CHAPTER 29

THE OPTIONS TO EXPAND AND ABANDON: VALUATION IMPLICATIONS

Problem 1

a. Net present value of the project = $30 - $40 = - $10 million

b. Inputs

\[ S = \text{Present Value of Net Revenues} = \$30 \text{ million} \]
\[ K = \text{Cost of televising the Olympics} = \$40 \text{ million} \]
\[ t = \text{Time until Olympics} = 2 \text{ years} \]
\[ r = \text{Riskless rate} = 5\% \]
\[ \text{Variance in value} = 0.09 \]
\[ y = \text{Cost of delay} = 0 \]
\[ d_1 = -0.2302 \quad N(d_1) = 0.4090 \]
\[ d_2 = -0.6545 \quad N(d_2) = 0.2564 \]

\[ \text{Value of the Rights} = 30 \times 0.409 - 40 \times \text{exp}(0.05(2)) \times 0.2564 = 2.99 \]

c. Probability that rights will be profitable = 0.2564 - 0.4090

Problem 2

a.

\[ S = \text{Expected reinvestment needs as percent of firm value} = 10\% \]
\[ K = \text{Reinvestment needs that can be met without excess debt capacity} = 6\% \]
\[ T = 1 \text{ year} \]
\[ \text{Standard deviation in reinvestment needs} = 0.30 \]

The option pricing value with these inputs is 4.32\%. If we assume that the current excess returns (18\% - 12\%) continue in perpetuity, the value of flexibility is

\[ \text{Value of flexibility (on an annual basis)} = 4.32\% \times 0.06/0.12 = 2.16\% \]

b.

Based upon part a, would you recommend that Skates use its excess debt capacity?

The value of flexibility exceeds what the firm would save by moving to its optimal (only 1\%). The firm should not use its excess debt capacity.

Problem 3

Value of abandonment option
S = PV of cashflows from development = $ 900 million * 0.4 = $ 360 million
K = Abandonment value = $ 300 million
T = 5 years
Riskless rate = 5%
Standard deviation = 40%
Value of abandonment option = $ 63.51 million
The net present value of this project to Disney is -$ 40 million.
Net present value = -400 + 360 = -40 million
The value of the abandonment option is greater than the negative net present value. I would advice Disney to make the investment.

If you were the developer, you would need to make a net present value equal to at least $63.51 million to cover the cost of the abandonment option.

PV of cash flows to developer = (63.51) + .6 (1000) = $ 663.51 million

**Problem 4**

For the expansion potential to have option value, Quality Wireless has to have exclusive rights to expand.

Net present value of initial investment = - $ 200 million
S = PV of cashflows from expansion (currently) = ?
K = $2500 million
T = 5 years
Standard deviation in firm value = 25%
Riskless rate = 5%
Setting up the option value = $ 200 million and solving for S, we get
S = $ 1511 million
(Sorry. The only way to get there is by trial and error. An approximate answer would have been sufficient)

**Problem 5**

Net present value of initial investment = -750 + 85 (PV of annuity, 10 years, 12%)
= - $269.73 million

Value of expansion option
S = 150 (PV of annuity, 12%, 15 years) = $1,021.63 million
K = Cost of expansion = $ 2,000 million
Riskless rate = 6.5%
Standard deviation in value = 40%
Life of the option = 10 years
Value of expansion option = $ 477.28 million