UCLA Anderson School of Management

Professor Stavros Panageas MGMTMFE403

Problem Set #1

You may work on this problem set in groups . Hand in one solution per group. You may discuss the problems only with members of your group. Answers should be typed (or printed legibly) and are due **at the beginning of the week 2 class. No late assignments will be accepted.**

Problem 1. A stock sells for \$50 today. The riskless rate over the period is 10%. Assume that next period (one year) the stock will either

- go up by 30% (to \$65),
- or go down by 20% (to \$40).

(If you want, you can assume that these happen equally likely, although you do not need to know this.)

Suppose you own an out of-the money European call option on the stock, which expires in one year from now. The stock will pay no dividends until then. The strike price equals \$55.

(a) What is replicating portfolio for the call?

(b) What is the call's current price (that is, what is the value of the replicating portfolio)?

(c) What are the "risk-neutral probabilities" of the up and down moves? (q and $1-q$, respectively)

(d) Find again the price of the call option, this time using the risk-neutral probabilities.

Problem 2. Suppose now that you consider holding the stock from the previous problem for two years, and each year it either goes up by 30% or down by 20%. The company has already announced its dividend policy: it will pay a \$15 dividend immediately **before** the stock price goes above \$70. You hold an American call option with strike price $K = \$55$, which expires in two years. You can exercise your option today, in one year from now, or in two years. Should you exercise the option early? (*Hint:* There is no shortcut for this problem. You have to do the work. Draw the stock payoff diagram, and make sure you factor in the \$15 dividend payment when the value of the stock is larger than \$70.)