**Corporate Risk Management**

**Homework 2**

1. (15 pts) A non-dividend paying stock is currently priced at $30 per share. You figure that one year from now, the price of the stock will have either gone up to $45 per share or down to $25 per share. The risk-free, continuously compounded interest rate is 4 percent.

Use the Two-State (Binomial) Option Pricing Model to determine the price of a call with a strike of $30 and an expiration date one year from now.

Use your answer above and the principle of put-call parity to determine the price of a put with a strike price of $30 and an expiration date one year from now.

1. (15 pts) Suppose you wrote a 180-day call option on General Motors stock with an exercise price of $50, and also bought a put with an exercise price of $45 on the same stock with the same expiration date. Both are European options. Draw the payoff diagram with the stock price on the X-axis and the *total* payoff (from both options) on the expiration date on the Y-axis. What must be your expectations about General Motors stock that would cause you to pursue the above strategy? Draw the payoff diagram below. **Be sure to place the correct dollar amount at every important point on the diagram**. Briefly describe your expectations for GM right below the diagram.
2. (10 pts) A stock is currently priced at $80 per share. The continuously compounded annual risk-free rate of interest is 2 percent. You observe calls with an expiration date six months from now and a strike price of $70 being sold for $15. What is the implied volatility of this stock over the next six months?
3. (10 pts) The same stock has put options being sold at a price of $7.80 with the same exercise price and the same risk-free rate, but they expire in one year. What is the implied volatility of the stock over the next six months? How do you interpret your answer with respect to the results of #3 above?
4. (25 points) Suppose on November 17, you buy fifteen (15) December Copper Futures contracts, which have a 100-ounce contract size. Your purchase price was $20 per ounce. Complete the following “Marking-to-Market” table if the Maintenance margin is 75% of the initial 5% margin. Assume that you withdraw any funds eligible for withdrawal due to accrued gains.
   1. What are the initial and maintenance margin amounts?
   2. At the end of November 21st, what is the total of funds withdrawn due to gains, if any?
   3. If you wanted to close out your position at the end of November 21st, what would you do?

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| --- | --- | --- | --- | --- | --- |
| Day | Futures Price | Daily Gain/Loss | Cumulative Gain/Loss | Margin Account Balance | Deposits or Withdrawals? |
| Initial | $20.00 | N/A | N/A |  | N/A |
| Nov 18 | $19.90 |  |  |  |  |
| Nov 19 | $19.50 |  |  |  |  |
| Nov 20 | $19.40 |  |  |  |  |
| Nov 21 | $20.05 |  |  |  |  |

6. (25 points) Revisit the work that we did in class regarding AIFS. What if they choose to hedge different percentages of their base case scenario expenses (25,000 students) with a combination of futures and options. As shown in the template on our class website, they can cover 0%, 25%, 50%, 75%, or 100% of the risk. When they choose to cover, they can do so with combinations of futures and options as shown in the spreadsheet.

Using the template I have provided you with, calculate the positive or negative windfalls for stable dollar, weak dollar and strong dollar assuming:

* 1. 25,000 student demand
  2. 30,000 student demand (but 25,000 were hedged for)
  3. 10,000 student demand (but 25,000 were hedged for)

Look carefully at all three spreadsheets after you have filled them out and make a recommendation for what hedging strategy AIFS should select (how much to hedge and which instruments to use in what proportions. Explain why you feel this is the best route for AIFS.