BEM 103 Introduction to Finance.

Homework 9: Future and Options

Due Monday December 2 5pm (in TA or instructor boxes).

1. **Financial Literacy**: Answer these questions in 3 steps. (1) give an answer to the question, (2) look over the material assigned for class and find a definition (3) modify, if need be, your first answer. The goal is not for you to memorize a given answer but to be sure you can explain the concept to someone. If you can't, then you do not control that concept.
   a. Financial incentives
   b. Transaction costs
   c. Incomplete contracts
   d. Leveraged buy out
   e. Stock buyback

2. **Firm finance**:
   The GooT travel agency is owned by Mr Brown, he has hired a manager, Dr Blue. He pays Dr Blue a wage w=600 francs. The firm's revenues are 500+1600log(E) where E is Dr Blue's effort per period. Dr Blue like to surf so spending long hours at the travel agency is not on her agenda. In fact her disutility for effort is $0.5E^2$.

   1. Dr Blue knows that if she puts in below 20 units a year Mr Brown will fire her. Given the contract they have, what does she do?
   2. What is the discounted present value of the firm if it last 10 years and the interest rate is 5%?
   3. Suppose Dr Blue is poor and comes to Mr Brown with an offer to buy him out in a leveraged buyout for 8,000 francs with a coupon rate of 6%. Should he accept the offer? Note to answer this question you must first find Dr Blue's effort level if she were the owner of the leverage firm, then you must find the firm's profit net of interest costs And then let Dr Blue deposit these profits in an interest bearing account so she can pay off the loan at the end.
   4. Suppose however that Mr Brown does not want to sell the whole firm, at what price should he be willing to sell Dr Blue half the firm? Would doing so improve profits?
   5. Going back to the beginning, if contracts were complete what could Mr Brown do?

3. **Company C**
   Company C faces some difficulties completing its most important project and hires Ms Tech as project manager because she has some engineering expertise that is particularly relevant. The firm stock price is S and to induce Ms Tech to get the project back on the right track they offer her 1000 options at strike price S. Consider Ms Tech's choices of strategy to fix the problem in different scenarios.
   1. On her first day of work the stock price is S and she has to chose between a safe and a risky project completion path. If she picks the safe path, the fix will be expensive but work for sure and the stock price will be S with probability 0.5 and 1.2S with probability 0.5. If she picks the risky approach, the project does not get completed on

time with probability 0.5 and the stock price will fall to 0.8S. With equal probability she will find very cheap fix and the stock price will jump to 1.3S. Which strategy does she pick? What would share holders want her to do?

2. On her first day of work the stock price is S_1=1.2S and she has to choose between a safe and a risky project completion. If she picks the safe path, the fix will be expensive but work for sure and the stock price will be S_1 with probability 0.5 and 1.2 S_1 with probability 0.5. If she picks the risky approach, the project does not get completed on time with probability 0.5 and the stock price will fall to $0.8S_1$. With equal probability she will find very cheap fix and the stock price will jump to $1.3S_1$. Which strategy does she pick? What would shareholders want her to do?

3. Can you just change the success probabilities in case 1 to make the shareholders agree with her choice of strategy? How?

Gambling for resurrection

Sunset co has been investing heavily in real estate. Its financial structure is as follows it has 100 million dollars of debt, its equity is valued at 5 million dollars (each share is 5 dollars) and its management owns 1 million stock options with a strike price of $15.

1. It could just sell all its real estate holdings. Pay off its debt and distribute the residual to shareholders. If value additivity holds (or markets are efficient) what do shareholders expect to get?
2. Second it could undertake to finish a mall it has under construction and if all goes well it add 5 million dollars to shareholder value if they run into further problems with terrain stability the loss will be 15 million dollars. The probability of success is 75%.
3. Third it could undertake to complete the mall and build condos on the adjacent land it also owns. That would be a profitable operation only if the real estate market bounces back strongly, something experts put at 20% but in this case the next gain to equity would be 25 million dollars. In case of failure the firm looses 20 million dollars. The probability of success of the condos is independent of that of the mall. Compute the different net values of the firm and of the firm's stock.
4. In what cases would management exercise their options remember that if management exercises the options the firm has to buy back at current prices enough shares to complete the transactions. So the share value has to be established after net of the cost of paying out the options.
5. If bondholders are in control what strategy do they pursue for the firm?
6. If shareholders are in control what strategy do they pursue for the firm?
7. If management is in control what strategy do they pursue for the firm?
8. What is socially efficient?