

Chapter 7, Problem 10

Flash Memory International: Option to Abandon

Input Data

Present value of future cash flows	\$400	million
Volatility	30%	annual
Risk-free interest rate	5%	annual
Time to expiration	5	years
Salvage value	\$200	million
Time step	1	year(s)

Results

NPV	\$400
ROV	\$407
Value added	\$7

Calculated Parameters

Up factor (u)	1.350
Down factor (d)	0.741
Risk-neutral probability (p)	0.510

Asset Valuation Lattice

Time period	0	1	2	3	4	5
Valuation of underlying asset	\$400	\$540	\$729	\$984	\$1,328	\$1,793
		\$296	\$400	\$540	\$729	\$984
			\$220	\$296	\$400	\$540
				\$163	\$220	\$296
					\$120	\$163
						\$89

Option Valuation Lattice*

Time period	0	1	2	3	4	5
Valuation of abandonment option	\$407	\$542	\$729	\$984	\$1,328	\$1,793
		\$310	\$404	\$540	\$729	\$984
			\$245	\$304	\$400	\$540
				\$208	\$237	\$296
					\$200	\$200
						\$200

*Continue if green

Abandon if red



Chapter 7, Problem 10

Flash Memory, International: Option to Expand

Input Data

Present value of future cash flows	\$400	million
Volatility	30%	annual
Risk-free rate of return	5%	annual
Time to expiration	5	years
Expansion factor	1.4	
Time step	1	year(s)
Cost of expansion	\$150	million

Results

NPV	\$400
ROV	\$463
Value added	\$63

Calculated Parameters

Up factor (u)	1.350
Down factor (d)	0.741
Risk-neutral probability (p)	0.510

Asset Valuation Lattice

Time period	0	1	2	3	4	5
Valuation of underlying asset	\$400	\$540	\$729	\$984	\$1,328	\$1,793
		\$296	\$400	\$540	\$729	\$984
			\$220	\$296	\$400	\$540
				\$163	\$220	\$296
					\$120	\$163
						\$89

Option Valuation Lattice*

Time period	0	1	2	3	4	5
Valuation of expansion option	\$463	\$643	\$894	\$1,242	\$1,717	\$2,360
		\$324	\$449	\$627	\$878	\$1,227
			\$227	\$312	\$432	\$606
				\$163	\$220	\$296
					\$120	\$163
						\$89

*Expand if green



Chapter 7, Problem 10

Flash Memory International: Option to Contract

Input Parameters

Present value of future cash flows	\$400	million
Volatility	30%	annual
Risk-free rate of return	5%	annual
Time to expiration	5	years
Contraction factor	0.5	
Time step	1	year(s)
Savings of contraction	\$150	million

Results

NPV	\$400
ROV	\$413
Value added	\$13

Calculated Parameters

Up factor (u)	1.350
Down factor (d)	0.741
Risk-neutral probability (p)	0.510

Asset Valuation Lattice

Time period	0	1	2	3	4	5
Valuation of underlying asset	\$400	\$540	\$729	\$984	\$1,328	\$1,793
		\$296	\$400	\$540	\$729	\$984
			\$220	\$296	\$400	\$540
				\$163	\$220	\$296
					\$120	\$163
						\$89

Option Valuation Lattice

Time period	0	1	2	3	4	5
Valuation of contraction option	\$413	\$544	\$729	\$984	\$1,328	\$1,793
		\$320	\$409	\$540	\$729	\$984
			\$261	\$316	\$401	\$540
				\$231	\$260	\$298
					\$210	\$231
						\$195

