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ECONOMICS 7344 – MACROECONOMIC THEORY II, Spring 2008

Homework 5. Wednesday February 13. Due Wednesday February 20.

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 (M/P)(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 $a(L) = 1 + .5\,L$ 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 $\mathrm{var}(y_0)$ will the time series y_t; $t = 0, 1, 2, ...$ 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

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

where e_t is white noise.

a) Is this time-series process stable?

b) If $y_0 = 2$, what is $E_0 y_1$?

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

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

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 $y_{t-3} = 10$?