

ECONOMICS 7344 – MACROECONOMIC THEORY II, Spring 2006

Homework 4. Thursday February 12. Due Wednesday February 19 (NOTE: The material in questions 3–5 will be covered in class Monday so allocate time Monday afternoon or Tuesday for doing these questions.)

1. Compare the formulas (6.50) and (6.51) in the text. Calculate the profits π_{FIXED} and π_{ADJ} for a 10 percent increase in real demand (just start from $M/P = 1$) for $\eta = 5$ and $\nu = 0.1$. Sketch the labor supply curve for this value of ν . Redo the calculations for $\eta = 2$. Interpret why the result change. Then assume that $\nu = 5$ and calculate the profits for this value (keep $\eta = 2$) and interpret. Sketch the labor supply curve for this value and interpret why it is different from the previous one.

2. Define the lag polynomial $a(L) = 1 + .5L$ and $b(L) = 1 - L + L^2$. Define the z-transform $a(z)$ corresponding to $a(L)$ and $b(z)$ corresponding to $b(L)$ and find the roots [meaning the solution(s) to, say, $a(z) = 0$] in each polynomial. Find the polynomial $c(z) = a(z) * b(z)$. Define the lag-polynomial $c(L)$ using the coefficients from $c(z)$ and verify that for a given time series x_t :

$$c(L)x_t = a(L)[b(L)x_t] .$$

3. (24% of midterm 1, Spring 2005) Assume that income follows the AR(1) process

$$y_t = 2 + 0.4y_{t-1} + e_t \quad (*)$$

where e_t is white noise with variance 3.

a) Is this time-series process stable?

b) Assume that y_0 is a random variable. For what values of the mean $E(y_0)$ and the variance $\text{var}(y_0)$ will the time series $y_t; t = 0, 1, 2, \dots$ be stationary?

c) What is $E_1 y_3$ if $y_1 = 5$ and $y_0 = 2$?

d) Write the infinite Moving Average model that is equivalent to the AR(1) model (*) [assuming that the process now is defined for any integer value of t]. (Half the points are from getting the correct mean term.)

4. (4% Core Spring 2004) Assume that income follows the ARMA process

$$y_t = 3 + 2.0y_{t-1} + e_t$$

where e_t is white noise.

- a) Is this time-series process stable?
- b) If $y_0 = 2$, what is E_0y_1 ?

5. (12% Final Exam 2004) Assume that income follows the ARMA process

$$y_t = 3 + 0.3y_{t-1} + e_t$$

where e_t is white noise.

- a) Is this time-series process stable?
- b) What is $E_{t-2}y_t$ if $y_{t-2} = 5$ and $y_{t-3} = 10$?