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ECONOMICS 7344 – MACROECONOMIC THEORY II, Spring 2016

Homework 3. February 11 (updated, Monday Feb 15), due Wednesday February 17.

1. Derive the formula for "b" (the slope in the Lucas supply curve) in terms of the deep structural parameters, γ, η, Var(z) and Var(m).

2. (This was question 2 in the 2005 final with a weight of 20%) Consider the Lucas imperfect information model.
Assume that shock to individual demand (z_i in the text) have a variance σ_z^2. Now assume that demand follow one of the two following models

$$m_t = 1 + .2m_{t-1} + u_t \ ; \ var(u_t) = 4 \ , \ (A)$$

or

$$m_t = 3 + .6m_{t-1} + u_t \ ; \ var(u_t) = 2 \ . \ (B)$$

(The process for individual demand is the same in both cases.) Assume that agents observe m_{t-1} before making decisions in period t; i.e., at time t m_{t-1} is given. Then assume that the shock u_t takes the value 1. Now would the impact of the shock be larger if monetary policy is described by model A or by model B. (Explain the logic of your answer).

3. (This was 25% of the 2012 Midterm 1—I had covered it in class already.) Assume a consumer maximizes the utility of consumption of N goods $C_1, ..., C_N$ using the utility index $U(C_1, ..., C_N) = (\Sigma_{i=1}^N C_i^{\frac{\eta-1}{\eta}})^{\frac{\eta}{\eta-1}}$. The price of good i is P_i and the consumer faces the budget constraint $\Sigma_{i=1}^N P_i C_i = Y$ where Y is the consumer's exogenous income. One can find that $C = Y/P$ for a price index P, where $C = (\Sigma_{i=1}^N C_i^{\frac{\eta-1}{\eta}})^{\frac{\eta}{\eta-1}}$. Derive P and verify that $C = Y/P$ (assume that each quantity is so small it doesn't affect P). Also find the optimal C_i in terms of P_i, P, and Y. (You will get 5 points for just stating the right formula for P).

4. (From the January 2011, make-up core exam.) A consumer lives for 2 periods and

earns $Y_1 = 10\$$, in period 1, and in period 2 he or she earns $Y_2^a = 10\$$ with probability 1/2 (state a) and $Y_2^b = 30\$$ with probability 1/2 (state b). The consumer starts with 0 assets and maximizes

$$U(C_1) + \frac{1}{1.10} E_1 U(C_2) \ ,$$

where

$$U(C) = 100C - \frac{1}{2}C^2 \ .$$

Assume that the safe rate of interest is 10 percent.

A) (5%) Let B denote the amount lent in period 1 (or, equivalently, the amount of a safe bond bought). Assuming that the agent only have access to a safe bond, find B and consumption in each period (for period 2, that means the consumption plan listing consumption in state a and state b.)

For the next question, assume the rate of interest on the bond (lending) is 0 percent and the consumer maximizes

$$U(C_1) + E_1 U(C_2) \ .$$

(These changes are just to simplify calculations.)

B) (15%) Now assume that a stock (equity) exists besides the safe bond. Let the amount of equity bought be S (it can be negative). Assume that the stock has a (net) rate of return of 0% if state a occurs [meaning that agent gets back the principal] and 100% if state b occurs. Find B and S and the implied consumption plan. (Note: the question is set up with "extreme" values to make the algebra easier, so the solution may also be "extreme." Also note, that for the PIH negative values of consumption are valid. If you are running out of time, most points will be accrued when you write down the equations that determines the answer.)