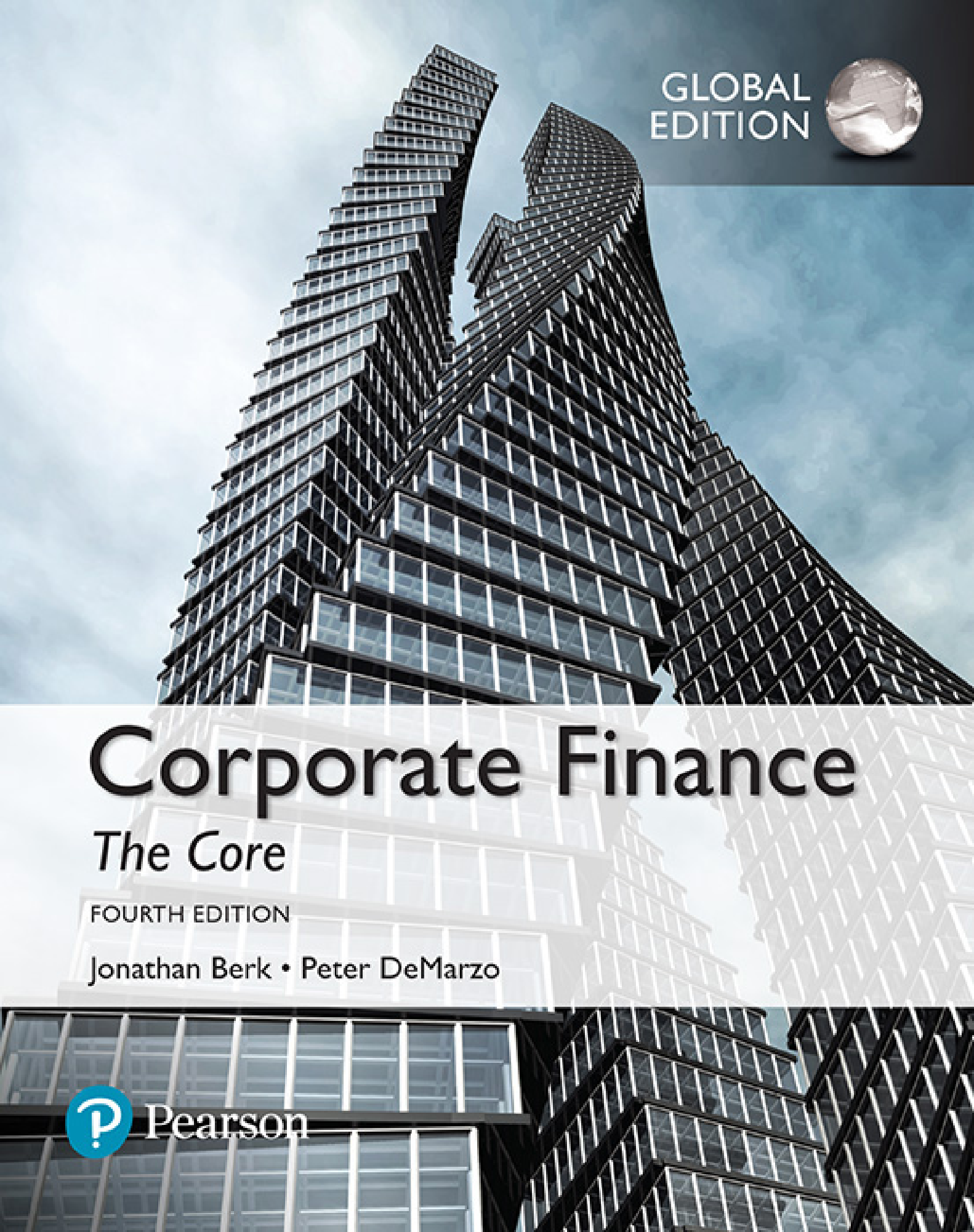


Corporate Finance

The Core

FOURTH EDITION

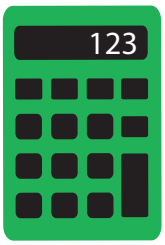
Jonathan Berk • Peter DeMarzo

Pearson

with MyFinanceLab™

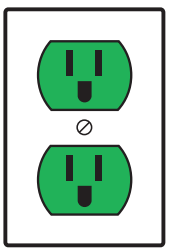
- **Worked Solutions**—Provide step-by-step explanations on how to solve select problems using the exact numbers and data that were presented in the problem. Instructors will have access to the Worked Solutions in preview and review mode.

- **Algorithmic Test Bank**—Instructors have the ability to create multiple versions of a test or extra practice for students.



- **Financial Calculator**—The Financial Calculator is available as a smartphone application, as well as on a computer, and includes important functions such as cash flow, net present value, and internal rate of return. Fifteen helpful tutorial videos show the many ways to use the Financial Calculator in MyFinanceLab.

- **Reporting Dashboard**—View, analyze, and report learning outcomes clearly and easily. Available via the Gradebook and fully mobile-ready, the Reporting Dashboard presents student performance data at the class, section, and program levels in an accessible, visual manner.



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- **Mobile Ready**—Students and instructors can access multimedia resources and complete assessments right at their fingertips, on any mobile device.

COMMON SYMBOLS AND NOTATION

A	market value of assets, premerger total value of acquirer
APR	annual percentage rate
B	risk-free investment in the replicating portfolio
C	cash flow, call option price
$Corr(R_i, R_j)$	correlation between returns of i and j
$Cov(R_i, R_j)$	covariance between returns of i and j
CPN	coupon payment
D	market value of debt
d	debt-to-value ratio
Div_t	dividends paid in year t
dis	discount from face value
E	market value of equity
EAR	effective annual rate
$EBIT$	earnings before interest and taxes
$EBITDA$	earnings before interest, taxes, depreciation, and amortization
EPS_t	earnings per share on date t
$E[R_i]$	expected return of security i
F, F_T	one-year and T-year forward exchange rate
FCF_t	free cash flow at date t
FV	future value, face value of a bond
g	growth rate
I	initial investment or initial capital committed to the project
Int_t	interest expense on date t
IRR	internal rate of return
K	strike price
k	interest coverage ratio, compounding periods per year
L	lease payment, market value of liabilities
ln	natural logarithm
MV_i	total market capitalization of security i
N	number of cash flows, terminal date, notational principal of a swap contract
N_i	number of shares outstanding of security i
$NPER$	annuity spreadsheet notation for the number of periods or dates of the last cash flow
NPV	net present value
P	price, initial principal or deposit, or equivalent present value, put option price
P_i	price of security i
P/E	price-earnings ratio
PMT	annuity spreadsheet notation for cash flow
PV	present value; annuity spreadsheet notation for the initial amount
q	dividend yield
p	risk-neutral probability
r	interest rate, discount rate of cost of capital
R_i	return of security i
R_{mkt}	return of the market portfolio
R_P	return on portfolio P
RATE	annuity spreadsheet notation for interest rate
r_E, r_D	equity and debt costs of capital
r_f	risk-free interest rate
r_i	required return or cost of capital of security i
r_U	unlevered cost of capital
r_{wacc}	weighted average cost of capital
S	stock price, spot exchange rate, value of all synergies
$SD(R_i)$	standard deviation (volatility) of return of security i
T	option expiration date, maturity date, market value of target
U	market value of unlevered equity
V_t	enterprise value on date t
$Var(R)$	variance of return R
x_i	portfolio weight of investment in i
YTC	yield to call on a callable bond
YTM	yield to maturity
α_i	alpha of security i
β_D, β_E	beta of debt or equity
β_i	beta of security i with respect to the market portfolio
β_s^P	beta of security i with respect to portfolio P
β_U	beta of unlevered firm
Δ	shares of stock in the replicating portfolio; sensitivity of option price to stock price
σ	volatility
τ	tax rate
τ_c	marginal corporate tax rate

CORPORATE FINANCE:
THE CORE

FOURTH EDITION

GLOBAL EDITION

The Pearson Series in Finance

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CORPORATE FINANCE: THE CORE

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To Rebecca, Natasha, and Hannah, for the love and for being there —J. B.

To Kaui, Pono, Koa, and Kai, for all the love and laughter —P. D.

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Brief Contents

Detailed Contents

PART 4 RISK AND RETURN

Bridging Theory and Practice

GLOBAL FINANCIAL CRISIS European Sovereign Debt Yields: A Puzzle

Before the EMU created the euro as a single European currency, the yields of sovereign debt issued by European countries varied widely. These variations primarily reflected differences in inflation expectations and currency risk (see Figure 6.6). However, after the monetary union was put in place at the end of 1998, the yields all essentially converged to the yield on German government bonds. Investors seemed to conclude that there was little distinction between the debt of the European countries in the union—they seemed to feel that all countries in the union were essentially exposed to the same default, inflation and currency risk and thus equally "safe."

Presumably, investors believed that an outright default was unthinkable: They apparently believed that member countries would be fiscally responsible and manage their debt obligations to avoid default at all costs. But as illustrated by Figure 6.6, once the 2008 financial crisis revealed the folly of this assumption, debt yields once again diverged as investors acknowledged the likelihood that some countries (particularly Portugal and Ireland) might be unable to repay their debt and would be forced to default.

In retrospect, rather than bringing fiscal responsibility, the monetary union allowed the weaker member countries to borrow at dramatically lower rates. In response, these countries reacted by increasing their borrowing—and at least in Greece's case, borrowed to the point that default became inevitable.

Focus on the Financial Crisis and Sovereign Debt Crisis

Global Financial Crisis boxes reflect the reality of the recent financial crisis and ongoing sovereign debt crisis, noting lessons learned. Fifteen boxes across the book illustrate and analyze key details.

The Law of One Price as the Unifying Valuation Framework

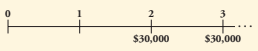
The Law of One Price framework reflects the modern idea that the absence of arbitrage is the unifying concept of valuation. This critical insight is introduced in Chapter 3, revisited in each part opener, and integrated throughout the text—motivating all major concepts and connecting theory to practice.

COMMON MISTAKE Discounting One Too Many Times

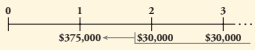
The perpetuity formula assumes that the first payment occurs at the end of the first period (at date 1). Sometimes perpetuities have cash flows that start later in the future. In this case, we can adapt the perpetuity formula to compute the present value, but we need to do so carefully to avoid a common mistake.

To illustrate, consider the MBA graduation party described in Example 4.7. Rather than starting immediately, suppose that the first party will be held two years from today (for the current entering class). How would this delay change the amount of the donation required?

Now the timeline looks like this:



We need to determine the present value of these cash flows, as it tells us the amount of money in the bank needed today to finance the future parties. We cannot apply the perpetuity formula directly, however, because these cash flows are not *exactly* a perpetuity as we defined it. Specifically, the cash flow in the first period is "missing." But consider the situation on date 1—at that point, the first party is one period away and then the cash flows are periodic. From the perspective of date 1, this *is* a perpetuity, and we can apply the formula. From the preceding calculation, we know we need $375,000 on date 1 to have enough to start the parties on date 2. We rewrite the timeline as follows:



Our goal can now be restated more simply: How much do we need to invest today to have $375,000 in one year? This is a simple present value calculation:

$$PV = \$375{,}000/1.08 = \$347{,}222 \text{ today}$$

A common mistake is to discount the $375,000 twice because the first party is in two periods. *Remember—the present value formula for the perpetuity already discounts the cash flows to one period prior to the first cash flow.* Keep in mind that this common mistake may be made with perpetuities, annuities, and all of the other special cases discussed in this section. All of these formulas discount the cash flows to one period prior to the first cash flow.

Study Aids with a Practical Focus

To be successful, students need to master the core concepts and learn to identify and solve problems that today's practitioners face.

Common Mistakes boxes alert students to frequently made mistakes stemming from misunderstanding core concepts and calculations—in the classroom and in the field.

Worked Examples accompany every important concept using a step-by-step procedure that guides students through the solution process. Clear labels make them easy to find for help with homework and studying.

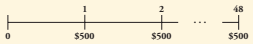
EXAMPLE 4.14 Evaluating an Annuity with Monthly Cash Flows

Problem

You are about to purchase a new car and have two options to pay for it. You can pay $20,000 in cash immediately, or you can get a loan that requires you to pay $500 each month for the next 48 months (four years). If the monthly interest rate you earn on your cash is 0.5%, which option should you take?

Solution

Let's start by writing down the timeline of the loan payments:



The timeline shows that the loan is a 48-period annuity. Using the annuity formula the present value is

$$PV(\text{48-period annuity of } \$500) = \$500 \times \frac{1}{0.005}\left(1 - \frac{1}{1.005^{48}}\right)$$

$$= \$21{,}290$$

Alternatively, we may use the annuity spreadsheet to solve the problem:

	NPER	RATE	PV	PMT	FV	Excel Formula
Given	48	0.50%		500	0	
Solve for PV			(21,290)			=–PV(0.005,48,500,0)

Thus, taking the loan is equivalent to paying $21,290 today, which is costlier than paying cash. You should pay cash for the car.

Applications that Reflect Real Practice

Corporate Finance: The Core features actual companies and leaders in the field.

Interviews with notable practitioners—four new for this edition—highlight leaders in the field and address the effects of the financial crisis.

General Interest boxes highlight timely material from financial publications that shed light on business problems and real-company practices.

INTERVIEW WITH
KEVIN M. WARSH

Kevin M. Warsh, a lecturer at Stanford's Graduate School of Business and a distinguished visiting fellow at the Hoover Institution, was a Federal Reserve governor from 2006 to 2011, serving as chief liaison to the financial markets.

QUESTION: *What are the main policy instruments used by central banks to control the economy?*

ANSWER: The Federal Reserve (Fed) deploys several policy tools to achieve its goals of price stability, maximum sustainable employment, and financial stability. Lowering the federal funds short-term interest rate, the primary policy instrument, stimulates the economy. Raising the federal funds rate generally slows the economy. Buying and selling short-term U.S. Treasury securities through *open market operations* is standard practice. Prior to the 2007–2009 financial crisis, the Fed's balance sheet ranged from $700–$900 billion. But when the Fed was unable to lower interest rates further because rates were so close to zero already, it resorted to large-scale, longer-term open market operations to increase liquidity in the financial system in the hopes of stimulating the economy further, thus growing its balance sheet significantly. With *open mouth operations*, the Fed's announcements of its intent to buy or sell assets indicates its desired degree of future policy accommodation, often prompting markets to react [illegible] interest rates immediately. The Fed's Le[illegible] clarity and confidence in the financial wherewithal of each other. One effective, innovative tool, the *Term Auction Facility (TAF)*, stimulated the economy by providing cheap and readily available term funding to banks, large and small, on the front lines of the economy, thus encouraging them to extend credit to businesses and consumers. After reducing the policy rate to near zero to help revive the economy, the Fed instituted two *Quantitative Easing (QE)* programs—special purchases of government and agency securities—to increase money supply, promote lending, and according to some proponents, increase prices of riskier assets.

The Fed also addressed the global financial crisis by establishing temporary *central bank liquidity swap lines* with the European Central Bank and other major central banks. Using this facility, a foreign central bank is able to obtain dollar funding for its customers by swapping Euros for dollars or another currency and agreeing to reverse the swap at a later date. The Fed does not take exchange rate risk, but it is subject to the credit risk of its central bank counterparty.

QUESTION: *What tools is the European Central Bank (ECB) using to address the sovereign debt crisis? How does its approach com[illegible] to the 2007–2009*

Teaching Students to Think Finance

With a consistency in presentation and an innovative set of learning aids, *Corporate Finance: The Core* simultaneously meets the needs of both future financial managers and non-financial managers. This textbook truly shows every student how to "think finance."

Simplified Presentation of Mathematics

One of the hardest parts of learning finance is mastering the jargon, math, and non-standardized notation. *Corporate Finance: The Core* systematically uses:

Notation Boxes: Each chapter opens by defining the variables and acronyms used in the chapter as a "legend" for students' reference.

Timelines: Introduced in Chapter 4, timelines are emphasized as the important first step in solving *every* problem that involves cash flows.

Numbered and Labeled Equations: The first time a full equation is given in notation form it is numbered. Key equations are titled and revisited in the chapter summary.

Using Excel Boxes: Provide hands-on instruction of Excel techniques and include screenshots to serve as a guide for students.

Spreadsheet Tables: Select tables are available as Excel files, enabling students to change inputs and manipulate the underlying calculations.

USING EXCEL

Excel's IRR Function

Excel also has a built-in function, IRR, that will calculate the IRR of a stream of cash flows. Excel's IRR function has the format, IRR (values, guess), where "values" is the range containing the cash flows, and "guess" is an optional starting guess where Excel begins its search for an IRR. See the example below:

	A	B	C	D	E
1	Period	0	1	2	3
2	Cash Flow C_t	(1,000.0)	300.0	400.0	500.0
3	IRR	8.9% =IRR(B2:E2)			

There are three things to note about the IRR function. First, the values given to the IRR function should include all of the cash flows of the project, including the one at date 0. In this sense, the IRR and NPV functions in Excel are inconsistent. Second, like the NPV function, the IRR ignores the period associated with any blank cells. Finally, as we will discuss in Chapter 7, in some settings the IRR function may fail to find a solution, or may give a different answer, depending on the initial guess.

TABLE 8.1 SPREADSHEET HomeNet's Incremental Earnings Forecast

	Year	0	1	2	3	4	5
Incremental Earnings Forecast ($000s)							
1	Sales	—	26,000	26,000	26,000	26,000	—
2	Cost of Goods Sold	—	(11,000)	(11,000)	(11,000)	(11,000)	—
3	**Gross Profit**	—	15,000	15,000	15,000	15,000	—
4	Selling, General, and Administrative	—	(2,800)	(2,800)	(2,800)	(2,800)	—
5	Research and Development	(15,000)	—	—	—	—	—
6	Depreciation	—	(1,500)	(1,500)	(1,500)	(1,500)	(1,500)
7	**EBIT**	(15,000)	10,700	10,700	10,700	10,700	(1,500)
8	Income Tax at 40%	6,000	(4,280)	(4,280)	(4,280)	(4,280)	600
9	**Unlevered Net Income**	**(9,000)**	**6,420**	**6,420**	**6,420**	**6,420**	**(900)**

Practice Finance to Learn Finance

Working problems is the proven way to cement and demonstrate an understanding of finance.

Concept Check questions at the end of each section enable students to test their understanding and target areas in which they need further review.

End-of-chapter problems written personally by Jonathan Berk and Peter DeMarzo offer instructors the opportunity to assign first-rate materials to students for homework and practice with the confidence that the problems are consistent with chapter content. Both the problems and solutions, which also were written by the authors, have been class-tested and accuracy-checked to ensure quality.

Data Cases present in-depth scenarios in a business setting with questions designed to guide students' analysis. Many questions involve the use of Internet resources and Excel techniques.

Data Case

This is your second interview with a prestigious brokerage firm for a job as an equity analyst. You survived the morning interviews with the department manager and the Vice President of Equity. Everything has gone so well that they want to test your ability as an analyst. You are seated in a room with a computer and a list with the names of two companies—Ford (F) and Microsoft (MSFT). You have 90 minutes to complete the following tasks:

1. Download the annual income statements, balance sheets, and cash flow statements for the last four fiscal years from MarketWatch (www.morningstar.com). Enter each company's stock symbol and then go to "financials." Export the statements to Excel by clicking the export button.
2. Find historical stock prices for each firm from Yahoo! Finance (finance.yahoo.com). Enter your stock symbol, click "Historical Prices" in the left column, and enter the proper date range to cover the last day of the month corresponding to the date of each financial statement. Use the closing stock prices (not the adjusted close). To calculate the firm's market capitalization at each date, multiply the number of shares outstanding (see "Basic" on the income statement under "Weighted Average Shares Outstanding") by the firm's historic stock price.
3. For each of the four years of statements, compute the following ratios for each firm:

Valuation Ratios
Price-Earnings Ratio (for EPS use Diluted EPS Total)
Market-to-Book Ratio
Enterprise Value-to-EBITDA
(For debt, include long-term and short-term debt; for cash, include marketable securities.)

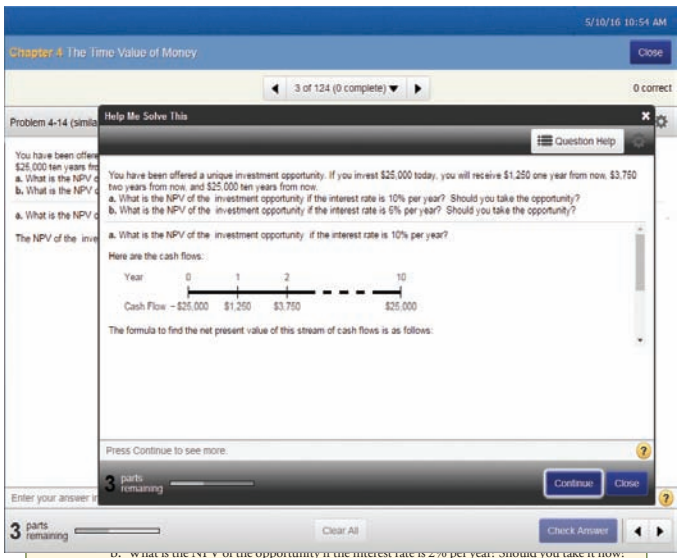
Profitability Ratios
Operating Margin
Net Profit Margin

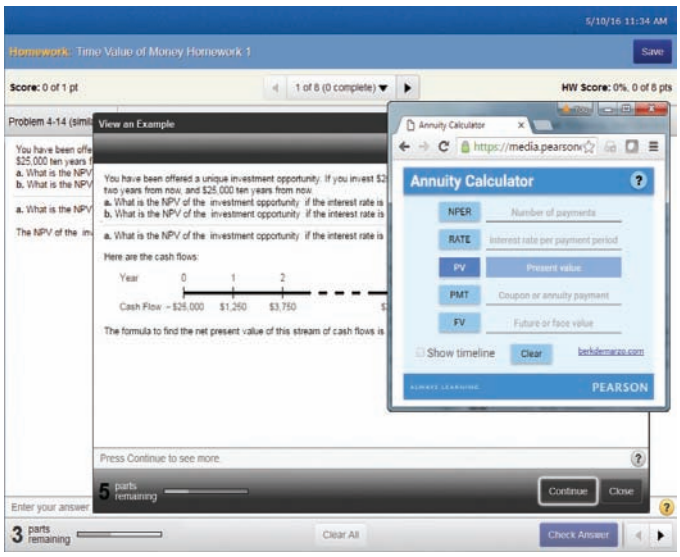
MyFinanceLab

Because practice with homework problems is crucial to learning finance, *Corporate Finance: The Core* is available with MyFinanceLab, a fully integrated homework and tutorial system. MyFinanceLab revolutionizes homework and practice with material written and developed by Jonathan Berk and Peter DeMarzo.

Online Assessment Using End-of-Chapter Problems

The seamless integration among the textbook, assessment materials, and online resources sets a new standard in corporate finance education.





- **End-of-chapter problems**—every single one—appear online. The values in the problems are algorithmically generated, giving students many opportunities for practice and mastery. Problems can be assigned by professors and completed online by students.
- **Helpful tutorial tools,** along with the same pedagogical aids from the text, support students as they study. Links to the eText direct students right to the material they most need to review.
- **Interactive Figures—**Select in-text graphs and figures—covering topics such as bonds, stock valuation, NPV, and IRR—have been digitally enhanced to allow students to interact with variables to affect outcomes and bring concepts to life.

Additional Resources in MyFinanceLab

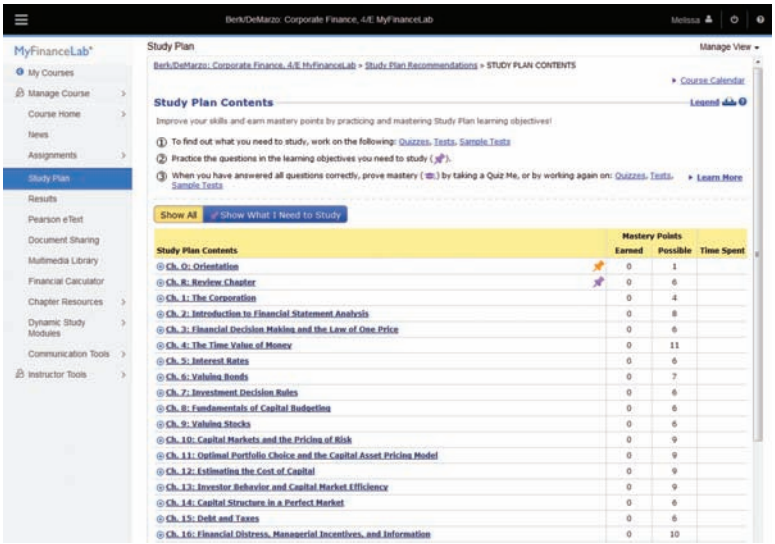
- **Video clips** profile high-profile firms such as Boeing, Cisco, Delta, and Intel through interviews and analysis. The videos focus on core topical areas, including capital budgeting, mergers and acquisitions, and risk and return.
- **Auto-Graded Excel Projects—**Using proven, field-tested technology, MyFinanceLab's new auto-graded Excel Projects allow instructors to seamlessly integrate Excel content into their course.
- **Finance in the News** provides weekly postings of a relevant and current article from a newspaper or journal article with discussion questions that are assignable in MyFinanceLab.
- Live **news and video feeds** from *The Financial Times* and ABC News provide real-time news updates.
- **Author Solution Videos** walk through the in-text examples using math, the financial calculator, and spreadsheets.

To learn more about MyFinanceLab, visit www.myfinancelab.com.

Hands-On Practice, Hands-Off Grading

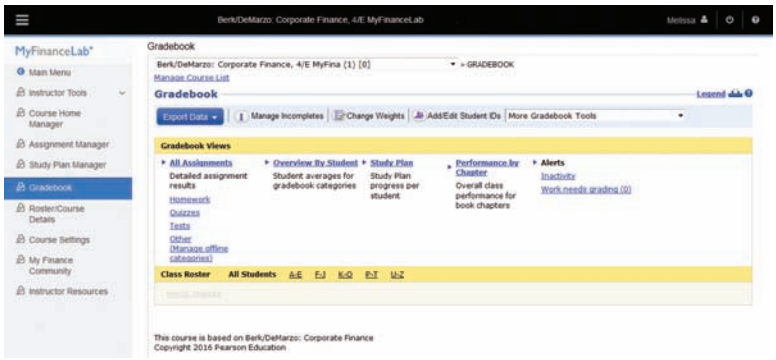
Hands-On, Targeted Practice

Students can take pre-built Practice Tests for each chapter, and their test results will generate an individualized Study Plan. With the Study Plan, students learn to focus their energies on the topics they need to be successful in class, on exams, and, ultimately, in their careers.



Powerful Instructor Tools

MyFinanceLab provides flexible tools that enable instructors to easily customize the online course materials to suit their needs.



- **Easy-to-Use Homework Manager.** Instructors can easily create and assign tests, quizzes, or graded homework assignments. In addition to pre-built MyFinanceLab questions, the Test Bank is also available so that instructors have ample material with which to create assignments.
- **Flexible Gradebook.** MyFinanceLab saves time by automatically grading students' work and tracking results in an online Gradebook.
- **Downloadable Classroom Resources.** Instructors also have access to online versions of each instructor supplement, including the Instructor's Manual, Solutions Manual, PowerPoint Lecture Notes, and Test Bank.

To learn more about MyFinanceLab, visit www.myfinancelab.com.

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Jonathan Berk is the A.P. Giannini Professor of Finance at the Graduate School of Business, Stanford University and is a Research Associate at the National Bureau of Economic Research. Before coming to Stanford, he was the Sylvan Coleman Professor of Finance at Haas School of Business at the University of California, Berkeley. Prior to earning his Ph.D., he worked as an Associate at Goldman Sachs (where his education in finance really began).

Professor Berk's research interests in finance include corporate valuation, capital structure, mutual funds, asset pricing, experimental economics, and labor economics. His work has won a number of research awards including the TIAA-CREF Paul A. Samuelson Award, the Smith Breeden Prize, Best Paper of the Year in *The Review of Financial Studies*, and the FAME Research Prize. His paper, "A Critique of Size-Related Anomalies," was selected as one of the two best papers ever published in *The Review of Financial Studies*. In recognition of his influence on the practice of finance he has received the Bernstein-Fabozzi/Jacobs Levy Award, the Graham and Dodd Award of Excellence, and the Roger F. Murray Prize. He served two terms as an Associate Editor of the *Journal of Finance*, and a term as a director of the American Finance Association, the Western Finance Association, and academic director of the Financial Management Association. He is a Fellow of the Financial Management Association and a member of the advisory board of the *Journal of Portfolio Management*.

Peter DeMarzo and Jonathan Berk

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Professor DeMarzo received the Sloan Teaching Excellence Award at Stanford and the Earl F. Cheit Outstanding Teaching Award at U.C. Berkeley. Professor DeMarzo has served as an Associate Editor for *The Review of Financial Studies, Financial Management,* and the *B.E. Journals in Economic Analysis and Policy,* as well as a director of the American Finance Association. He has served as Vice President and President of the Western Finance Association. Professor DeMarzo's research is in the area of corporate finance, asset securitization, and contracting, as well as market structure and regulation. His recent work has examined issues of the optimal design of contracts and securities, leverage dynamics and the role of bank capital regulation, and the influence of information asymmetries on stock prices and corporate investment. He has received numerous awards including the Western Finance Association Corporate Finance Award and the Barclays Global Investors/Michael Brennan best-paper award from *The Review of Financial Studies.*

Professor DeMarzo was born in Whitestone, New York, and is married with three boys. He and his family enjoy hiking, biking, and skiing.

Preface

WE WERE MOTIVATED TO WRITE THIS TEXTBOOK BY A CENTRAL insight: The core concepts in finance are simple and intuitive. What makes the subject challenging is that it is often difficult for a novice to distinguish between these core ideas and other intuitively appealing approaches that, if used in financial decision making, will lead to incorrect decisions. De-emphasizing the core concepts that underlie finance strips students of the essential intellectual tools they need to differentiate between good and bad decision making.

We present corporate finance as an application of a set of simple, powerful ideas. At the heart is the principal of the absence of arbitrage opportunities, or Law of One Price—*in life, you don't get something for nothing*. This simple concept is a powerful and important tool in financial decision making. By relying on it, and the other core principles in this book, financial decision makers can avoid the bad decisions brought to light by the recent financial crisis. We use the Law of One Price as a compass; it keeps financial decision makers on the right track and is the backbone of the entire book.

New to This Edition

We have updated all text discussions and figures, tables, data cases, and facts to accurately reflect developments in the field in the last four years. Specific highlights include the following:

- Addressed the implications of negative interest rates throughout the book.
- Expanded coverage of the European debt crisis in Chapter 6 (Valuing Bonds) including a case study on the Greek default.
- Added material throughout Part 5 (Capital Structure) that relates the capital structure to the current debate on bank leverage.
- Added coverage in Chapter 1 (The Corporation) describing the ongoing changes to how stocks are traded worldwide.
- Expanded the explanation of key financial ratios in Chapter 2 (Introduction to Financial Statement Analysis) and index arbitrage in Chapter 3 (Financial Decision Making and the Law of One Price).
- Updated the coverage in Chapter 13 (Investor Behavior and Capital Market Efficiency) to reflect recent developments in asset pricing.
- Four new practitioner interviews incorporate timely perspectives from leaders in the field related to the recent financial crisis and ongoing European sovereign debt crisis.
- Added Nobel Prize boxes to reflect the recent Nobel Prizes awarded for material covered in the book.
- Added a new Case Study, two new Data Cases, new problems and refined many others, once again personally writing and solving each one. In addition, every single problem is available in MyFinanceLab, the groundbreaking homework and tutorial system that accompanies the book.

The Law of One Price as a Unifying Principle of Valuation

This book presents corporate finance as an application of a small set of simple core ideas. Modern finance theory and practice is grounded in the idea of the absence of arbitrage—or

the Law of One Price—as the unifying concept in valuation. We introduce the Law of One Price concept as the basis for NPV and the time value of money in Chapter 3, *Financial Decision Making and the Law of One Price.* In the opening of each part and as pertinent throughout the remaining chapters, we relate major concepts to the Law of One Price, creating a framework to ground the student reader and connect theory to practice.

Table of Contents Overview

Corporate Finance: The Core offers coverage of the major topical areas for introductory-level MBA students as well as the depth required in a reference textbook for upper-division courses. Most professors customize their classes by selecting a subset of chapters reflecting the subject matter they consider most important. We designed this book from the outset with this need for flexibility in mind. Parts 2 through 6 are the core chapters in the book. We envision that most MBA programs will cover this material—yet even within these core chapters instructors can pick and choose.

Single quarter course: Cover Chapters 3–15; if time allows, or students are previously familiar with the time value of money, add on Chapters 16–19.

Semester-long course: For a semester-long course, or a course desiring coverage of financial and real options, venture capital and equity financing, long and short-term debt financing, mergers and acquisitions, corporate governance, risk management or international capital budgeting, *Corporate Finance* is the appropriate text to use.

Single mini-semester: Assign Chapters 3–10, 14, and 15 if time allows.

Chapter	Highlights and Changes
1 The Corporation	Introduces the corporation and its governance; updated the Dodd-Frank Act information; new interview with M. Hatheway, NASDAQ
2 Introduction to Financial Statement Analysis	Introduces key financial statements; coverage of financial ratios is centralized to prepare students to analyze financial statements holistically; new interview with Ruth Porat, Google
3 Financial Decision Making and the Law of One Price	Introduces the Law of One Price and net present value as the basis of the book's unifying framework; new box on dynamics of stock index arbitrage and high-frequency trading
4 The Time Value of Money	Introduces the mechanics of discounting with applications to personal finance; Using Excel boxes familiarizes students with spreadsheet functionality; new box on an annuity due
5 Interest Rates	Discusses key determinants of interest rates and their relation to the cost of capital; new Data Case on Florida's pension plan liability
6 Valuing Bonds	Analyzes bond prices and yields, as well as the risk of fixed-income securities as illustrated by the sovereign debt crisis; expanded Global Financial Crisis box on negative bond yields; new Case Study on Greek default
7 Investment Decision Rules	Introduces the NPV rule as the "golden rule" against which we evaluate other investment decision rules; new Data Case using NPV rule to choose between mortgage loans; introduces the use of Data Tables for sensitivity analysis
8 Fundamentals of Capital Budgeting	Provides a clear focus on the distinction between earnings and free cash flow, and shows how to build a financial model to assess the NPV of an investment decision; new Common Mistake box on the sunk cost fallacy

Chapter	Highlights and Changes
9 Valuing Stocks	Provides a unifying treatment of projects within the firm and the valuation of the firm as a whole
10 Capital Markets and the Pricing of Risk	Establishes the intuition for understanding risk and return, explains the distinction between diversifiable and systematic risk, and introduces beta and the CAPM; extensive data updates throughout to reflect current market conditions
11 Optimal Portfolio Choice and the Capital Asset Pricing Model	Presents the CAPM and develops the details of mean-variance portfolio optimization; updated examples and Data Case
12 Estimating the Cost of Capital	Demonstrates the practical details of estimating the cost of capital for equity, debt, or a project, and introduces asset betas, and the unlevered and weighted-average cost of capital; new Common Mistake box on using a single cost of capital in multidivisional firms; new Using Excel box on estimating beta
13 Investor Behavior and Capital Market Efficiency	Examines the role of behavioral finance and ties investor behavior to the topic of market efficiency and alternative models of risk and return; expanded discussion of fund manager performance; updated interview with Jonathan Clements, former columnist at WSJ
14 Capital Structure in a Perfect Market	Presents Modigliani and Miller's results and introduces the market value balance sheet, discussion of important leverage fallacies with application to bank capital regulation
15 Debt and Taxes	Analyzes the tax benefits of leverage, including the debt tax shield and the after-tax WACC; new box on the repatriation tax controversy
16 Financial Distress, Managerial Incentives, and Information	Examines the role of asymmetric information and introduces the debt overhang and leverage ratchet effect
17 Payout Policy	Considers alternative payout policies including dividends and share repurchases; analyzes the role of market imperfections in determining the firm's payout policy; updated discussion of corporate cash retention
18 Capital Budgeting and Valuation with Leverage	Develops in depth the three main methods for capital budgeting with leverage and market imperfections: the weighted average cost of capital (WACC) method, the adjusted present value (APV) method, and the flow-to-equity (FTE) method; new interview with Zane Rowe, VMware; new appendix explaining the relation between DCF and residual income valuation methods
19 Valuation and Financial Modeling: A Case Study	Builds a financial model for a leveraged acquisition; new Using Excel box "Summarizing Model Outputs"

A Complete Instructor and Student Support Package

MyFinanceLab

A critical component of the text, MyFinanceLab will give all students the practice and tutorial help they need to succeed. For more details, see pages 20–21.

Instructor's Resource Center

The 'Instructor resources' link, accessible at www.pearsonglobaleditions.com/berk, hosts all of the instructor resources that follow. Instructors should click on the "IRC Help Center" link for easy-to-follow instructions on getting access or may contact their sales representative for further information.

Solutions Manual

- Prepared by Jonathan Berk and Peter DeMarzo.
- Provides detailed, accuracy-verified, class-tested solutions to every chapter Problem.
- See the Instructor's Resource Center for spreadsheet solutions to select chapter Problems and Data Cases.

Instructor's Manual

- Written by Janet Payne of Texas State University.
- Corresponding to each chapter, provides: chapter overview and outline correlated to the PowerPoint Lecture Notes; learning objectives; guide to fresh worked examples in the PowerPoint Lecture Notes; and listing of chapter problems with accompanying Excel spreadsheets.

Test Item File

- Revised by Janet Payne and William Chittenden of Texas State University.
- Provides a wide selection of multiple-choice, short answer, and essay questions qualified by difficulty level and skill type and correlated to chapter topics. Numerical-based Problems include step-by-step solutions.
- Available as Computerized Test Bank in TestGen.

PowerPoint Lecture Presentation

- Authored by William Chittenden of Texas State University.
- Offers outlines of each chapter with graphs, tables, key terms, and concepts from each chapter.
- Worked examples provide detailed, step-by-step solutions in the same format as the boxes from the text and correlated to parallel specific textbook examples.

Videos

- Profile well-known firms such as Boeing and Intel through interview and analysis.
- Focus on core topical areas such as capital budgeting and risk and return.
- Author Solution Videos that walk through the in-text examples using math, the financial calculator, and spreadsheets.
- Available in MyFinanceLab.

Acknowledgments

Looking back, it is hard to believe that this book is in its fourth edition. We are heartened by its success and impact on the profession through shaping future practitioners. As any textbook writer will tell you, achieving this level of success requires a substantial amount of help. First and foremost we thank Donna Battista, whose leadership, talent, and market savvy are imprinted on all aspects of the project and are central to its more than 10 years of success; Denise Clinton, a friend and a leader in fact not just in name, whose experience and knowledge were indispensable in the earliest stages; Rebecca Ferris-Caruso, for her unparalleled expertise in managing the complex writing, reviewing, and editing processes and patience in keeping us on track—it is impossible to imagine writing the first edition without her; Jami

Minard, for spearheading marketing efforts; Kate Fernandes, for her energy and fresh perspective as our new editor; Miguel Leonarte, for his central role on MyFinanceLab; Gillian Hall for getting the book from draft pages into print; and Paul Corey for his insightful leadership and unwavering support of this fourth edition. We were blessed to be approached by the best publisher in the business and we are both truly thankful for the indispensable help provided by these and other professionals, including Kathryn Brightney, Dottie Dennis, Meredith Gertz, Nancy Freihofer, Melissa Honig, and Carol Melville.

Updating a textbook like ours requires a lot of painstaking work, and there are many who have provided insights and input along the way. We would especially like to call out Jared Stanfield for his important contributions and suggestions throughout. We're also appreciative of Marlene Bellamy's work conducting the lively interviews that provide a critically important perspective, and to the interviewees who graciously provided their time and insights.

Of course, this fourth edition text is built upon the shoulders of the first three, and we have many to thank for helping us make those early versions a reality. We remain forever grateful for Jennifer Koski's critical insights, belief in this project, and tireless effort, all of which were critical to the first edition. Many of the later, non-core chapters required specific detailed knowledge. Nigel Barradale, Reid Click, Jarrad Harford, and Marianne Plunkert ensured that this knowledge was effectively communicated. Joseph Vu and Vance P. Lesseig contributed their talents to the Concept Check questions and Data Cases, respectively.

Creating a truly error-free text is a challenge we could not have lived up to without our team of expert error checkers; we owe particular thanks to Sukarnen Suwanto, Siddharth Bellur, Robert James, Anand Goel, Ian Drummond Gow, Janet Payne, and Jared Stanfield. Thomas Gilbert and Miguel Palacios tirelessly worked examples and problems in the first edition, while providing numerous insights along the way.

A corporate finance textbook is the product of the talents and hard work of many talented colleagues. We are especially gratified with the work of those who updated the impressive array of supplements to accompany the book: Janet Payne and William Chittenden, for the Instructor's Manual, Test Item File, and PowerPoint; and Sukarnen Suwanto, for his accuracy review of the Solutions Manual.

As a colleague of both of us, Mark Rubinstein inspired us with his passion to get the history of finance right by correctly attributing the important ideas to the people who first enunciated them. We have used his book, *A History of the Theory of Investments: My Annotated Bibliography,* extensively in this text and we, as well as the profession as a whole, owe him a debt of gratitude for taking the time to write it all down.

We could not have written this text if we were not once ourselves students of finance. As any student knows, the key to success is having a great teacher. In our case we are lucky to have been taught and advised by the people who helped create modern finance: Ken Arrow, Darrell Duffie, Mordecai Kurz, Stephen Ross, and Richard Roll. It was from them that we learned the importance of the core principles of finance, including the Law of One Price, on which this book is based. The learning process does not end at graduation and like most people we have had especially influential colleagues and mentors from which we learned a great deal during our careers and we would like to recognize them explicitly here: Mike Fishman, Richard Green, Vasant Naik, Art Raviv, Mark Rubinstein, Joe Williams, and Jeff Zwiebel. The passing of Rick last year was a loss we will feel forever. We continue to learn from all of our colleagues and we are grateful to all of them. Finally, we would like to thank those with whom we have taught finance classes over the years: Anat Admati, Ming Huang, Dirk Jenter, Robert Korajczyk, Paul Pfleiderer, Sergio Rebelo, Richard Stanton, and Raman Uppal. Their ideas and teaching strategies have without a doubt influenced our own sense of pedagogy and found their way into this text.

Finally, and most importantly, we owe our biggest debt of gratitude to our spouses, Rebecca Schwartz and Kaui Chun DeMarzo. Little did we (or they) know how much this project would impact our lives, and without their continued love and support—and especially their patience and understanding—this text could not have been completed. We owe a special thanks to Kaui DeMarzo, for her inspiration and support at the start of this project, and for her willingness to be our in-house editor, contributor, advisor, and overall sounding-board throughout each stage of its development.

Jonathan Berk
Peter DeMarzo

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We are truly thankful to have had so many manuscript reviewers, class testers, and focus group participants. We list all of these contributors below, but Gordon Bodnar, James Conover, Anand Goel, James Linck, Evgeny Lyandres, Marianne Plunkert, Mark Simonson, and Andy Terry went so far beyond the call of duty that we would like to single them out.

We are very grateful for all comments—both informal and in written evaluations—from Third Edition users. We carefully weighed each reviewer suggestion as we sought to streamline the narrative to improve clarity and add relevant new material. The book has benefited enormously for this input.

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PART

1

Introduction

WHY STUDY CORPORATE FINANCE? No matter what your role in a corporation, an understanding of why and how financial decisions are made is essential. The focus of this book is how to make optimal corporate financial decisions. In this part of the book, we lay the foundation for our study of corporate finance. We begin, in Chapter 1, by introducing the corporation and related business forms. We then examine the role of financial managers and outside investors in decision making for the firm. To make optimal decisions, a decision maker needs information. As a result, in Chapter 2, we review an important source of information for corporate decision-making—the firm's financial statements.

We then introduce the most important idea in this book, the concept of *the absence of arbitrage* or *Law of One Price* in Chapter 3. The Law of One Price allows us to use market prices to determine the value of an investment opportunity to the firm. We will demonstrate that the Law of One Price is the one unifying principle that underlies all of financial economics and links all of the ideas throughout this book. We will return to this theme throughout our study of Corporate Finance.

CHAPTER

1 The Corporation

THE MODERN U.S. CORPORATION WAS BORN IN A COURTROOM in Washington, D.C., on February 2, 1819. On that day the U.S. Supreme Court established the legal precedent that the property of a corporation, like that of a person, is private and entitled to protection under the U.S. Constitution. Today, it is hard to entertain the possibility that a corporation's private property would not be protected under the Constitution. However, before the 1819 Supreme Court decision, the owners of a corporation were exposed to the possibility that the state could take their business. This concern was real enough to stop most businesses from incorporating and, indeed, in 1816 that concern was realized: The state seized Dartmouth College.

Dartmouth College was incorporated in 1769 as a private educational institution governed by a self-perpetuating board of trustees. Unhappy with the political leanings of the board, the state legislature effectively took control of Dartmouth by passing legislation in 1816 that established a governor-appointed board of overseers to run the school. The legislation had the effect of turning a private university under private control into a state university under state control. If such an act were constitutional, it implied that any state (or the federal government) could, at will, nationalize any corporation.

Dartmouth sued for its independence and the case made it to the Supreme Court under Chief Justice John Marshall in 1818. In a nearly unanimous 5–1 decision, the court struck down the New Hampshire law, ruling that a corporation was a "contract" and that, under Article 1 of the Constitution, "the state legislatures were forbidden to pass any law impairing the obligation of contracts."[1] The precedent was set: Owners of businesses could incorporate and still enjoy the protection of private property, as well as protection from seizure, both guaranteed by the U.S. Constitution. The modern business corporation was born.

[1]The full text of John Marshall's decision can be found at www.constitution.org/dwebster/dartmouth_decision.htm.

Today, the corporate structure is ubiquitous all over the world, and yet continues to evolve in the face of new forces. In 2008 the financial crisis once again transformed the financial landscape, bringing down giants like Bear Stearns, Lehman Brothers, and AIG and reshaping investment banks like Goldman Sachs into government-guaranteed commercial banks. Government bailouts have provoked challenging questions regarding the role of the federal government in the control and management of private corporations. In the wake of the crisis, significant reforms of the regulation and oversight of financial markets were passed into law. Understanding the principles of corporate finance has never been more important to the practice of business than it is now, during this time of great change.

The focus of this book is on how people in corporations make financial decisions. This chapter introduces the corporation and explains alternative business organizational forms. A key factor in the success of corporations is the ability to easily trade ownership shares, and so we will also explain the role of stock markets in facilitating trading among investors in a corporation and the implications that has for the ownership and control of corporations.

1.1 The Four Types of Firms

We begin our study of corporate finance by introducing the four major types of firms: *sole proprietorships*, *partnerships*, *limited liability companies*, and *corporations*. We explain each organizational form in turn, but our primary focus is on the most important form—the corporation. In addition to describing what a corporation is, we also provide an overview of why corporations are so successful.

Sole Proprietorships

A **sole proprietorship** is a business owned and run by one person. Sole proprietorships are usually very small with few, if any, employees. Although they do not account for much sales revenue in the economy, they are the most common type of firm in the world, as shown in Figure 1.1. Statistics indicate that nearly 72% of businesses in the United States are sole proprietorships, although they generate only 4% of the revenue.[2] Contrast this with corporations, which make up under 18% of firms but are responsible for 83% of U.S. revenue.

Sole proprietorships share the following key characteristics:

1. Sole proprietorships are straightforward to set up. Consequently, many new businesses use this organizational form.
2. The principal limitation of a sole proprietorship is that there is no separation between the firm and the owner—the firm can have only one owner. If there are other investors, they cannot hold an ownership stake in the firm.
3. The owner has unlimited personal liability for any of the firm's debts. That is, if the firm defaults on any debt payment, the lender can (and will) require the owner to repay the loan from personal assets. An owner who cannot afford to repay the loan must declare personal bankruptcy.

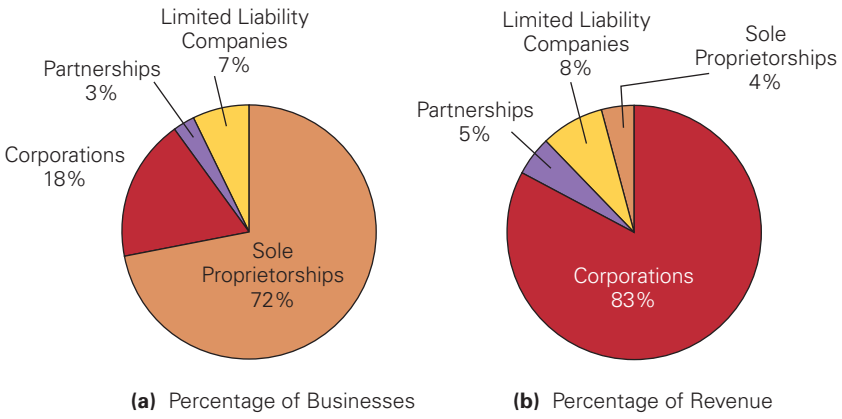
[2] www.irs.gov (www.irs.gov/uac/SOI-Tax-Stats-Integrated-Business-Data)

FIGURE 1.1

Types of U.S. Firms

There are four different types of firms in the United States. As (a) and (b) show, although the majority of U.S. firms are sole proprietorships, they generate only a small fraction of total revenue, in contrast to corporations.

Source: www.irs.gov



(a) Percentage of Businesses **(b)** Percentage of Revenue

4. The life of a sole proprietorship is limited to the life of the owner. It is also difficult to transfer ownership of a sole proprietorship.

For most businesses, the disadvantages of a sole proprietorship outweigh the advantages. As soon as the firm reaches the point at which it can borrow without the owner agreeing to be personally liable, the owners typically convert the business into a form that limits the owner's liability.

Partnerships

A **partnership** is identical to a sole proprietorship except it has more than one owner. The following are key features of a partnership:

1. *All* partners are liable for the firm's debt. That is, a lender can require *any* partner to repay all the firm's outstanding debts.
2. The partnership ends on the death or withdrawal of any single partner, although partners can avoid liquidation if the partnership agreement provides for alternatives such as a buyout of a deceased or withdrawn partner.

Some old and established businesses remain partnerships or sole proprietorships. Often these firms are the types of businesses in which the owners' personal reputations are the basis for the businesses. For example, law firms, groups of doctors, and accounting firms are often organized as partnerships. For such enterprises, the partners' personal liability increases the confidence of the firm's clients that the partners will strive to maintain their reputation.

A **limited partnership** is a partnership with two kinds of owners, general partners and limited partners. General partners have the same rights and privileges as partners in a (general) partnership—they are personally liable for the firm's debt obligations. Limited partners, however, have **limited liability**—that is, their liability is limited to their investment. Their private property cannot be seized to pay off the firm's outstanding debts. Furthermore, the death or withdrawal of a limited partner does not dissolve the partnership, and a limited partner's interest is transferable. However, a limited partner has no management authority and cannot legally be involved in the managerial decision making for the business.