

CONTENTS

<i>Preface</i>	vii
1 Asset Prices in a Single-period Model	1
1.1 Initial Setup and Key Assumptions	1
1.2 Properties of the State Price, q_i	3
1.3 A Simplification of the State Space	3
1.4 The Pricing Kernel, ϕ_i	4
1.5 The Capital Asset Pricing Model	7
1.6 The Arbitrage Pricing Theory	9
1.7 Risk Aversion and the Pricing Kernel in an Equilibrium Model	10
1.8 Examples	12
1.8.1 Case 1: Risk Neutrality	12
1.8.2 Case 2: Utility is Quadratic	12
1.9 A Note on the Equivalent Martingale Measure	13
1.10 A Note on the Asset Specific Pricing Kernel, $\psi(x_j)$	14
1.11 Conclusions	15
2 Risk Aversion, Background Risk, and the Pricing Kernel	19
2.1 Risk Aversion and Declining Marginal Utility of Wealth	19
2.2 Absolute Risk Aversion	21
2.2.1 Relative Risk Aversion	22
2.2.2 The Elasticity of the Pricing Kernel	25
2.2.3 Prudence	26
2.3 Background Risk and the Pricing Kernel	30
2.3.1 Consumption Optimisation Under Background Risk	32
2.3.2 The Precautionary Premium and the Shape of the Pricing Kernel	33
2.4 Conclusion	35
2.5 Appendix: Properties of the Precautionary Premium	35

3	Option Pricing in a Single-period Model	39
3.1	The General Case	39
3.2	An example: Quadratic Utility and Joint-normal Distribution for x_j and x_m	40
3.3	Option Valuation When x_j is Lognormal	41
3.3.1	Notation for the Lognormal Case	42
3.3.2	The Asset-Specific Pricing Kernel	42
3.3.3	The Risk-adjusted PDF	43
3.3.4	The Forward Price of the Underlying Asset under Lognormality	46
3.3.5	The Lognormal RNVR	46
3.4	The Black-Scholes Price of a European Call Option	47
3.4.1	Some Applications of the General Black-Scholes Formula	49
3.5	The Black-Scholes Model and the Elasticity of the Pricing Kernel	51
3.6	Sufficient Conditions for $\psi(x_j)$ to have Constant Elasticity	52
3.7	Conclusion	53
3.8	Appendix: The Normal Distribution	54
4	Valuation of Contingent Claims: Extensions	57
4.1	Sufficient Conditions for Constant Elasticity	58
4.1.1	Asset Price Follows a Geometric Brownian Motion	58
4.1.2	Lognormal Wealth and Power Utility	59
4.2	RNVR on Non-Lognormal Prices	61
4.2.1	The Transformed Normal Distribution	61
4.2.2	The Asset-specific Pricing Kernel	62
4.2.3	The Price of Contingent Claims	63
4.2.4	Pricing Options on a Normally Distributed Asset Price	63
4.3	A Generalisation of the RNVR: Missing Parameters in the Option Pricing Function	65
4.4	Contingent Claim Pricing given Non-constant Elasticity of the Pricing Kernel	68
4.4.1	Bounds on Option Prices	73
4.5	Conclusions	74

4.6	Appendix	74
4.6.1	The Mean of a Truncated Normal Variable	74
5	Multi-period Asset Pricing	77
5.1	Basic Setup	77
5.2	A Complete Market: The Multi-period Case	78
5.3	Pricing Multi-period Cash Flows	80
5.3.1	The Time-State Preference Approach	80
5.3.2	The Rational Expectations Model	82
5.3.3	The Relationship between the Time-State Preference and the Rational Expectations Equilibria Prices	84
5.3.4	The Relationship between the Pricing Kernels when Interest Rates are Non-stochastic	85
5.4	Multi-Period Valuation Equilibrium: Joint-Normal Cash Flows	86
5.5	Time-State Preference: Pricing Kernels in a Multi-period Equilibrium	89
5.6	Marginal Utility of Consumption and Wealth in a Normal Distribution and Exponential Utility Model	92
5.7	Conclusions	94
6	Forward and Futures Prices of Contingent Claims	97
6.1	Forward and Futures Cash Flows	97
6.2	No-arbitrage Relationships	98
6.3	Forward and Futures Prices in a Rational Expectations Model	100
6.4	Futures and Forward Prices given Lognormal Variables	104
6.5	Futures Rates and Forward Rates in a Normal Interest-rate Model	107
6.6	Futures and Forward Prices of European-style Contingent Claims	108
6.7	Conclusions and Further Reading	110

7	Bond Pricing, Interest-rate Processes, and the LIBOR Market Model	113
7.1	Bond Pricing under Rational Expectations	113
7.1.1	Bond Forward Prices	115
7.1.2	Some Further Implications of Forward Parity and Rational Expectations	116
7.2	The Drift of Forward Rates	117
7.2.1	FRA Pricing and the Drift of the Forward Rate: One-period Case	119
7.2.2	FRA Pricing and the Drift of the Forward Rate: Two-period Case	120
7.2.3	The Drift of the Forward Rate under Lognormality	122
7.3	An Application of the Forward Rate Drift: The LIBOR Market Model	124
7.4	Conclusions	126
7.5	Appendix	127
	Appendix: Stein's Lemma	131
	Bibliography	135
	Index	139