Contents

	Preface	xiii
	Acknowledgments	xv
1	Quotations and Characteristics of Stock Options	1
	Options Markets and Contracts	1
	Why Do Options Markets Exist? History of Options Markets Modern Options Markets Calls and Puts	1 2 2 3
	Stock Call Option Quotations and Pricing Relationships	5
	Call Option Quotations Profits at Call Option Expiration and Payoff Diagrams	5 10
	Stock Put Option Quotations and Pricing Relationships	14
	Put Option Quotations Profits at Put Option Expiration and Payoff Diagrams	14 16
	Characteristics of Stock Options	20
	Option Classes and Expiration Dates Strike Prices, Stock Splits, and Position Limits Leaps	20 21 22
	Stock Index Options	22
	Characteristics of Index Options Quoting Index Options Cash Settlement Versus Asset Settlement	22 23 25
	Market Organization	25
	The Clearing Corporation Costs of Trading Regulation	25 26 26
2	Principles of Option Pricing and the Binomial Model	31
	Call Option Price Changes Before Expiration	31
	Boundary Conditions Trading Options and Pricing Factors	31 32

vi Contents

	Pricing Relationships Call Prices Before Expiration The Time to Expiration Leverage, Volatility, and Interest Rates	32 34 34 40
	Put Option Price Changes Before Expiration	41
	Leverage Time to Expiration, Volatility, and Interest Rates	41 42
	Dynamically Replicating Options	43
	Put-Call Parity	44
	The Binomial Option Pricing Model	47
	Two States of Nature Eliminating Risk: The Hedge Ratio The Value of the Option Mispriced Binomial Options Call Prices and a Binomial Example Extending the Model and a Summary	47 50 51 53 55 55
	Empirical Evidence	57
	Option Boundary Tests Put-Call Parity Tests Summary and Looking Ahead	57 59 59
	Appendix 2A: Comparing Options to Forward and Futures Contracts	61
	Appendix 2B: The Multiperiod Binomial Model	62
3	Pricing Stock Options	65
	Basic Properties of Option Pricing	65
	Use of Option Models	65
	The Fair Value of an Option	66
	Black-Scholes Option Pricing	66
	An Overview of the Model Valuing a Call Option: The Black-Scholes Equation Finding the Value of the Normal Distribution Function Interpreting the Black-Scholes Model The Hedge Ratio Black-Scholes Call Values Mispriced Options	66 67 68 70 71 76
	Basic Assumptions of the Black-Scholes Model	78
	Calculating the Inputs	80
	Current Stock Price	80

Contents	s VII
Time to Expiration	80
The Risk-Free Rate	81
Volatility	81
Dividends on Stocks	83 84
Dividends on an Index	•
Volatility and Options	86
Implied Volatility	86
Forecasting Volatility and GARCH	90
Volatility and Stock Indexes	90 93
Volatility Quoted Options	
Put Option Pricing	94
Black-Scholes and Put-Call Parity Put Pricing	94
Early Put Exercise and the Resultant Put Models	95
Trading on the Option Floor	96
The Trading Floor	96
Floor Trading	99
The Market Maker as Scalper	100
Using Black-Scholes and Ratio Spread Strategies	100 101
Box Spreads and Conversions	
Market Microstructure in the Options Market	104
Intraday Options Pricing Behavior Abnormal Pricing Behavior and Bid-Ask Spreads	104 104
Appendix 3A: Assumptions of the Black-Scholes Option Model	108
Constant Variance and Interest Rates	108
Continuous Stock Price and Lognormal Distribution	109
Transactions Costs, Dividends, and Exercise	109
Index Options and Assumptions of the Model	110
Appendix 3B: Deriving the Black-Scholes Model	114
Option Pricing Sensitivities and	117
Pricing Evidence	117
The Pricing Sensitivities	117
What Are Pricing Sensitivities?	117
Delta	119
Elasticity (Lambda)	125
Gamma	129
Theta	136
Vega	143 147
Rho	147
Interactions and a Summary of the Pricing Sensitivities	140

	Evidence on Option Pricing	151
	The Black-Scholes Model	151
	Tests on Other Models	153
	A Summary of the Empirical Results	154
	Summary and Looking Ahead	155
	Appendix 4A: Derivatives of Option Inputs: Option Value Sensitivities	157
•	Option Strategies: Speculating and Spreading	159
	Risk Management with Options	160
		160
	Risk and Options Strategies with Options	160
	The Advantages and Disadvantages of Speculating	
	with Options	161
	Speculating with Call Options	162
	Buying Calls	162
	Buying Calls Plus Investing in T-Bills	165
	Selling Calls	166
	Speculating with Put Options	168
	Buying Puts	168
	Selling Puts	169
	Spreads and Straddles	172
	What Is a Spread?	172 174
	Straddles	
	Calendar and Strike Price Spreads	181
	Calendar Spreads	181
	Strike Price Spreads	187 196
	Pricing Spreads	
	A Summary and Other Combinations	198
	Summarizing Spread Combinations	198 198
	Other Spreads and Option Combinations	190
	Choosing a Strategy and Follow-up Strategies Summary and Looking Ahead	200
6	Hedging with Options	207
	Covered Option Writing	207
	The Concepts	207
	The Relationships for Covered Writing	211

		Contents	ix
	Covered Option Writing: Strategies and Implementation The Evidence Concerning Covered Option Writing Ratio Writing		215 220 224
	Protective Puts		226
	The Concepts and Payoff Diagrams Using Index Puts Protective Puts Versus Covered Calls The Evidence Other Hedging Strategies Summary and Looking Ahead		226 226 232 232 234 235
,	Options on Futures	2	237
	A Background to Options on Futures		237
	What Are Options on Futures? What Are the Advantages of Options on Futures?		237 238
	Characteristics and Quotations of Options on Futures		239
	Stock Index Options		241
	Interest Rate Options		241 242
	Agricultural and Commodity Options General Characteristics		242
	Trading Options on the Exchange		244
	The Pricing of Options on Futures Contracts		245
	The Black Model for Calls		246
	Early Exercise of Options on Futures Contracts		246
	Comparing Options on Futures Prices		249 251
	Pricing Options on T-Bond Futures Put-Call Parity		251
	The Black Model for Puts		252
	The Delta and Theta Sensitivities		252
	Uses of Options on Futures		254
	Synthetic Options and Futures Positions		254
	Speculation		255
	Hedging		255
	Summary and Looking Ahead		257
3	Currency Options	!	259
	Types and Characteristics of Currency Options		259
	Options on Currency		260
	Options on Currency Futures		263
	Taking Positions in Currency Options		264

	The Pricing of Currency Options	200
	The Modified Black-Scholes Model	265
	Pricing Options on Currency Futures	269
	Interest Rate Parity	269
	Put-Call Parity	272
	The Modified Black-Scholes Put Equation for Currency Options	272
	Uses of Currency Options	272
	Speculation	272
	Hedging	274
	Summary and Looking Ahead	274
	Appendix 8A: Foreign Exchange Markets and Their Futures Contracts	277
	Foreign Exchange Markets	277
	Uses of Foreign Exchange	277
	Foreign Exchange Quotations	278
	Currency Futures	281
9	Financial Engineering: Synthetic Instruments and Exotic Options	283
	What Is Financial Engineering?	283
	The Concepts	283
	Futures, Options, and Financial Engineering	284
	Swaps and Swaptions	285
	Swap Concepts	285
	Swap Risk and Pricing Swaps	287
	Swaptions	287
	Over-the-Counter Options	288
	Reasons for the Existence of Over-the-Counter Options	288
	Pricing of Specialized Options	288
	Interest Rate Options	289
	Caps, Floors, and Collars	289
	Options on the Slope of the Yield Curve	290
	Pricing Interest Rate Options	291
	Compound and Exotic Options	291
	Range Forwards	294
	Average-Rate Options	296
	Compound Options	297
	Lookback and Barrier Options	297 301
	Rainbow Options	301
	Summary	501

	Contents xi
Appendix 9A: Values for the Probabilities from the	
Normal Distribution	303
Appendix 9B: Natural Logorithms	304
Terminology	305
Bibliography	311
Credits	316
Index	319