

Contents

Acknowledgment	xiii
1 Overview	1
1.1 Background and Objectives of the Study	1
1.2 Organization of the Study	4
2 Introduction to Real Options	7
2.1 Basic Idea	7
2.1.1 Why Flexibility Adds Value	7
2.1.2 Flexibility and Traditional Capital Budgeting Methods . .	11
2.1.3 Towards a New Investment Paradigm	13
2.2 Classification of Real Options	21
2.2.1 Management Perspective	21
2.2.2 Valuation Perspective	25
2.3 Discussion of the Real Options Approach	39
2.3.1 When to Use Real Options	40
2.3.2 Advantages of the Real Options Approach	40
2.3.3 Drawbacks of the Real Options Approach	42
2.4 Conclusions	45
3 Real Options and Stochastic Control	47
3.1 Real Option Interactions and Stochastic Control	47
3.2 Introduction to Impulse Control and Optimal Stopping	53
3.2.1 General Idea	53
3.2.2 Impulse Control	54
3.3 Impulse Control Model for Valuing Real Options	61
3.3.1 Problem Formulation	61
3.3.2 Impulse Control Verification Theorem	66
3.3.3 Interpretation and Extensions	72
3.4 Combined Impulse Control and Optimal Stopping	74
3.4.1 Problem Formulation	74
3.4.2 Combined Verification Theorem	78

4	Valuing Real Options in a Stochastic Control Framework	85
4.1	Equivalence of Stochastic Control and Contingent Claims Analysis	86
4.1.1	Hedging Portfolio and Fundamental Pricing Equation . . .	86
4.1.2	Equivalent Martingale Measure	94
4.1.3	Interpretation and Conclusions	99
4.2	Contingency Structure of Option Interactions	101
4.3	Example: Timing and Intensity of Investment	117
5	Extensions: Competition and Time Delay Effects	129
5.1	Competitive Interaction	129
5.1.1	Exogenous Competition	130
5.1.2	Endogenous Competition	142
5.2	Time Delay Effects	157
6	Case Study: Flexibility in the Manufacturing Industry	169
6.1	Real Options and Volume Flexibility	170
6.2	Model	172
6.2.1	Static Project Value with Fixed Capacity	175
6.2.2	Timing and Intensity	180
6.2.3	Flexible Capacity	184
6.2.4	Timing, Intensity and Flexible Capacity	189
6.3	Numerical Solution Techniques	191
6.3.1	Finite Difference Methods	193
6.3.2	General Numerical Solution Procedure	199
6.4	Numerical Analysis	200
6.5	Simulation Results	218
7	Conclusions and Extensions	241
	Bibliography	245
	Index	263