

ECONOMICS 7344—MACROECONOMIC THEORY II, part b, Spring  
2022

Homework 3. Due Friday April 15.

1. (13% of the January 2015 exam) Assume that income follows the ARMA(1,1) process

$$y_t = 3 + \frac{1}{3}y_{t-1} + e_t + 1.5e_{t-1} \quad (*)$$

where  $e_t$  is white noise and  $y_{-1} = 1$ ,  $e_{-1} = 0$ , and  $e_0 = 4$ .

Also assume that the rate of interest is  $\frac{1}{3}$  (i.e., the net interest rate is 33.333 percent) and equal to the discount rate.

Further assuming that a given agent has quadratic preferences and can freely lend and borrow at the fixed interest rate.

A) (6%) What is the change in consumption from period  $-1$  to period  $0$ ?

B) (7%) Assume the agents assets at the start of period  $0$  are 200 dollars. What is the level of consumption in period  $0$ ?

2. (20% of Midterm 1, 2016) Assume that a consumer has a utility function  $U(C)$  where  $U$  is monotonically increasing and strictly concave. Assume that the consumer maximizes

$$\sum_{t=0}^{\infty} \beta^t U(C_t),$$

subject to a flow of known income  $y_t$  and initial wealth. Also assume that the interest rate is equal to the discount rate.

a) Show that consumption is constant over time.

b) Assume that  $y_0 = 10$ ,  $A_0 = 300$ , and

$$y_t = 1.1 y_{t-1}.$$

If the interest rate is 20% (implying that the discount factor  $\beta = 1/1.2$ ), what is the level of consumption?

3. (20% of Midterm 1, 2016) a) Explain what is meant by “excess sensitivity of consumption.”

b) Explain what is meant by “excess smoothness of consumption.”

In either question, you have to be as explicit as was the coverage in class.

4. (20% of Midterm 2, 2016) This question is about the Campbell-Mankiw rule-of-thumb (rot) consumer model.

a) Write down the model and explain the content.

b) Assume that you have time series of data on (aggregate) income and consumption.

Let  $y_t$  be income and  $c_t$  be consumption. Assume that income is well describe by a stationary AR(1) in differences and that the covariance between  $\Delta y_t$  and  $\Delta y_{t-1}$  is 0.5 while the variance of  $\Delta y_t$  is 1.0. Further assume that when you regress  $\Delta c_t$  on  $\Delta y_{t-1}$  you get a coefficient of 0.8.

Given these numbers, what is the estimated fraction of rot consumers in the Campbell-Mankiw model?