Law 7930-12
Finance
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Black Tuesday

April 26, 2005
8:30-11:30
Room 331

This final exam consists of 3 problems (each containing questions a, b, and c) and 4 short essay questions. Each of the 7 problems/questions will be given equal weight in determining your final grade.

This is an open book and open note exam. You may use your textbook, other texts and articles, class notes, commercial outlines, commercial supplements, lucky charms, and any other printed or written materials you believe will be helpful in completing your answers. You are also allowed to use your financial calculators.

You will be given three hours to complete this exam, and you may allocate your time among the questions as you see fit. There is no answer sheet for this exam. Write all of your answers in bluebooks. You may write as long or as short an answer as you believe is necessary to completely answer the test questions. If you need extra bluebooks or scrap paper, please quietly request them from the proctor. If you finish early, please submit your bluebooks to the exam proctor and quietly exit the room.

If you perceive an ambiguity or error in any test question, please proceed to answer it, noting the ambiguity/error and making any reasonable assumptions you believe are necessary to answer the question. Please state these assumptions in your answer and provide your justification for the assumption. Also, partial credit for incorrect answers in the problem section is only available for those who show their work.

Good luck and have a nice summer.

1. As a newly minted corporate attorney, you acquire a job at a prestigious Manhattan law firm. You want to live on the upper West Side and you decide you can't possibly survive in less than 1,000 square feet of space. You find an apartment/co-op that you like that rents for $3,500 per month. The owner also offers to sell it to you outright for $900,000.

   a. If you know that rents in this neighborhood have increased, on average, by about 6% per year, what annual discount rate makes you indifferent between buying and renting this property?

      This question is a lot like problem #5.b from Problem Set 2-3 (though there you were valuing a stock instead of a house but both can be thought of as perpetuities.

      $$P = \frac{\text{annual rent}}{\text{annual discount rate - annual growth rate}} = \frac{3500 * 12}{i - .06} = 900,000$$

      therefore i-0.06=42,000/900,000=0.0467 therefore i = 0.0467+0.06=10.67%

   b. If, given your outside investment opportunities and your beliefs about the volatility of the NYC real estate market (driven by your beliefs about the potential for more terrorist attacks, renewed crime in the city, etc.), the annual discount rate you apply in estimating the value of this property is 20%, what would you be willing to pay to purchase this property outright (again assuming an expectation of 6% annual rental price growth)?

      This question looks like 6.a (though again, now we're talking about a house instead of a stock)

      $$\text{Price} = \frac{42000}{.2-.06} = \frac{42000}{.14} = 300,000$$

   c. If $900,000 is the going market price for this property (i.e., if the owner doesn't sell to you, he will easily sell at that price to someone else), what might it tell you about your estimate of the risk of this investment? What might it tell you about the NYC real estate market?

      It could mean that you've overestimated the risk (thus your discount rate is too high) or it could mean that your estimate of the risk is right, but the market is currently in a bubble.

2. The annual returns (in percentage terms) on the security FSU and the market index are as follows:

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Market	10.1	1.3	37.6	23.0	33.4	28.6	21.0	-9.1	-11.9	-22.1
FSU	25.0	8.0	38.0	26.0	41.0	33.0	46.0	-20.0	-35.0	-30.0

a. Using this data only, calculate FSU's beta.

This question is new, but it is a straightforward calculation of beta (p. 348 in text):

$$\text{beta} = \frac{\text{covariance between FSU return and market return}}{\text{market variance}}$$

The covariance formula is on p. 316. You need to sum up the products of the deviation of FSU's return from its mean and the deviation of the market from its mean and then take an average (since all of these returns represent a single year p in the formula = 1/n = 1/10.

The mean of the FSU return is 13.2 . The mean of the market return is 11.19 The sum of the products of the FSU deviation and the market deviation is 5353.34, so the covariance is 535.334 .

Variance is simply the square of standard deviation. The standard deviation formula is on p. 275. In essense variance is the average of the squared deviations of the market return from the mean of the market returns. The variance here is 388.16 .

So beta = 535.334/388.16 = 1.38 (it should have been obvious that FSU moved in the same direction as the market therefore beta would be positive; also you should have seen that FSU's changes were larger than the market's changes so beta would have to be larger than 1).

b. Using the beta you calculated in 2.a and assuming a risk free rate of return of 4, if you know the market return in 2003 was 29, what is the CAPM's prediction for FSU's return in 2003?

On page 348, you have the formula relating beta to the expected return:
$$E(r_{FSU}) - 0.04 = 1.38[.29 - .04] = 1.38 * .25$$
$$\therefore E(r_{FSU}) = 0.04 + 0.345 = 0.385 = 38.5\%$$
You should have known a) that the FSU return was going to be positive and b) it was going to be larger than the market return.

c. What are some reasons why the true return of FSU in 2003 might diverge from the return implied by the CAPM?

Assumptions of CAPM don't hold (i.e., investors don't maximize; market not in equilibrium, etc) or there has been a fundamental change in either the

market variance or the covariance between the two returns (remember you calculate on the basis of historical info, but the relationships may change in the future e.g., Enron going from a utility to a trading company).

3. You just graduated from law school and are trying to decide whether or not to enroll in an MBA program. Your best job offer is from the state government and it promises to pay you $50,000 per year in real terms for the next 30 years until you retire (since it's government work, there's virtually no chance you will be fired, but your only raises will be to compensate you for inflation). If you go to business school, tuition will cost $20,000 per year in real terms and it takes 2 years to earn an MBA. Your reasonable expectation is that if you do well in business school (you estimate the likelihood of this at 50%), you will be able to secure a job that pays $100,000 in inflation adjusted terms and you would retire in 28 years. If you don't do well, you think you can take the original state offer (making $50,000/yr in real terms and retiring in 30 years). Your annual discount rate is 10%. For simplicity, assume that all payments (your salary and the amount you would pay intuition) occur in lump sums at the end of each year long period.

   a. What is the net present value of enrolling in the MBA program?
   This problem is just like lots of the valuation problems we did in the problem sets with a slight change (i.e., the probabilistic component of whether or not you'll succeed in B-school).

   First you need to figure out the value of the govt job now (PMT = 50,000; FV = 0; N = 30; i = 10 => 471,345.72)

   Now you need to figure out the value of the good job (PMT = 100,000; FV = 0; N = 28; i = 10). This gives you a value of 930,656.65 but that's the value once you start the job in 2 years so you need to discount it (FV=930,656.65; N=2; i = 10, PMT = 0) therefore the future cash flow is worth 769,137.73 to you now (some people discounted it for 3 years, which isn't quite right given the structure of the problem, but I gave full credit to those people since I thought maybe there was some ambiguity).

   You also need to figure the value of the bad job (we already figured out the value of the cash flow above 471,345.72 but now we are only getting that money 2 years in the future so we need to discount it for those two years so its value is 389,541.92)

   Lastly, you need to calculate the present cost of tuition (PMT = 20,000; FV = 0; n = 2; i = 10) => 34,710.74

   The NPV of the MBA then is the present value of the expected cash inflow if you do the MBA net of the tuition costs and the foregone earnings from taking the other job now.

There's a few ways you can get to the right answer, but perhaps the most intuitive is this:
Prob of getting good job*value of good+Prob of bad job*value of bad job-value of foregone career-tuition cost:
0.5*769,137.73 + 0.5*389,541.92 - 471,345.72 – 34,710.74
   = 579,339.83 – 471,345.72 – 34,710.74 = 74,283.37

b. If, at the end of your first year of business school, you re-evaluate your chances of doing well to be only 10% (but all other assumptions stay the same), what should you do?

Your need to reevaluate your NPV calculation recognizing that the probabilities have changed and also recognizing that the income that comes from the MBA is now only 1 year away:

So recalculate the present value of the good job (FV =930,656.65, PMT = 0; N = 1; i = 10) => 846,051.50
Recalculate the present value of the bad job (FV = 471,345.72; PMT = 0; N = 1; i = 10) => 428,496.11
Recalculate the cost of tuition (FV = 0; PMT = 20,000; N =1, i = 10) = 18,181.82

Your new NPV is Prob Good job* good job value + prob bad job * bad job value – value of taking bad job now – cost of tuition:

0.1*846,051.50 + 0.9*428,496.11 – 471,345.72 – 18,181.82 =
84,605.15 + 385,646.50 – 471,345.72 – 18,181.82 = -19,275.89

Since NPV < 0 you should drop out (I gave credit to those who said drop out w/o any supporting calculations; for those who said stay in school, I gave some credit if they provided some calculations that weren't completely ridiculous).

c. How does the cost of your first year's business school tuition (which you've already paid) enter into the financial calculation you did to answer 3.b? Why?

You'll notice that we only included one year's worth of tuition in the calculation for 3.b. As of now, you have already paid the first year's tuition . . . that cost is sunk and therefore it should not affect your current decision (since no matter what you do, you can't get that money back).

Short Essay Questions

4. It is generally the case that when interest rates go up (e.g., if the Fed raises the federal funds rate), stock prices drop. Provide a potential explanation(s) for this empirical regularity.

Most simply, given that we value stocks as $P = Div/(i-g)$, if interest rates go up, investors will use higher discount rates when determining stock prices so the denominator goes up, lowering the price of stocks. Other answers could involve the idea that higher interest rates make it more difficult for firms to borrow making fewer investment activities attractive, etc.

5. Explain the difference(s) between an arbitrageur and a speculator in a financial market. What benefit(s) do each provide to passive investors in that market?

Arbitrageurs exploit pricing mistakes that arise because of technical shortcomings in the pricing (e.g., mutual funds practice of only revaluing funds at the end of the day even though the underlying securities may continue to trade and be repriced) or transactions costs. They do not think they have any better information than the market; they merely look for technical mistakes.

Speculators make bets on the basis of what they believe is superior info than the market has.

Both push asset prices toward their correct levels making the markets more efficient and both provide liquidity to the markets.

6. Despite the Modigliani-Miller Theorem, dividend policy might not be irrelevant to firm value. Provide some reasons why, in practice, shareholders might favor/disfavor the declaration of dividends.

MM assumes no taxes, no agency costs, etc. In the real world, these assumptions don't hold. Investors may favor dividends because they drain free cash out of the firm therefore when managers want to make new investments, they need to face the scrutiny of the equity/debt markets (i.e., mitigate agency costs). Dividends may also provide info to the market about the firm's performance if markets are not completely efficient.

However, due to differential tax treatment, investors may not want dividends. In the past, dividends were taxed at a higher rate than capital gains (this is no longer true), and there was differential taxation in the sense that capital gains taxes are deferred until the gains are realized whereas dividend income was included in the present year's income for tax purposes.

7. Even before 9/11, many airlines in the U.S. were in financial trouble because of their high debt levels and increased competition from upstart airlines. In the years

since, the financial woes of the industry have not disappeared and, in some sense, have grown worse due to reduced consumer demand and the rising price of oil (since fuel costs are a large component of an airline's operating costs). Given that airlines let consumers book flights far in advance of their travel dates and most airlines must enter into long term contracts with their unionized employees, it is often difficult for airlines to pass sudden fuel price increases onto their consumers in the form of higher prices or onto their employees in the form of lower wages. As a matter of financial strategy, what could the airlines do to protect their shareholders from bearing all of the risk of future oil price spikes? Why might the airlines hesitate in following these strategies?

The airlines could hedge the cost of fuel by entering into forward/futures contracts or buying options for oil/fuel. Or they could buy insurance against the possibility that fuel prices will rise in the future.

The main reason the airlines would be hesitant to do this is because of their high debt levels. That is, given that many of the airlines are in bankruptcy or are near bankruptcy, they might not be around to reap the benefits of having hedged against future price increases, though investors would have to pay for the hedges now. This is the classic moral hazard problem associated with debt.

Interestingly, Southwest, one of the few airlines that's not in financial trouble and has relatively low debt, has been hedging against fuel price increases for some time now.