Contents

Part 1 INTRODUCTION 1

Chapter 1 INTRODUCTION 2 Outline of the Book 2 The Economic Theory of Choice: An Illustration under Certainty 4 Conclusion 8 Multiple Assets and Risk 8 Questions and Problems 9

Bibliography 10

Chapter 2 FINANCIAL SECURITIES 11 Types of Marketable Financial Securities 11 The Return Characteristics of Alternative Security Types 19 Stock Market Indexes 21 Bond Market Indexes 22 Conclusion 23

Chapter 3 FINANCIAL MARKETS 24 Trading Mechanics 24 Margin 27 Markets 30 Trade Types and Costs 36 Conclusion 38

Part 2 PORTFOLIO ANALYSIS 39

Section 1 MEAN VARIANCE PORTFOLIO THEORY 41

THE CHARACTERISTICS OF THE OPPORTUNITY SET UNDER RISK 42 Determining the Average Outcome 43 A Measure of Dispersion 44 Variance of Combinations of Assets 47 Characteristics of Portfolios in General 50 Two Concluding Examples 59 Conclusion 62 Questions and Problems 62 Bibliography 64

Chapter 5

Chapter 4

DELINEATING EFFICIENT PORTFOLIOS 65 Combinations of Two Risky Assets Revisited: Short Sales Not Allowed 65 The Shape of the Portfolio Possibilities Curve 74 The Efficient Frontier with Riskless Lending and Borrowing 81

Examples and Applications 85 Three Examples 89 Conclusion 92 Questions and Problems 92 Bibliography 93

Chapter 6

TECHNIQUES FOR CALCULATING THE EFFICIENT FRONTIER 95 Short Sales Allowed with Riskless Lending and Borrowing 96 Short Sales Allowed: No Riskless Lending and Borrowing 100 Riskless Lending and Borrowing with Short Sales Not Allowed 100 No Short Selling and No Riskless Lending and Borrowing 101 The Incorporation of Additional Constraints 102 An Example 103 Conclusion 106

Appendix A: An Alternative Definition of Short Sales 106 Appendix B: Determining the Derivative 107 Appendix C: Solving Systems of Simultaneous Equations 111

Appendix D: A General Solution 114 Appendix E: Quadratic Programming and Kuhn-Tucker Conditions 118 Questions and Problems 121 Bibliography 122

Section 2 SIMPLIFYING THE PORTFOLIO SELECTION PROCESS 125

Chapter 7

THE CORRELATION STRUCTURE OF SECURITY RETURNS—THE SINGLE-INDEX MODEL 126 The Inputs to Portfolio Analysis 127 Single-Index Models: An Overview 128 Characteristics of the Single-Index Model 133 Estimating Beta 135 The Market Model 148 An Example 149 Questions and Problems 150 Bibliography 152

Chapter 8

SECURITY RETURNS—MULTI-INDEX MODELS AND GROUPING TECHNIQUES 155 Multi-index Models 156 Average Correlation Models 162 Mixed Models 163 Fundamental Multi-index Models 163 Conclusion 169 Appendix A: Procedure for Reducing Any Multi-index Model to a Multi-index Model with Orthogonal Indexes 169

THE CORRELATION STRUCTURE OF

Appendix B: Mean Return, Variance, and Covariance of a Multi-index Model 170 Questions and Problems 172 Bibliography 173

Chapter 9

SIMPLE TECHNIQUES FOR DETERMINING THE EFFICIENT FRONTIER 176 The Single-index Model 177 Security Selection with a Purchasable Index 188 The Constant Correlation Model 189 Other Return Structures 192 An Example 192 Conclusion 193 Appendix A: Single-index Model— Short Sales Allowed 194 Appendix B: Constant Correlation Coefficient—Short Sales Allowed 196 Appendix C: Single-index Model—Short Sales Not Allowed 197 Appendix D: Constant Correlation Coefficient—Short Sales Not Allowed 199 Appendix E: Single-index Model, Short Sales Allowed, and a Market Asset 201 Questions and Problems 201 Bibliography 202

Section 3 SELECTING THE OPTIMUM PORTFOLIO 205

Chapter 10

ESTIMATING EXPECTED RETURNS 206 Aggregate Asset Allocation 206 Forecasting Individual Security Returns 212 Portfolio Analysis with Discrete Data 214 Appendix: The Ross Recovery Theorem—A New Approach to Using Market Data to Calculate Expected Return 215 Bibliography 218

Chapter 11

HOW TO SELECT AMONG THE PORTFOLIOS IN THE OPPORTUNITY SET 220

Choosing Directly 220 An Introduction to Preference Functions 221 Risk Tolerance Functions 224 Safety First 226 Maximizing the Geometric Mean Return 232 Value at Risk (VaR) 234 Utility and the Equity Risk Premium 235 Optimal Investment Strategies with Investor Liabilities 237 Liabilities and Safety-First Portfolio Selection 241

Simulations in Portfolio Choice 241

Conclusion **247**Appendix: The Economic Properties of Utility Functions **247**

Relative Risk Aversion and Wealth

Questions and Problems

249

Bibliography

250

Section 4 WIDENING THE SELECTION UNIVERSE 255

Chapter 12

INTERNATIONAL DIVERSIFICATION 256
Historical Background 257
Calculating the Return on Foreign

Investments **257**The Risk of Foreign Securities **261**Market Integration **267**

Returns from International Diversification **268**

The Effect of Exchange Risk **269**

Return Expectations and Portfolio Performance 270 Emerging Markets 272 Other Evidence on Internationally Diversified Portfolios 276 Sovereign Funds 278 Models for Managing International Portfolios 280

Conclusion **283**Questions and Problems **284**Bibliography **285**

Part 3 MODELS OF EQUILIBRIUM IN THE CAPITAL MARKETS 289

Chapter 13

THE STANDARD CAPITAL ASSET PRICING MODEL **290**The Assumptions Underlying the

Standard Capital Asset Pricing Model (CAPM) **290**

The CAPM 291
Prices and the CAPM 300
Conclusion 302

Appendix: Appropriateness of the Single-Period Asset Pricing Model **304**Questions and Problems **308**

Bibliography 309

Chapter 14

NONSTANDARD FORMS OF CAPITAL ASSET PRICING MODELS 311

Short Sales Disallowed 312
Modifications of Riskless Lending and Borrowing 312
Personal Taxes 322

Nonmarketable Assets **324**Heterogeneous Expectations **326**

Non-Price-Taking Behavior **327** Multiperiod CAPM **327**

The Multi-beta CAPM 328
Consumption CAPM 328
Conclusion 330

Appendix: Derivation of the General

Equilibrium with Taxes 331

Questions and Problems 333

Bibliography 334

Chapter 15

EMPIRICAL TESTS OF EQUILIBRIUM MODELS **340**

The Models—Ex Ante Expectations and Ex Post Tests **340**Empirical Tests of the CAPM **341**Testing Some Alternative Forms of the CAPM Model **352**Testing the Posttax Form of the

CAPM Model **353**Some Reservations about Traditional Tests of General Equilibrium Relationships and Some New Research **356**Conclusion **358**

Ouestions and Problems **359** Bibliography **360**

Chapter 16

THE ARBITRAGE PRICING MODEL

APT—A MULTIFACTOR APPROACH
TO EXPLAINING ASSET PRICES **364**

APT—What Is It? **364**Estimating and Testing APT **369**

APT and CAPM 381

Recapitulation 382

Term Structure Factor **392** Credit Risk Factor **392**

Foreign Exchange [FX] Carry **393** Value Factor **393**

Size Factor 393

Momentum Factor **393** Volatility Factor **394**

Liquidity Factor 394

Inflation Factor **395**GDP Factor **395**Equity Risk Premium **396**Limitations of Factor Investing **396**Factor Investing Summary **397**Conclusion **397**

Appendix A: A Simple Example of Factor Analysis **397**Appendix B: Specification of the APT with an Unobserved Market Factor **399**Questions and Problems **400**Bibliography **401**

Part 4 SECURITY ANALYSIS AND PORTFOLIO THEORY 409

Chapter 17

EFFICIENT MARKETS 410

Early Development 411

The Next Stages of Theory 412

Recent Theory 414

Some Background 415

Testing the EMH 416

Tests of Return Predictability 417

Tests on Prices and Returns 417

Monthly Patterns 419

Announcement and Price Return 431

Methodology of Event Studies 432

Strong-Form Efficiency 437

Market Rationality 440

Conclusion 442

Questions and Problems 442

Chapter 18

Bibliography 443

THE VALUATION PROCESS 454

Discounted Cash Flow Models 455

Cross-Sectional Regression Analysis 467

An Ongoing System 471

Conclusion 476

Questions and Problems 476

Bibliography 477

Chapter 19

EARNINGS ESTIMATION 481

The Elusive Number Called Earnings 48
The Importance of Earnings 484
Characteristics of Earnings and
Earnings Forecasts 487
Conclusion 495
Questions and Problems 496
Bibliography 496

Chapter 20

BEHAVIORAL FINANCE, INVESTOR DECISION MAKING, AND ASSET PRICES 499

Prospect Theory and Decision
Making under Uncertainty 499

Biases from Laboratory Experiments 502 Summary of Investor Behavior 505 Behavioral Finance and Asset Pricing Theory 506 Bibliography 513

Chapter 21

INTEREST RATE THEORY AND THE PRICING OF BONDS 517 An Introduction to Debt Securities 518 The Many Definitions of Rates 519 Bond Prices and Spot Rates 526 Determining Spot Rates 528 The Determinants of Bond Prices 530 Collateral Mortgage Obligations 546 The Financial Crisis of 2008 547 Conclusion 549 Appendix A: Special Considerations in Bond Pricing 549 Appendix B: Estimating Spot Rates 550 Appendix C: Calculating Bond Equivalent Yield and Effective Annual Yield 552 Questions and Problems 552 Bibliography 553

Chapter 22

PORTFOLIOS 557

Duration **557**Protecting against Term Structure Shifts **565**Bond Portfolio Management of Yearly Returns **569**Swaps **578**Appendix A: Duration Measures **580**

Appendix B: Exact Matching Programs **584**Appendix C: Bond-Swapping
Techniques **586**Appendix D: Convexity **587**

Questions and Problems 588
Bibliography 589

THE MANAGEMENT OF BOND

Chapter 23

OPTION PRICING THEORY 592

Types of Options 592

Some Basic Characteristics of
Option Values 598
Valuation Models 603
Artificial or Homemade Options 614
Uses of Options 615
Conclusion 618
Appendix A: Derivation of the
Binomial Formula 618
Appendix B: Derivation of the
Black–Scholes Formula 621
Questions and Problems 623

Chapter 24

THE VALUATION AND USES OF FINANCIAL FUTURES 630

Description of Financial
Futures 630
Valuation of Financial Futures 634
The Uses of Financial Futures 639
Nonfinancial Futures and
Commodity Funds 643
Ouestions and Problems 644
Bibliography 645

Part 5 EVALUATING THE INVESTMENT PROCESS 647

Chapter 25

MUTUAL FUNDS 648

Bibliography 624

Open-End Mutual Funds 649 Closed-End Mutual Funds 652 Exchange-Traded Funds (ETFs) 655 Conclusion 658 Bibliography 658

Chapter 26

EVALUATION OF PORTFOLIO PERFORMANCE 660

Evaluation Techniques 661
A Manipulation-Proof Performance
Measure 669
Timing 670
Holding Measures of Timing 674

Performance Measurement **675**Using Holdings Data to Measure
Performance Directly **678**

Time-Varying Betas **679**Conditional Models of Performance

Multi-index Models and

Measurement, Bayesian Analysis, and Stochastic Discount Factors **679**

Bayesian Analysis 680

Stochastic Discount Factors 681

What's a Researcher to Do? **681** Measuring the Performance

of Active Bond Funds 682

The Performance of Actively Managed Mutual Funds **682**

How Have Mutual Funds Done? **682**The Persistence of Performance **684**Persistence **684**

Appendix: The Use of APT Models to Evaluate and Diagnose Performance 689

Questions and Problems 693

Bibliography 693

Chapter 27

EVALUATION OF SECURITY ANALYSIS 699

Why the Emphasis on Earnings? 700
The Evaluation of Earnings
Forecasts 701
Evaluating the Valuation Process 708
Conclusion 711
Questions and Problems 712
Bibliography 712

Chapter 28

PORTFOLIO MANAGEMENT REVISITED 714

Managing Stock Portfolios 715
Active Management 718
Passive Versus Active 719
International Diversification 720
Bond Management 720
Bond and Stock Investment with a Liability Stream 723
Bibliography 728

Index 731