Homework Assignment 4
Investments with follow on options

Many of the capital budgeting examples considered in class are simplified. We intentionally ignored many facets of reality, so that we could concentrate on one or two issues. Problems in the real world are more complex. This homework assignment is simple relative to many real world situations. This assignment gives you the opportunity to apply what you have learned about capital budgeting and real options to a more realistic, and therefore messier, situation.

This assignment will ask you to make a sequence of capital budgeting decisions. Each time you invest it costs money. However, the project is only successful with a small probability. This problem is more realistic than regular capital budgeting examples from class, in the sense that you do not know the true probability of success with certainty. If the project is successful, you will receive a large payoff. If the project is unsuccessful, the payoff is zero. However, following unsuccessful investments you have the option to invest again. You may continue investing until you are successful or until you decide that it no longer makes sense to continue investing. Assume a zero percent discount rate – i.e., sum the expected cash flows to calculate the NPV.

The final feature of the investment decision is you must decide whether to purchase the rights to the investment project. If you choose to purchase the investment project, you will then be asked whether you want to invest. After each unsuccessful investment round, you will be asked whether you want to invest again. After 30 unsuccessful investments, the program will stop and move you onto the next case. You will need to decide whether you should continue to invest or stop. To make your decisions, you may want to use our discussion of real investment options (Lecture 5), your knowledge of capital budgeting from Finance I, and any experience from your work experience which you think is relevant.

The program will run through eighteen independent examples. In each case, you will be given information on the investment project and asked whether you want to purchase the project. The information will include the purchase price of the project, the cost of each incremental investment, the payoff if the investment is successful, and the distribution for the probability of success. Only the cost of each incremental investment will remain constant across the 18 cases. It will always be $10. The other numbers will change across the 18 cases. You will be told the two possible values of the true probability of success. For example, the probability of a successful investment may be 15% or 25% with equal probability. The actual probability of success will be one of these probabilities and will not change for the duration of the case. You, however, will not know which one is correct.[1] Each case is independent of the others.

[1] For those of you interested in the mechanics of the program, here is what the computer is doing. The computer will tell you that the true probability of success is 15% or 25% with equal probability, for example. Then the computer will 'flip a coin'. If the coin comes up heads (which happens 50% of the time), it will select 15% as the true probability of success. If the coin comes up tails, it will select 25% as the true probability of success. You don't know what the true probability of success is. If the first coin came up heads, each time you choose to invest an additional time, the computer 'flips another coin' which comes up heads 15% of the time. If the first coin came up tails, each time you choose to invest an additional time, the computer 'flips another coin' which comes up heads 25% of the time.

The computer will ask you for your netid and a 7 digit ID number (which may be the ID number that the school assigned you or another 7 digit number). When you are finished the computer will store your results along with your netid. Do not use the number 1234567 as your ID. The computer automatically throws these entries away. Since I can not post your name with your homework score, I will post your answers by the last six digits of the ID number you enter on the web page. I will also link your first and second trials using the id number. On your second trial, make sure you enter the same ID number as the first time. If there are problems with the program or you have questions about the assignment, please ask me. You must run the program twice. I will grade you on the correctness of your investment decisions – i.e., did you take positive NPV projects and only positive NPV projects. I will use the maximum of your two scores in assigning a score for this homework.[2]

Additional Computer Instructions:

Go to the corporate finance web page and click on homework 3. Follow the instructions. The computer may take time to respond when many people are on -- be patient. You should also check the web page for any last minute changes to these instructions.

Although you will complete the assignment through the web, the underlying program runs on a secure server at Kellogg. Thus if you are not physically on campus when you complete the assignment, you will need to VPN into the Kellogg network before starting the assignment. For information on using VPN, see the instructions provided by Kellogg Information Systems (link available from the corporate finance web page).

[2] **If you do the homework only once, your score will be one half the score given on your first completion of the assignment.** You should do the program exactly twice. I will consider it a violation of the honor code if you complete the homework under a fictitious name.