

Chapter 8, Problem 13

Shrinking Stomach

Simulatneous Market and Private Risk

Input Data

Present value of future cash flows	\$55	million
Volatility	30%	annual
Risk-free rate of return	5%	annual
Time to expiration	8	years
Time step	1	year(s)
Clinical trial cost	\$20	million
Clinical trial investment year	0	
Clinical trial results year	2	
Clinical trial success probability	0.7	
FDA approval cost	\$10	million
FDA approval year	2	
FDA approval results year	3	
FDA approval success probability	0.8	
Investment discount rate	8%	annual
Strike price (Launch cost)	\$60	million

Calculated Parameters

Up factor (u)	1.350	
Down factor (d)	0.741	
Risk-neutral probability (p)	0.510	
Present value of investment costs	\$29	million

Results

NPV w/ private risk	-\$57.8
ROV w/ private risk	-\$15.2
Value added	\$42.6



Asset Valuation Lattice

Time period	0	1	2	3	4	5	6	7	8
Valuation of underlying asset	\$55	\$74	\$100	\$135	\$183	\$246	\$333	\$449	\$606
		\$41	\$55	\$74	\$100	\$135	\$183	\$246	\$333
			\$30	\$41	\$55	\$74	\$100	\$135	\$183
				\$22	\$30	\$41	\$55	\$74	\$100
					\$17	\$22	\$30	\$41	\$55
						\$12	\$17	\$22	\$30
							\$9	\$12	\$17
								\$7	\$9
									\$5

Option Valuation Lattice

Time period	0	1	2	3	4	5	6	7	8
Valuation of wait option w/ private risk	\$13.4	\$21	\$47	\$90	\$134	\$195	\$278	\$392	\$546
		\$7	\$16	\$33	\$53	\$84	\$128	\$189	\$273
			\$4	\$8	\$15	\$27	\$47	\$78	\$123
				\$1	\$2	\$5	\$9	\$20	\$40
					\$0	\$0	\$0	\$0	\$0
						\$0	\$0	\$0	\$0
							\$0	\$0	\$0
								\$0	\$0
									\$0

