CHAPTER 28

THE OPTION TO DELAY AND VALUATION IMPLICATIONS

Problem 1

S = PV of $25 million a year for 20 years at 16% = $148.22 million

K = Cost of Taking Project = $300 million

t = 10 years

Standard Deviation = 20%

r = 12%

y = Dividend Yield = 1/ Project Life = 10%

Problem 2

a. PV of Inflows = $400,000 * 0.85 * (1 - 1.04^25/1.07^25)/(.07 - .04) -400,000 * 0.40 * (1 - 1.03^25/1.07^25)/(.07 - .03) = $3,309,756

Fixed Costs associated with opening

= -3,000,000

NPV = 3,309,756 -3,000,000 = $309,756

b. S = 3,309,756

K = 3,000,000

t = 25

r = 7%

σ = 0.25

y = 1/25 = 4%

Value of the Call Option = $828,674

c. The latter considers the option characteristics of owning the mine, i.e., that copper prices may go up, and that the mine-owner will be more likely to develop the mine at higher copper prices.

Problem 3

Current Value of Developed Reserve = 10,000,000 * ($20 - $6) = $140,000,000

Exercise Price = Cost of Developing Reserve = $120,000,000

t = 20 years

r = 7%

s = 20%

y = 4% (Alternatively, you can use 1/20 or 5% as your cost of delay)
Value of Call (Natural Resource Reserve) = $37,360,435

Problem 4

a. NPV of Project = $250 - $200 = $50 million

b. The option has the following characteristics:
S = 250
K = 200
r = 8%
t = 5
Variance = 0.04
Dividend Yield = 12.5/250 = 5%
Value of Call (Project Rights) = $68.68

c. The latter captures the value of delaying the project. The difference between the two values will increase as the variance in the project cash flows increases.

Problem 5

a. S = PV of Cash Inflows on Project = 250
K = Cost of Taking Project = 500
t = 10 years
r = 6%
s = 0.6
y = 10/250 = 4%
Value of Call (Product Patent) = $95 million

b. It is an increasing function of the variance in project cash flows. This analysis suggests that the rights to products in technologically volatile areas are likely to be worth a great deal, even though the products may not be viable now.