

MIT OpenCourseWare
<http://ocw.mit.edu>

15.997 Practice of Finance: Advanced Corporate Risk Management
Spring 2009

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.

Problem Set #3.

Valuation of a business tied to the copper price.

The objective of this assignment is to implement a real options valuation of a mine. You should use the 10 step binomial tree method from Assignments #1 & #2. All parameters are the same: set the drift in the copper price to 10%, the annual volatility to 28%, the risk-free rate to 5%, and the copper spot price to \$2.65/pound. Assume that the appropriate discount rate to apply to copper related cash flows is 10% as in problem #3 of problem set #2. The output of the mine is fixed at 5,000,000 pounds per year. The forecasted annual operating cost is \$12,500,000. Let us assume that a mine can not be abandoned so that the mine always operates.

- (1) Determine the contingent cash flows throughout the binomial tree. First, determine the contingent revenue stream, then determine the contingent net cash flow.
- (2) Value the revenue stream:
 - a) First, use the risk-neutral methodology to determine the value of the risky revenue stream.
 - b) Second, use the risk-adjusted discounting methodology to determine the value of the risky revenue stream.
 - c) Third, use the forward prices from problem set #2 to determine the value of the revenue stream.
- (3) Value the cost stream.
 - a) First, use the risk-neutral methodology.
 - b) Second, use the risk-adjusted discounting methodology.
- (4) Value the net cash flow stream.
 - a) First, use the risk-neutral methodology.
 - b) Second, use the use the risk-adjusted discounting methodology.
- (5) Now assume that the mine can be abandoned at no cost:
 - a) Value the mine.
 - b) Find the nodes where the mine is abandoned.
 - c) Compare the value of a mine with no abandonment option and the one with abandonment option. Explain the difference