

Final Exam, May 3 — 4 questions. All sub-questions carry equal weight unless otherwise indicated.

1. (15%) Assume that Joe's wage income follows the AR(2) process

$$y_t = 3 + 0.9y_{t-1} + 0.1y_{t-2} + e_t \quad (*)$$

where e_t is white noise with variance 3.

Assume Joe's boss gave Joe a wage of 100\$ period 0 and a salary of 50\$ in period 1.

- i) (5%) What is Joe's expected wages in periods 2 and 3?
ii) (10%) If Joe's boss give Joe a raise of 50\$ in period 2, what would be Joe's change in consumption if the rate of interest is 10%. (Assume the PIH holds.)

2. i) (5%) i) Explain what is meant by excess sensitivity of consumption. (Be precise about all assumptions.)
ii) (10%) Explain what is meant by excess smoothness of consumption.

3. (10%) Consider the CAPM-model. Assume the safe rate of interest is 3%, the mean return to the market portfolio is 5% 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 1000 and variance 5. 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?

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4. (60%) Consider the case of a 3 agents (“Home,” “Foreign,” and “Really Foreign”), 2 periods, 2 states-of-the-world model where agents can trade using a full set of Arrow securities. Assume that all agents have quadratic utility functions $U(C_0) + \beta E_0 U(C_1)$, where $U(C_t) = C_t - \frac{1}{200} C_t^2$ and $\beta = \frac{1}{1.1}$.

Assume that the endowment of the first agent is $y_0 = 3$, that of the second agent in period 0 is $y_0^* = 3$, and that of the third agent $y^{**} = 6$.

The following table gives the possible endowments and the probabilities for Home, Foreign and Really Foreign:

	Home		Foreign		Really Foreign	
State of the world:	A	B	A	B	A	B
period 1 endowment	2	7	7	2	9	9
probability:	.5	.5	.5	.5	.5	.5

- Find the prices of the Arrow-Debreu assets for each of the 2 states of the world.
- Find the rate of interest.
- Argue in economic terms why the interest rate is larger or smaller than 0 and larger or smaller than the discount rate.
- Assume that now only bonds can be traded. Find the rate of interest?
- Find the consumption in period 1 and period 2 of the Home agent. (If you write down one equation in one unknown, that is considered a full answer, don't spend time on solving.)
- Assume that now there again are Arrow-Debreu securities but $U(C) = \log(C)$. Find the prices of the Arrow-Debreu securities.
- Find the rate of interest.
- Find the consumption of all agents in all periods and all states of the world.
- Assume that the agents only have access to a bond. State 3 equations in 3 unknowns that would determine the consumption of the agents and the interest rate. (The equations are messy to solve, so do not solve them.)
- Assume now that agents have access to an Arrow-Debreu security that pays out one unit in state A and the agents also have access to a bond. Find the consumption of all agents in all states of the world. (Hint: If you think carefully about this, you may not have to do a lot of calculations.)