11,118
Unlevered free cash flow	\$11,514	\$25,272	\$20,277	\$26,129	\$28,548	\$30,579	\$32,361	\$33,925	\$35,305	\$36,668	\$37,431	\$38,816	\$39,787

Exhibit may contain small rounding errors

P1.9 Analysis of Free Cash Flows—Frits Seegers Inc.: Review Exhibit P1.3 for Frits Seegers Inc. and measure the free cash flow for Seegers for Year 0 and six years of forecasts (Year +1 to Year +6) shown. The company does not hold any excess cash, so the change in the cash balance is equal to the change in required cash. The change in Retained Earnings in a year is equal to the company's net income minus the dividends declared by the company in that year. Discuss the major factors that caused the free cash flows to change from year to year.

P1.10 DCF Valuation—Frits Seegers Inc.: Value Frits Seegers Inc. as of the end of Year 0 using the information in Exhibit P1.3 and a 13% risk-adjusted discount rate, and a constant growth rate of 3% for free cash flows generated in perpetuity after Year 6.

EXHIBIT P1.3 Frits Seegers Inc. Financial Statement—Actual and Forecasts

FRITS SEEGER INC. Income Statement and Balance Sheet Forecasts (for the years ended December 31)								
	Actual		Forecast					
	Year -1	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Income Statement								
Revenue	\$1,000.0	\$1,100.0	\$1,650.0	\$2,310.0	\$3,003.0	\$3,303.3	\$3,402.4	\$3,504.5
Cost of goods sold	-610.0	-671.0	-1,006.5	-1,409.1	-1,831.8	-2,015.0	-2,075.5	-2,137.7
Gross margin	\$ 390.0	\$ 429.0	\$ 643.5	\$ 900.9	\$1,171.2	\$1,288.3	\$1,326.9	\$1,366.7
Selling, general, and administrative	-120.0	-132.0	-198.0	-277.2	-360.4	-396.4	-408.3	-420.5
Operating income	\$ 270.0	\$ 297.0	\$ 445.5	\$ 623.7	\$ 810.8	\$ 891.9	\$ 918.6	\$ 946.2
Interest expense	-77.0	-96.0	-112.0	-128.0	-136.0	-144.0	-152.0	-160.0
Income before taxes	\$ 193.0	\$ 201.0	\$ 333.5	\$ 495.7	\$ 674.8	\$ 747.9	\$ 766.6	\$ 786.2
Income tax expense	-77.2	-80.4	-133.4	-198.3	-269.9	-299.2	-306.7	-314.5
Net income	\$ 115.8	\$ 120.6	\$ 200.1	\$ 297.4	\$ 404.9	\$ 448.7	\$ 460.0	\$ 471.7
Balance Sheet								
Cash balance	\$ 50.0	\$ 55.0	\$ 82.5	\$ 115.5	\$ 150.2	\$ 165.2	\$ 170.1	\$ 175.2
Accounts receivable	166.7	183.3	275.0	385.0	500.5	550.6	567.1	584.1
Inventory	118.6	130.5	195.7	274.0	356.2	391.8	403.6	415.7
Total current assets	\$ 335.3	\$ 368.8	\$ 553.2	\$ 774.5	\$1,006.8	\$1,107.5	\$1,140.7	\$1,175.0
Land	1,550.0	1,825.0	2,155.0	2,501.5	2,651.7	2,701.2	2,752.2	2,804.8
Total assets	\$1,885.3	\$2,193.8	\$2,708.2	\$3,276.0	\$3,658.5	\$3,808.7	\$3,893.0	\$3,979.8
Accounts payable	\$ 50.8	\$ 55.9	\$ 83.9	\$ 117.4	\$ 152.7	\$ 167.9	\$ 173.0	\$ 178.1
Other current operating liabilities	35.0	38.5	57.8	80.9	105.1	115.6	119.1	122.7
Total current liabilities	\$ 85.8	\$ 94.4	\$ 141.6	\$ 198.3	\$ 257.8	\$ 283.5	\$ 292.0	\$ 300.8
Debt	1,200.0	1,400.0	1,600.0	1,700.0	1,800.0	1,900.0	2,000.0	2,100.0
Total liabilities	\$1,285.8	\$1,494.4	\$1,741.6	\$1,898.3	\$2,057.8	\$2,183.5	\$2,292.0	\$2,400.8
Common stock	\$ 383.6	\$ 383.6	\$ 450.7	\$ 564.5	\$ 564.5	\$ 564.5	\$ 564.5	\$ 564.5
Retained earnings	215.8	315.7	515.8	813.3	1,036.3	1,060.7	1,036.5	1,014.5
Total shareholders equity	\$ 599.4	\$ 699.4	\$ 966.6	\$1,377.7	\$1,600.7	\$1,625.2	\$1,600.9	\$1,579.0
Total liabilities and equities	\$1,885.3	\$2,193.8	\$2,708.2	\$3,276.0	\$3,658.5	\$3,808.7	\$3,893.0	\$3,979.8

Exhibit may contain small rounding errors

SOLUTIONS FOR REVIEW EXERCISES

Solution for Review Exercise 1.1: The Market Value Company Economic Balance Sheet

We have sufficient information to value the claims on the company's resources. The company's share price is \$12.08 and it has 1,200 shares outstanding or an equity value of \$14,496. Its debt is trading at a premium indicating that its market value is equal to 102% of its book value or \$5,304. The resulting value of the firm is \$19,800. From that amount we subtract the value of the excess asset, land valued at \$3,000, and the value created from debt financing, \$3,800, to measure the value of the unlevered operations, \$13,000.

THE MARKET VALUE COMPANY Economic Balance Sheet	
Economic Balance Sheet—Resources/Assets	
Value of the unlevered business operations without excess assets	\$13,000.0
Value of the excess assets	3,000.0
Value of the unlevered firm	<u>\$16,000.0</u>
Value created from financing	3,800.0
Value of the firm	<u><u>\$19,800.0</u></u>
Economic Balance Sheet—Claims on Resources	
Value of debt	\$ 5,304.0
Value of equity	<u>14,496.0</u>
Value of securities issued	<u><u>\$19,800.0</u></u>

Solution for Review Exercise 1.2: The Market Value Company Unlevered Free Cash Flow

We show the calculation of the unlevered free cash flow below. Notice that the unlevered free cash flow is negative. The negative free cash flow occurred not because the company was unprofitable but because the company invested more cash than it generated. Note that the Capital Expenditures equal the change in the Net Property, Plant, and Equipment plus the Depreciation Expense for the Year.

THE MARKET VALUE COMPANY Free Cash Flow Forecasts	
Earnings before interest and taxes (EBIT)	\$1,621.0
– Income taxes paid on EBIT	<u>–616.0</u>
Earnings before interest and after taxes	\$1,005.0
+ Depreciation	500.0
– Change in accounts receivable	–57.1
– Change in inventory	–28.7
+ Change in accounts payable	12.3
+ Change in current other liabilities	12.0
– Change in required cash balance	<u>–17.1</u>
Unlevered cash flow from operations	\$1,426.4
– Capital expenditures	<u>1,528.1</u>
Unlevered free cash flow	<u><u>–\$ 101.7</u></u>

$$\text{Income taxes paid on EBIT} = 0.38 \times \$1,621 = \$616$$

$$\text{CAPEX} = \Delta \text{Net PPE} + \text{Depreciation} = \$1,028.1 + \$500.0 = \$1,528.1$$

Solution for Review Exercise 1.3: Valuation of Unlevered Free Cash Flows

We show the calculation of the value of the unlevered free cash flows below.

Cost of capital	12.0%				
Growth rate for free cash flow for continuing value	2.0%				
(\$ in millions)	Year 0	Year 1	Year 2	Year 3	CV _{Firm} Year 3
Unlevered free cash flow for continuing value (CV)					\$ 123.22
Discount factor for continuing value					10.000
Unlevered free cash flow and CV		\$100.20	\$114.00	\$120.80	\$1,232.16
Discount factor		0.893	0.797	0.712	0.712
Present value		<u>\$ 89.46</u>	<u>\$ 90.88</u>	<u>\$ 85.98</u>	<u>\$ 877.03</u>
Value of the firm	<u>\$1,143.35</u>				
FCF g = 13.8% 6.0% 2.0%					

Exhibit may contain small rounding errors

$$FCF_4 = FCF_3 \times (1 + g) = \$120.80 \times 1.02 = \$123.22$$