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

Part 2  PORTFOLIO ANALYSIS  39

Section 1  MEAN VARIANCE PORTFOLIO THEORY  41

Chapter 4
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
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

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

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

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  THE CORRELATION STRUCTURE OF 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

Section 3  SELECTING THE OPTIMUM PORTFOLIO 205

Chapter 10  ESTIMATINGEXPECTED RETURNS 206
Aggregate Asset Allocation 206
Forecasting Individual Security Returns 212
Portfolio Analysis with Discrete Data 214
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

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

Relative Risk Aversion and Wealth 249
Questions and Problems 249
Bibliography 250

## Section 4 WIDENING THE SELECTION UNIVERSE

### 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

### 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
Questions 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
Bibliography 443

Chapter 18 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 481
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 THE MANAGEMENT OF BOND 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

Chapter 23 OPTION PRICING THEORY 592
Types of Options 592