

Financial Theory and Corporate Policy

THIRD
EDITION

COPELAND/WESTON



Financial Theory and Corporate Policy / THIRD EDITION

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This book is dedicated to our wives, Casey and June, who have provided their loving support; and to the pioneers in the development of the modern theory of finance: Hirshleifer, Arrow, Debreu, Miller, Modigliani, Markowitz, Sharpe, Lintner, Jensen, Fama, Roll, Black, Scholes, Merton, Ross, and others cited in the pages that follow. Without their intellectual leadership this text could not exist.

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Preface

In this third edition we seek to build on our experiences and the suggestions of users of the two previous editions. The feedback that we have received from all sources confirms our original judgment that there is a need for a book like *Financial Theory and Corporate Policy*. Therefore, we will continue to emphasize our original objectives for the book. Primarily, our aim is to provide a bridge to the more theoretical articles and treatises on finance theory. For doctoral students the book provides a framework of conceptual knowledge, enabling the students to understand what the literature on financial theory is trying to do and how it all fits together. For MBAs it provides an in-depth experience with the subject of finance. Our aim here is to equip the MBA for his or her future development as a practicing executive. We seek to prepare the MBA for reading the significant literature of the past, present, and future. This will help the practicing financial executive keep up to date with developments in finance theory, particularly as they affect the financial executive's own thinking processes in making financial decisions.

As before, our emphasis is on setting forth clearly and succinctly the most important concepts in finance theory. We have given particular attention to testable propositions and to the literature that has developed empirical tests of important elements of finance theory. In addition, we have emphasized applications so that the nature and uses of finance theory can be better understood.

A. PURPOSE AND ORGANIZATION

Over the past 30 years a branch of applied microeconomics has been developed and specialized into what is known as modern finance theory. The historical demarcation point was roughly 1958, when Markowitz and Tobin were working on the theory of portfolio selection and Modigliani and Miller were working on capital structure and valuation. Prior to 1958, finance was largely a descriptive field of endeavor. Since then major theoretical thrusts have transformed the field into a positive science. As evidence of the changes that have taken place we need only look at the types of people who teach in the schools of business. Fifty years ago the faculty were drawn from the ranks of business and government. They were respected and experienced statesmen within their fields. Today, finance faculty are predominantly academicians in the traditional sense of the word. The majority of them have no business experience except for consulting. Their interest

and training is in developing theories to explain economic behavior, then testing them with the tools provided by statistics and econometrics. Anecdotal evidence and individual business experience have been superseded by the analytic approach of modern finance theory.

The rapid changes in the field of finance have profound implications for management education. As usual, the best students (and the best managers) possess rare intuition, initiative, common sense, strong reading and writing skills, and the ability to work well with others. But those with the greatest competitive advantage also have strong technical training in the analytical and quantitative skills of management. Modern finance theory emphasizes these skills. It is to the students and faculty who seek to employ them that this textbook is addressed.

The six seminal and internally consistent theories upon which modern finance is founded are: (1) utility theory, (2) state-preference theory, (3) mean-variance theory and the capital asset pricing model, (4) arbitrage pricing theory, (5) option pricing theory, and (6) the Modigliani-Miller theorems. They are discussed in Chapters 4 through 8 and in Chapter 13. Their common theme is "How do individuals and society allocate scarce resources through a price system based on the valuation of risky assets?" Utility theory establishes the basis of rational decision making in the face of risky alternatives. It focuses on the question "How do people make choices?" The objects of choice are described by state-preference theory, mean-variance portfolio theory, arbitrage pricing, and option pricing theory. When we combine the theory of choice with the objects of choice, we are able to determine how risky alternatives are valued. When correctly assigned, asset prices provide useful signals to the economy for the necessary task of resource allocation. Finally, the Modigliani-Miller theory asks the question "Does the method of financing have any effect on the value of assets, particularly the firm?" The answer to this question has important implications for the firm's choice of capital structure (debt-to-equity mix) and dividend policy.

It is important to keep in mind that what counts for a positive science is the development of theories that yield valid and meaningful predictions about observed phenomena. The critical first test is whether the hypothesis is consistent with the evidence at hand. Further testing involves deducing new facts capable of being observed but not previously known, then checking those deduced facts against additional empirical evidence. As students of finance, we must not only understand the theory, but also review the empirical evidence to determine which hypotheses have been validated. Consequently, every effort has been made to summarize the empirical evidence related to the theory of finance. Chapter 7 discusses empirical evidence on the capital asset pricing model and the arbitrage pricing theory. Chapter 8 includes studies of how alternative option pricing models perform. Chapter 9, newly added to this edition, discusses the theory and evidence on futures markets. Chapter 11 covers evidence on the efficient markets hypothesis. Chapter 14 reviews evidence on capital structure; Chapter 16 on dividend policy; Chapter 20 on mergers and acquisitions; and Chapter 22 on international finance.

Finally, in addition to the theory and empirical evidence there is always the

practical question of how to apply the concepts to difficult and complex real-world problems. Toward this end, Chapters 2 and 3 are devoted to capital budgeting, Chapter 14 shows how to estimate the cost of capital for a large, publicly held corporation, and Chapter 16 determines the value of the same company. Chapter 18, another change in this edition, emphasizes the theory and evidence on topics of interest to chief financial officers: pension fund management, interest rate swaps, and leveraged buyouts. Throughout the text we attempt, wherever feasible, to give examples of how to apply the theory. Among other things we show how the reader can estimate his or her own utility function, calculate portfolio means and variances, set up a cross-hedge to reduce the variance of equity returns, value a call option, determine the terms of a merger or acquisition, use international exchange rate relationships.

In sum, we believe that a sound foundation in finance theory requires not only a complete presentation of the theoretical concepts, but also a review of the empirical evidence that either supports or refutes the theory as well as enough examples to allow the practitioner to apply the validated theory.

B. CHANGES IN THE THIRD EDITION

We have tried to move all the central paradigms of finance theory into the first half of the book. In the second edition this motivated our shifting the option pricing material into Chapter 8. In this third edition we decided to add a completely new chapter on futures markets—Chapter 9. It covers traditional material on pricing both commodity and financial futures, as well as newer issues: why futures markets exist, why there are price limits in some markets but not others, and empirical evidence on normal backwardation and contango.

In the materials on portfolio theory we have added a section on how to use T-bond futures contracts for cross-hedging. In Chapter 7 we have updated the literature review on the Capital Asset Pricing Model and the Arbitrage Pricing Model. Chapter 8 contains new evidence on option pricing. The materials on capital structure (Chapters 13 and 14) and on dividend policy (Chapters 15 and 16) have been completely rewritten to summarize the latest thinking in these rapidly changing areas of research.

Chapter 18 is completely new. Many topics of importance to chief financial officers are applications of finance theory. Pension fund management, interest rate swaps, and leveraged buyouts are the examples developed in this chapter.

Chapters 19 and 20 on mergers and acquisitions, restructuring, and corporate control represent up-to-date coverage of the burgeoning literature. Similarly, Chapters 21 and 22 reflect the latest thinking in the field of international financial management.

We made numerous other minor changes. In general, we sought to reflect all of the new important literature of finance theory—published articles and treatises as well as working papers. Our aim was to keep the book as close as possible to the frontiers of the “state-of-the-art” in the literature of finance theory.

C. SUGGESTED USE IN CURRICULUM

At UCLA we use the text as a second course in finance for MBA students and as the first finance course for doctoral students. We found that requiring all finance majors to take a theory-of-finance course before proceeding to upper-level courses eliminated a great deal of redundancy. For example, a portfolio theory course that uses the theory of finance as a prerequisite does not have to waste time with the fundamentals. Instead, after a brief review, most of the course can be devoted to more recent developments and applications.

Because finance theory has developed into a cohesive body of knowledge, it underlies almost all of what had formerly been thought of as disparate topics. The theory of finance, as presented in this text, is prerequisite to security analysis, portfolio theory, money and capital markets, commercial banking, speculative markets, investment banking, international finance, insurance, case courses in corporation finance, and quantitative methods of finance. The theory of finance can be, and is, applied in all of these courses. That is why, at UCLA at least, we have made it a prerequisite to all the aforementioned course offerings.

The basic building blocks that will lead to the most advantageous use of this text include algebra and elementary calculus; basic finance skills such as discounting, the use of cash flows, pro-forma income statements and balance sheets; elementary statistics; and an intermediate-level microeconomics course. Consequently, the book would be applicable as a second semester (or quarter) in finance. This could occur at the junior or senior undergraduate year, for MBAs during the end of their first year or beginning of their second year, or as an introductory course for Ph.D. students.

D. USE OF THE SOLUTIONS MANUAL

The end-of-chapter problems and questions ask the students not only to feed back what they have just learned, but also to take the concepts and extend them beyond the material covered directly in the body of the text. Consequently, we hope that the solutions manual will be employed almost as if it were a supplementary text. It should not be locked up in the faculty member's office, as so many instructor's manuals are. It is not an instructor's manual in a narrow sense. Rather, it is a solutions manual, intended for use by the students. Anyone (without restriction) can order it from the publisher. We order it, through our bookstore, as a recommended supplemental reading.

Understanding of the theory is increased by efforts to apply it. Consequently, most of the end-of-chapter problems are oriented toward applications of the theory. They require analytical thinking as well as a thorough understanding of the theory. If the solutions manual is used, as we hope it will be, then students who learn how to apply their understanding of the theory to the end-of-chapter problems will at the same time be learning how to apply the theory to real-world tasks.

E. ACKNOWLEDGMENTS

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There are undoubtedly errors in the final product, both typographical and conceptual as well as differences of opinion. We invite readers to send suggestions, comments, criticisms, and corrections to the authors at the Anderson Graduate School of Management, University of California, Los Angeles, CA 90024. Any form of communication will be welcome.

Los Angeles, California

T.E.C.
J.F.W.

Contents

PART I THE THEORY OF FINANCE	1
1 Introduction: Capital Markets, Consumption, and Investment	3
Introduction	3
Consumption and Investment without Capital Markets	4
Consumption and Investment with Capital Markets	9
Marketplaces and Transactions Costs	13
Transactions Costs and the Breakdown of Separation	14
Summary	15
Problem Set	15
References	16
2 Investment Decisions: The Certainty Case	17
Introduction	17
Fisher Separation	18
The Agency Problem	20
Maximization of Shareholders' Wealth	20
Techniques for Capital Budgeting	25
Comparison of Net Present Value with Internal Rate of Return	31
Cash Flows for Capital Budgeting Purposes	36
Summary and Conclusion	41
Problem Set	41
References	44
3 More Advanced Capital Budgeting Topics	46
Introduction	46
Capital Budgeting Techniques in Practice	47
Projects with Different Lives	49
Constrained Capital Budgeting Problems	55
Capital Budgeting Procedures under Inflation	61
The Term Structure of Interest Rates	65
Summary and Conclusions	71
Problem Set	72
References	74
4 The Theory of Choice: Utility Theory Given Uncertainty	77
Five Axioms of Choice under Uncertainty	79
Developing Utility Functions	80
Establishing a Definition of Risk Aversion	85
Comparison of Risk Aversion in the Small and in the Large	90
Stochastic Dominance	92
Using Mean and Variance as Choice Criteria	96

A Mean-Variance Paradox	99
Recent Thinking and Empirical Evidence	102

Summary	103
Problem Set	103
References	107

5 State-Preference Theory

109

Uncertainty and Alternative Future States	110
Definition of Pure Securities	111
Complete Capital Market	111
Derivation of Pure Security Prices	113
No Arbitrage Profit Condition	115
Economic Determinants of Security Prices	116
Optimal Portfolio Decisions	119
Portfolio Optimality Conditions and Portfolio Separation	122
Firm Valuation, the Fisher Separation Principle, and Optimal Investment Decisions	124

Summary	128
Problem Set	129
References	131
Appendix A to Chapter 5: Forming a Portfolio of Pure Securities	133
Appendix B to Chapter 5: Use of Prices for State-Contingent Claims in Capital Budgeting	135
Appendix C to Chapter 5: Application of the SPM in Capital Structure Decisions	140

6 Objects of Choice: Mean-Variance Uncertainty

145

Measuring Risk and Return for a Single Asset	146
Measuring Portfolio Risk and Return	153
Optimal Portfolio Choice: The Efficient Set with Two Risky Assets (and No Risk-Free Asset)	166
The Efficient Set with One Risky and One Risk-Free Asset	171

Optimal Portfolio Choice: Many Assets	173
Portfolio Diversification and Individual Asset Risk	184
Summary	188
Problem Set	188
References	192

7 Market Equilibrium: CAPM and APT

193

Introduction	193
The Efficiency of the Market Portfolio	194
Derivation of the CAPM	195
Properties of the CAPM	198
Use of the CAPM for Valuation: Single-Period Models, Uncertainty	202
Applications of the CAPM for Corporate Policy	204
Extensions of the CAPM	205

Empirical Tests of the CAPM	212
The Problem of Measuring Performance: Roll's Critique	217
The Arbitrage Pricing Theory	219
Empirical Tests of the Arbitrage Pricing Theory	228
Summary	231
Problem Set	231
References	235

8 Pricing Contingent Claims: Option Pricing Theory and Evidence

240

Introduction	240
A Description of the Factors That Affect Prices of European Options	241

Combining Options, A Graphic Presentation	245
Equity as a Call Option	248

Put-Call Parity	249	Empirical Evidence on the Option Pricing Model	283
Some Dominance Theorems That Bound the Value of a Call Option	251	Summary	289
Derivation of the Option Pricing Formula—The Binomial Approach	256	Problem Set	290
Valuation of an American Call with No Dividend Payments	269	References	292
Pricing American Put Options	277	Appendix to Chapter 8: Derivation of the Black-Scholes Option Pricing Model	296
Extensions of the Option Pricing Model	280		

9 Futures Contracts and Markets 300

Introduction	300	Synthetic Futures and Options on Futures	322
General Characteristics of Futures Contracts	300	Summary	325
The Theory of Futures Markets and Futures Contract Pricing	308	Problem Set	325
Empirical Evidence	319	References	326

10 Efficient Capital Markets: Theory 330

Defining Capital Market Efficiency	330	Statistical Tests Unadjusted for Risk	346
A Formal Definition of the Value of Information	332	The Joint Hypothesis of Market Efficiency and the CAPM	350
The Relationship between the Value of Information and Efficient Capital Markets	338	Summary	352
Rational Expectations and Market Efficiency	339	Problem Set	353
Market Efficiency with Costly Information	343	References	355

PART II CORPORATE POLICY: THEORY, EVIDENCE, AND APPLICATIONS 357

11 Efficient Capital Markets: Evidence 361

Empirical Models Used for Residual Analysis	361	Stock Splits	380
Accounting Information	362	Performance of Managed Portfolios	383
Block Trades	370	Weekend and Year-End Effects	390
Insider Trading	376	Summary	392
New Issues	377	Problem Set	393
		References	395

12 Capital Budgeting under Uncertainty: The Multiperiod Case	401
Introduction	401
Multiperiod Capital Budgeting with "Imperfect" Markets for Physical Capital	402
An Examination of Admissible Uncertainty in a Multiperiod Capital Asset Pricing World	406
Using the Arbitrage Pricing Theory for Multiperiod Capital Budgeting	411
Comparing Risky Cost Structures	414
Abandonment Value	419
Summary	430
Problem Set	431
References	435
13 Capital Structure and the Cost of Capital: Theory	437
The Value of the Firm Given Corporate Taxes Only	439
The Value of the Firm in a World with Both Personal and Corporate Taxes	451
Introducing Risk—A Synthesis of M-M and CAPM	455
The Cost of Capital with Risky Debt	462
The Maturity Structure of Debt	471
The Effect of Other Financial Instruments on the Cost of Capital	472
Summary	481
Problem Set	481
References	485
Appendix to Chapter 13: Duration and Optimal Maturity Structure of the Balance Sheet	489
Duration	489
Immunization	492
Application of Duration to Debt Maturity Structure	494
References to Appendix	495
14 Capital Structure: Empirical Evidence and Applications	497
Introduction	497
Possible Reasons for an "Optimal" Mix of Debt and Equity	498
Empirical Evidence on Capital Structure	516
Cost of Capital: Applications	523
Summary	536
Problem Set	536
References	539
15 Dividend Policy: Theory	544
The Irrelevance of Dividend Policy in a World without Taxes	545
Valuation, Growth, and Dividend Policy	548
Dividend Policy in a World with Personal and Corporate Taxes	556
Toward a Theory of Optimal Dividend Policy	561
Other Dividend Policy Issues	569
Summary	571
Problem Set	572
References	573
16 Dividend Policy: Empirical Evidence and Applications	576
Behavioral Models of Dividend Policy	577
Clientele Effects and Ex Date Effects	578
Dividend Announcement Effects on the Value of the Firm: The Signaling Hypothesis	584
The Relationship between Dividends and Value	588
Corporate Equity Repurchases via Tender Offer	596
Overview of Empirical Evidence	600
Valuation and Corporate Policy	601
Problem Set	608
References	609

17 The Economics of Leasing	614
Introduction 614	Empirical Evidence on Leasing 632
The Legal and Accounting Treatment of Leases 615	Summary 633
The Theory of Leasing 618	Problem Set 634
	References 635
18 Applied Issues in Corporate Finance	638
Pension Fund Management 638	Executive Compensation Plans 665
Interest Rate Swaps 656	Summary 672
Leveraged Buyouts and Going Private 661	Problem Set 672
	References 673
19 Mergers, Restructuring, and Corporate Control: Theory	676
Introduction 676	Theories of Restructuring 690
Corporate Restructuring and Control 677	Conglomerate Mergers 691
Recent Developments in M&A Activity 680	Summary 708
Theories of M&A Activity 682	Problem Set 710
	References 712
20 Mergers and Restructuring: Tests and Applications	716
Tests of Merger and Tender Offer Returns 717	Terms of Mergers 757
Studies of Antitrust Cases 730	Managerial Policies in a Valuation Framework 763
Corporate Governance 734	Summary 769
Studies of Other Forms of Restructuring 744	Problem Set 769
Generalizations from the Studies 753	References 773
21 Exchange Rate Systems and Parity Conditions	777
The Importance of International Finance 777	Balance of Payments Analysis 788
The International Financial Mechanism 778	Fundamental Equilibrium Relationships 790
The Shift from Fixed to Flexible Exchange Rates 783	Summary 803
	Problem Set 805
	References 806
22 International Financial Management: Tests and Implications	809
International Diversification 810	Interest Rate and Currency Swaps 829
Asset Pricing Models 810	Foreign Currency Translation 830
Exchange Risk and Purchasing Power Parity 813	Summary 833
Market Efficiency 818	Problem Set 834
Managerial Aspects of Foreign Exchange Risks 823	References 837

Appendix A Discounting	841
Introduction	841
The Time Value of Money: Discrete Compounding	841
The Time Value of Money: Continuous Compounding	851
Summary	854
Appendix B Matrix Algebra	861
Matrices and Vectors	861
The Operations of Matrices	862
Linear Equations in Matrix Form	864
Special Matrices	865
Matrix Inversion Defined	865
Matrix Transposition	866
Determinants	866
The Inverse of a Square Matrix	869
Solving Linear Equation Systems	870
Cramer's Rule	870
Applications	871
Appendix C An Introduction to Multiple Regression	877
Ordinary Least Squares Linear Estimation	877
Simple Hypothesis Testing of the Linear Regression Estimates	881
Bias and Efficiency	886
Summary	892
References	893
Appendix D Calculus and Optimization	894
Functions	894
Differential Calculus	901
Optimization	911
Taylor and MacLaurin Series	916
Integral Calculus	921
Reference	925
Author Index	927
Subject Index	933

PART I

The Theory of Finance

PART I OF THIS TEXT covers what has come to be the accepted theory of financial decision making. Its theme is an understanding of how individuals and their agents make choices among alternatives that have uncertain payoffs over multiple time periods. The theory that explains how and why these decisions are made has many applications in the various topic areas that traditionally make up the study of finance. The topics include security analysis, portfolio management, financial accounting, corporate financial policy, public finance, commercial banking, and international finance.

Chapter 1 shows why the existence of financial marketplaces is so important for economic development. Chapters 2 and 3 describe the appropriate investment criterion in the simplest of all possible worlds—a world where all outcomes are known with certainty. For many readers, they will represent a summary and extension of material covered in traditional texts on corporate finance. Chapter 4 covers utility theory. It provides a model of how individuals make choices among risky alternatives. An understanding of individual behavior in the face of uncertainty is fundamental to understanding how financial markets operate. Chapter 5 introduces the objects of investor choice under uncertainty in the most general theoretical framework—state-preference theory. Chapter 6 describes the objects of choice in a mean-variance partial equilibrium framework. In a world of uncertainty each combination of assets provides risky outcomes that are assumed to be described in terms of two parameters: mean and variance. Once the opportunity set of all possible choices has been described, we are able to combine Chapter 4, “The Theory of Choice,” with Chapter 6, “Objects

of Choice,” in order to predict exactly what combination of assets an individual will choose. Chapter 7 extends the study of choice into a market equilibrium framework, thereby closing the cycle of logic. Chapter 1 shows why capital markets exist and assumes that all outcomes are known with certainty. Chapter 7 extends the theory of capital markets to include equilibrium with uncertain outcomes and, even more important, describes the appropriate concept of risk and shows how it will be priced in equilibrium, including the very general arbitrage pricing theory. Chapter 8 on the option pricing model includes a treatment of the equilibrium prices of contingent claim assets that depend on the outcome of another risky asset. Therefore these materials provide a framework for decision making under uncertainty that can be applied by financial managers throughout the economy. Chapter 9 introduces commodity and financial futures contracts and how they are priced in equilibrium. Chapter 10, the last chapter in Part I, discusses the concept of efficient capital markets. It serves as a bridge between theory and reality. Most of the theory assumes that markets are perfectly frictionless, i.e., free of transactions costs and other “market imperfections” that cannot be easily modeled. The questions arise: What assumptions are needed to have efficient (but not necessarily frictionless) capital markets? How well does the theory fit reality?

The empirical evidence on these and other questions is left to Part II of the text. It focuses on applications of financial theory to corporate policy issues such as capital budgeting, the cost of capital, capital structure, dividend policy, leasing, mergers and acquisitions, and international finance. For almost every topic, there is material that covers the implications of theory for policy and the empirical evidence relevant to the theory, and that provides detailed examples of applications.

Through the alterations in the income streams provided by loans or sales, the marginal degrees of impatience for all individuals in the market are brought into equality with each other and with the market rate of interest.

Irving Fisher, *The Theory of Interest*, Macmillan, New York, 1930, 122

Introduction: Capital Markets, Consumption, and Investment

A. INTRODUCTION

The objective of this chapter is to study consumption and investment decisions made by individuals and firms. Logical development is facilitated if we begin with the simplest of all worlds, a one-person/one-good economy. The decision maker, Robinson Crusoe, must choose between consumption now and consumption in the future. Of course, the decision not to consume now is the same as investment. Thus Robinson Crusoe's decision is simultaneously one of consumption and investment. In order to decide, he needs two types of information. First, he needs to understand his own subjective trade-offs between consumption now and consumption in the future. This information is embodied in the utility and indifference curves depicted in Figs. 1.1 through 1.3. Second, he must know the feasible trade-offs between present and future consumption that are technologically possible. These are given in the investment and production opportunity sets of Figs. 1.4 and 1.5.

From the analysis of a Robinson Crusoe economy we will find that the optimal consumption/investment decision establishes a subjective interest rate for Robinson Crusoe. Shown in Fig. 1.5, it represents his (unique) optimal rate of exchange between consumption now and in the future. Thus interest rates are an integral part of consumption/investment decisions. One can think of the interest rate as the price of