BEM 103 FALL 2013 Practice Final

Instructions: This exam is open book and notes, but it should involve your work only, you will need a calculator and can use a computer. For each question where a computation is needed your answer must consist of the derivation of the formulas you need to arrive at your answer and the actual numerical solution, two digit precision is good (on interest rates, that is in 100th of percents). This exam should take you about two and half hour but you may use as much as five hours.
Short questions answer each in less than 100 words

A.(3pts). If a closed end fund trades below its net asset value (NAV) is that a violation of value

additivity?

B.(3pts). What is the highest possible future price for a barrel of oil given price today.

C.(3pts). Please define the efficient portfolio frontier

D.(3pts). Why might large (old/well established) firms prefer to fund new ventures with debt

rather than equity?

Problems

1. Modigliani Miller

Two Caltech undergraduates (J&J) create a new windmill that is adaptable to extremely cold and wet climates. To develop this invention they need 50 million dollars in capital for plant, equipment, and advances to power companies in Greenland and Nova Scotia. Net of variable costs (labor, supplies, shipping…) the firm would clear 5 million dollars a year two years after starting.

A.(2pts). If the interest rate is 5% and there is no equity premium show that J&J are indifferent between financing their capital needs by debt or by equity. What fraction of the firm's income do the two inventors retain?

B.(2pts).Now suppose there is a 20% possibility that the government of Nova Scotia decides at the end of year 1 to ban the new windmill reducing income by 50%. Show again that if markets are efficient, combinations of debt and equity do not affect the value of the firm.

C.(3pts).What financial structure implies that after an adverse regulatory decision by the government of Nova Scotia, the company would belong to bond holders?

2. Riskless bonds
A.(3pts).The yield on the 1 year T-Bill was 0.1% on May 7 2013, the yield on the 5 year T-Bill was 0.75%. Both have a coupon of 0.25% paid once a year. What is the expected interest rate from year 2 to 5?
B.(3pts).On July 1 2013 the yield on the 10 year T-Bill hit 2% up from 1.1% May 1 before. If those T-bills had a 1% coupon (paid annually). What were their prices on July 1 and May 1.

3 Future Fuel: The NbN airline company sells tickets a year in advance and it flies from Southbend to Southpark. The fuel consumption for each flight is of the form a+bq where q is the number of passengers. The CEO, Alfred H. Sir, contemplates hedging and scheduling.

A.(2pts).On the first day of the month he has to commit to a schedule (number of flights per month) for that month a year hence and at the end of each month he gets an update on how many tickets have been sold. What should he do if it wants to hedge fuel costs?

B.(2pts).Suppose NbN has raised all its capital as equity and in the absence of any hedging has a $\beta=0.5$. Does hedging increase or decrease its β if fuel price volatility is perfectly correlated with market volatility? Why?

C.(1pts).In case B, Alfred H. Sir owns 20% of NbN and is risk averse, does he want to hedge?

D.(2pts).Does its β increase or decrease if fuel price volatility is uncorrelated with market volatility? Why?

3 Future Rocks

You are a construction operator and are bidding to build a road to do so you will need 100,000 tons of granite rocks every six months to face earthworks.

A.(2pts).Supposing the price of granite is $10 today, the price of storage is zero, the real interest rate is 0.25% a month. What should future prices be for you to decide to hedge your granite rock needs? Give the sequence of price for 6 months, 1 year, and 1.5 years that would make you indifferent between hedging or not.

A.(2pts).Suppose you do hedge today for the next year and a half using futures. Six month later you take delivery of the first contracts. Then a week later a Canadian firm offers to deliver granite at $5 a ton. What should you do?

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Computing Options

A.(2pts). The current price of Ampere Co is 136. The price of an option with strike price one month ahead (i.e.) December 2013 is 9.50, assuming the interest rate is 0.25% a month. What is the expected price if the option were to be exercise next month (assume that the expected price if the option is not exercised is symmetric about the current price).

B.(2pts). Currently Ampere makes about 6000 cars a quarter, recently there have been some fires in cars crashes. Suppose that if this problem persists the price of shares will fall to 100 dollars by February 13 (3months hence). If the problem is quickly solved the stock price will bounce back to 172. Assuming the interest rate is 0.25% a month, what should be the value of binomial call option with strike price 136?

A.(2pts). Right now Ampere is facing problems securing enough batteries suppose each month supply can either go up by 5% or down by 5% and that will be fully reflected in the stock price because it is the only constraint on increasing output. What is a January call option worth today (assuming the interest rate is 0.25% a month).

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. 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%.   Alternatively, 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..

A.(2pts) Compute the different net values of the firm and of the firm's stock in each case.

B.(2pts)What is the return to bondholders, stockholders, and management in each of the two cases

C.(2 pts) If management is in control what strategy do they pursue for the firm and what is socially efficient?