
Contents

Introduction	ix
Chapter 1. Risk and Flexibility Integration in Valuation	1
1.1. Introduction	1
1.2. The scope of real options	2
1.2.1. The concept of real options	3
1.2.2. Empirical use of real options	7
1.2.3. Paradigms in options	12
1.3. Valuation of investments by real options	20
1.3.1. Optional valuation of investments in a discrete-time approach	20
1.3.2. Optional valuation of investments in a continuous-time approach	28
1.4. Option model extensions by incorporating new parameters (Levyne and Sahut 2008)	35
1.4.1. Stochastic volatility	36
1.4.2. Transaction costs and models with jumps	39
1.4.3. Option pricing	41
1.5. Conclusion	44
Chapter 2. Optional Modeling of Investment Choices and Surplus Value Linked to the Option to Invest	47
2.1. Introduction	47
2.2. Framework of optional interactions and option to develop an investment project	48
2.2.1. Real investment opportunity	50

2.2.2. Opportunity to postpone decision-making to infinity	52
2.2.3. Development cycle and taking into account new information within dependent projects and focusing on research and development	62
2.3. Option to exchange and abandon an investment project	65
2.3.1. Real options within the replacement cycle and disinvestment alternatives	66
2.3.2. The value of an investment project in the natural resources sector	69
2.3.3. Valuation of the abandonment option by investors	85
2.4. Growth option resulting from investment decisions and acquisition strategies	88
2.4.1. Company profiles justifying growth option value	89
2.4.2. Growth option value related to interactions between financing and investment decisions	90
2.4.3. Acquisition strategies by the real options approach	98
2.5. Conclusion	106
Chapter 3. Data Generation Applied to Strategic and Operational Option Models	107
3.1. Introduction	107
3.2. Determining the right time to invest	107
3.2.1. Application to the carry option	108
3.2.2. Application of the Dixit and Pindyck model	110
3.3. Flexibility of asset exchange, abandonment and temporary shutdown of projects	113
3.3.1. Application to the exchange option	113
3.3.2. Application to the abandonment option	115
3.3.3. Application to the temporary shutdown option	116
3.4. Incorporation of development phases	121
3.4.1. Implementation of a two-stage investment project	121
3.4.2. Valuation of a sequential project	122
Conclusion	135
Appendices	139
Appendix 1. Demonstration of the CRR Formula	141
Appendix 2. Stochastic Differential Calculus	147

Appendix 3. Test of the Black and Scholes Formula and Return on the Log–Normal Distribution	155
Appendix 4. Demonstration of the Black and Scholes Formula	159
Bibliography	165
Index	173