

Midterm Exam 2, April 9—3 questions, all sub-questions carry equal weight.

Assume that 2 agents live for 2 periods in an economy with perfect Arrow-Debreu markets and no storage. Assume that the endowment of the first agent is $y_0 = 1, y_1 = 2$ and that the endowment of the second agent in period 0 is $y_0^* = 1$ and in period 1 his or her endowment is $y_1^* = 3$ in the “good state” g . In the “bad state” b the endowment of the second agent is $y_1^* = 1$. Assume that the good state happens with probability $1/2$.

Assume each agent maximizes a utility function

$$-C_0^{-1} - E_0 C_1^{-1} .$$

- i) Find the period 0 prices of the Arrow securities that pays out one unit in the good and the bad state, respectively. (I suggest that you follow Obstfeld-Rogoff and parameterize such that the period 0 price of 1 unit delivered in the good state is $p^g/(1+r)$ and in the bad state it is $p^b/(1+r)$ which implies that $p^g + p^b = 1$ when r is the safe rate of interest. The price of a unit of period 0 consumption is normalized to 1.)
- ii) Find the safe rate of interest r .
- iii) Find the value (in terms of period 0 output) of the second (“*”) agent’s output.
- iv) Find the level of consumption of each of the agents in periods 0 and 1 and both states of the world. Which agent has a higher level of consumption and why?
- v) Argue, using words, whether the consumption of agent 1 would increase or decrease (compared to the model above) if the utility function were $\frac{C_0^{-2}}{-2} + E_0 \frac{C_1^{-2}}{-2}$. (Spell this out using the correct term from consumer theory.)
- vi) Demonstrate what would happen to the interest rate (i.e., would it go up or would it go down) if world output in period 1 were constant rather than a random variable—assume that the mean value of period 1 output is the same. Use Jensen’s inequality.
- vii) What would happen to the interest rate if world output in period 0 increased (with no change in period 1). Show this mathematically and interpret in words.
- viii) What would happen to the interest rate (going up or down) if the agents discounted second period consumption with positive discount rate instead of with the 0 discount rate used so far? Show this mathematically and interpret in words.
- ix) Now change the assumptions and assume that no Arrow securities exists, but that the agents in period 0 can trade a safe asset. Find the safe interest rate in this case (you will get a quadratic equation in the gross interest rate, I am not sure yet which root to pick, try and argue for what you do). Explain intuitively which agent would be expected to purchase a positive amount of the bond in period 0.

x) What is the period 1 consumption of agent 2 in this situation (in each state of the world)?

2. (10%). Explain what is meant by “the equity premium puzzle” using *words*.

3. (20%). In Chapter 5.1 of Obstfeld and Rogoff (where prices are taken as given) a condition is given for when a consumer (“country” in the book) would choose the same level of consumption in each state of the world.

i) What is the condition?

ii) Derive this condition.