Chapter 8, Problem 1

Hybrid Hydrogen: Option to Stage

Input Parameters

Present value of future cash flows	$600	million
Volatility	30.0%	annual
Risk-free interest rate	6.0%	annual
Option life for Phase I	1	years
Investment cost of Phase I	$200	million
Option life for Phase II	3	years
Investment cost of Phase II	$600	million
Time step	1	year(s)

Results

NPV	-$200
ROV	$54
Value added	$254

Calculated Parameters

Up factor (u)	1.350
Down factor (d)	0.741
Risk-neutral probability (p)	0.527

Asset Valuation Lattice

Time period	0	1	2	3
Valuation of underlying asset	$600	$810	$1,093	$1,476
		$444	$600	$810
			$329	$444
				$244

Option Valuation Lattice (Phase II Only)

Time period	0	1	2	3
Valuation of Phase II option	$176	$309	$528	$876
		$52	$104	$210
			$0	$0
				$0

Option Valuation Lattice (Phase I Only)

Time period	0	1
Valuation of Phase I option	$54	$109
		$0

Combined Valuation Lattice (Phases I and II)

Time period	0	1	2	3
Valuation of combined option	$54	$109	$528	$876
		$0	$104	$210
			$0	$0
				$0