ECONOMICS 7344, Spring 2009
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March 9, 2009

Midterm Exam 1, March 9—3 questions. All sub-questions carry equal weight except where otherwise indicated.

1. (25%) a) State precisely the assumptions underlying Hall's 1978 Permanent Income Hypothesis/Model Model (PIH).
b) Derive the result that consumption is a martingale under these assumptions.

2. (25%) 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. (You can use an integral, rather than a sum, if you find it convenient.)
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 such that $C = Y/P$. Also find the optimal C_i in terms of P_i, P, and Y. (You will get 10 points for stating the right formula for P).

3. (50%) Assume that a time series z_t follows the Moving Average process

$$z_t = 10 + u_t + .8u_{t-1} + .7u_{t-2} \ .$$

a) Find $\frac{\partial z_{t+1}}{\partial u_t}$.
b) Plot the Impulse Response Function (IRF) for z_t.

Now assume that income of an individual follows the process

$$y_t = 10 + .5y_{t-1} + u_t \ .$$

c) Plot the IRF for y_t.

Next assume that you know that $y_0 = 0$.
d) Find $E_0 y_1$ and $E_0 y_2$.

Now assume that the rate of interest is fixed and equal to 10 percent.
e) Find the expected present value of present and future income; i.e., $(E_0 \Sigma_{t=0}^{\infty} (1+r)^{-t} y_t)$. [Hint: To get full point you need to solve for a compact expression; i.e., not give the answer as an infinite sum.]

Finally, assume the individual has no assets and his or her consumption follows the PIH model.
f) What is c_0, the individual's level of consumption in period 0?