**ECONOMICS 7344, Spring 2015**
**Bent E. Sørensen**
**March 3, 2015**

HOMEWORK 6. Wednesday March 4, due March 11.

1. Romer (4th ed.) question 8.1. (This homework builds on a very famous paper by Lucas and it is important that you try to understand the details—in other words, this will be assumed known for the exams.)

2. (15% of 2013 midterm 2) Assume that inflation in period $t$ is $I_t$ and $I_t$ is positively correlated with the (gross) market return $R_t^M$. Inflation has a positive mean (i.e., different from 0). Set the safe rate of interest to 0 for simplicity. A researcher may find the following patterns (with significant positive coefficients) for assets $i$:

$$
\begin{aligned}
(A) \qquad & R_t^i = \alpha^i I_t + u_{it} \ , \\
(B) \qquad & R_t^i = \beta^i R_t^M + u_{it} \ , \\
(C) \qquad & R_t^i = \alpha^i I_t + \beta^i R_t^M + u_{it} \ ,
\end{aligned}
$$

where the $u$ error terms are white noise.
i) In case A, does the CAPM hold? does the CAPM not hold? or, we cannot tell?
ii) In case B, does the CAPM hold? does the CAPM not hold? or, we cannot tell?
iii) In case C, does the CAPM hold? does the CAPM not hold? or, we cannot tell?

3. Assume that an economy is inhabited by identical agents (or a representative agent) with logarithmic utility functions.
a) If the (non-stochastic) growth rate of consumption is 4 percent from period 1 to period 2 and agents have a discount factor of 0.99 (you can approximate the discount rate by 0.01), what is the safe rate of interest (the rate of interest from period 1 to period 2)?
b) Maintain the assumptions of part (a) but now assume the expected growth rate of consumption from period 2 to period 3 is 8 percent. Using the Euler Equation for the representative agent, find the (period 1) forward rate of interest for period 2 to period 3. (For this question only, you can make the assumption that $E\frac{1}{X} = \frac{1}{EX}$ for a certain variable $X$.)

4. (This is a question from a final exam I gave at Binghamton.) Consider the Consumption-CAPM (C-CAPM). Assume that there are two states of the economy next year, "good" and "bad", the good state happens with probability 0.5 (and the bad state 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 pay-outs. For D the payout is 20 in the bad state and 10 in the good state, while for E the payout is 5 in the bad state and 5 in the good state. Use the C-CAPM as it

was derived in the handout. The safe rate of return is 1%.
What would be the prices of assets D and E?