
Indifference Pricing

Theory and Applications

Edited by René Carmona

PRINCETON UNIVERSITY PRESS
PRINCETON AND OXFORD

Contents *lib*

Preface	ix
PART 1. FOUNDATIONS	1
Chapter 1. The Single Period Binomial Model <i>Marek Musiela and Thaleia Zariphopoulou</i>	3
1.1 Introduction	3
1.2 The Incomplete Model	5
Chapter 2. Utility Indifference Pricing: An Overview <i>Vicky Henderson and David Hobson</i>	44
2.1 Introduction	44
2.2 Utility Functions	45
2.3 Utility Indifference Prices: Definitions	48
2.4 Discrete Time Approach to Utility Indifference Pricing	51
2.5 Utility Indifference Pricing in Continuous Time	52
2.6 Applications, Extensions, and a Literature Review	65
2.7 Related Approaches	68
2.8 Conclusion	72
PART 2. DIFFUSION MODELS	75
Chapter 3. Pricing, Hedging, and Designing Derivatives with Risk Measures <i>Pauline Barrieu and Nicole El Karoui</i>	77
3.1 Indifference Pricing, Capital Requirement, and Convex Risk Measures	78
3.2 Dilatation of Convex Risk Measures, Subdifferential and Conservative Price	93
3.3 Inf-Convolution	98
3.4 Optimal Derivative Design	105
3.5 Recalls on Backward Stochastic Differential Equations	118
3.6 Axiomatic Approach and g -Conditional Risk Measures	120
3.7 Dual Representation of g -Conditional Risk Measures	128
3.8 Inf-Convolution of g -Conditional Risk Measures	136
3.9 Appendix: Some Results in Convex Analysis	141

Chapter 4. From Markovian to Partially Observable Models	
<i>René Carmona</i>	147
4.1 A First Diffusion Model	147
4.2 Static Hedging with Liquid Options	154
4.3 Non-Markovian Models with Full Observation	159
4.4 Optimal Hedging in Partially Observed Markets	169
4.5 The Conditionally Gaussian Case	174
PART 3. APPLICATIONS	181
Chapter 5. Portfolio Optimization	
<i>Aytac Ilhan, Mattias Jonsson, and Ronnie Sircar</i>	183
5.1 Introduction	183
5.2 Indifference Pricing and the Dual Formulation	186
5.3 Utility Indifference Pricing	190
5.4 Stochastic Volatility Models	197
Chapter 6. Indifference Pricing of Defaultable Claims	
<i>Tomasz R. Bielecki and Monique Jeanblanc</i>	211
6.1 Preliminaries	211
6.2 Indifference Prices Relative to the Reference Filtration	216
6.3 Optimization Problems and BSDEs	222
6.4 Quadratic Hedging	230
Chapter 7. Applications to Weather Derivatives and Energy Contracts	
<i>René Carmona</i>	241
7.1 Application I: Temperature Options	241
7.2 Application II: Rainfall Options	249
7.3 Application III: Commodity Derivatives	256
PART 4. COMPLEMENTS	265
Chapter 8. BSDEs and Applications	
<i>Nicole El Karoui, Said Hamadène, and Anis Matoussi</i>	267
8.1 General Results on Backward Stochastic Differential Equations	269
8.2 Applications to Optimization Problems	279
8.3 Markovian BSDEs	285
8.4 BSDEs with Quadratic Growth with Respect to Z	296
8.5 Reflected Backward Stochastic Differential Equations	303
Chapter 9. Duality Methods	
<i>Robert J. Elliott and John van der Hoek</i>	321
9.1 Introduction	321
9.2 Model	322
9.3 Utility Functions	325
9.4 Pricing Claims	326

9.5	The Dual Cost Function	333
9.6	The Minimum of $\tilde{V}_G(y)$ and $\tilde{V}_0(y)$	341
9.7	The Calculation of $V_0(x)$	346
9.8	The Indifference Asking Price for Claims	348
9.9	The Indifference Bid Price	355
9.10	Examples	356
9.11	Properties of v	361
9.12	Numerical Methods	364
9.13	Approximate Formulas	374
9.14	An Alternative Representation for $V_G(x)$	381
	Bibliography	387
	List of Contributors	405
	Notation Index	409
	Author Index	410
	Subject Index	413