ECONOMICS 7344, Spring 2020

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HOMEWORK 4. Due Thursday April 16.

For the first two questions, if not obvious, read the last part of the CCAPM note. That part is elementary, so you should be able to solve the first two quest

1. (20% of final, Summer 2010). Assume that there are two states of the economy next year, "good" and "bad," each with probability 0.5. In the good state aggregate consumption grows 4% and in the bad state it grows 0%. Now consider assets D and E. For these we know the payouts. For D the payout is 5 in the bad state and 15 in the good state, while for E the payout is 5 in the bad state and 5 in the good state. Use the CCAPM as it was derived in the handout. The safe rate of return is 1%.
a) What would be the prices of assets D and E?
b) What would be the returns (you can give gross or net, but state which) of assets D and E?

2. (10% of final 2010) Consider the CAPM-model. Assume the safe rate of interest is 10%, the mean return to the market portfolio is 20% and the variance of the return to the market portfolio is 0.02. Now consider assets D and E. For these we know the distribution of the pay-outs. For D the payout is normally distributed with mean 100 and variance 10, while for E the payout is normally distributed with mean 200 and variance 40. Assume the covariance of the payout to asset D with the market return is 1 while the covariance of payout to asset E with the market return is 2.
What would be the prices of assets D and E?

The following questions are in the "Obstfeld-Rogoff" note, so you probably do not want to start on this before class Monday.

3. (Partial equilibrium.) Consider an agent with income ("output" in Obstfeld-Rogoff) $Y_1 = 10$, $Y_2^A = 16$, and $Y_2^B = 6$, where A and B are states of the world with $\pi^A = 0.5$ and $\pi^B = 0.5$. Assume $p^A = p^B$, $r = 10\%$ and the discount rate is $\beta = \frac{1}{1+r}$.

a) Assume the agent has quadratic utility and that the agent can trade in Arrow-securities for both state A and state B. Does the "PIH-relation" $C_1 = EC_2$ hold?

b) Find C_2^A/C_2^B.

c) How many units of each Arrow-security does the agent purchase and how many units of the period 1 good? (this can be a negative number so "purchase" may mean sell.)

Now assume that the agent has utility function $U(C) = -\frac{1}{3}C^{-3}$.

d) Find C_2^A/C_2^B. (Give the intuition for why it does or does not change from the answer in part b). [This is probably a hard question]).

e) Find C_1.

f) Now assume $\frac{p^A}{p^B} = \frac{2}{3}$. Now find C_1 and C_2^S for $S = A, B$ and check if $C_1 = EC_2$.