
THE OPTIONS TO EXPAND AND ABANDON: VALUATION
IMPLICATIONS

Problem 1

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

b. Inputs

S = Present Value of Net Revenues = \$ 30 million

K = Cost of televising the Olympics = \$ 40 million

t = Time until Olympics = 2 years

r = Riskless rate = 5%

Variance in value = 0.09

y = Cost of delay = 0

d1 = -0.2302 N(d1) = 0.4090

d2 = -0.6545 N(d2) = 0.2564

Value of the Rights = $30 (0.409) - 40 \exp(-0.05)(2) (0.2564) = 2.99$

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

Problem 2

a.

S = Expected reinvestment needs as percent of firm value = 10%

K = Reinvestment needs that can be met without excess debt capacity = 6%

T = 1 year

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

Value of flexibility (on an annual basis) = $4.32\% * .06/.12 = 2.16\%$

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

$S = \text{PV of cashflows from development} = \$ 900 \text{ million} * 0.4 = \$ 360 \text{ million}$

$K = \text{Abandonment value} = \$ 300 \text{ million}$

$T = 5 \text{ years}$

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.

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

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

$S = \text{PV of cashflows from expansion (currently)} = ?$

$K = \$2500 \text{ million}$

$T = 5 \text{ years}$

Standard deviation in firm value = 25%

Riskless rate = 5%

Setting up the option value = \$ 200 million and solving for S, we get

$S = \$ 1511 \text{ million}$

(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