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Dynamic Microeconomics. Midterm October 14, 2013.
(All questions have weight 20%.)

1. Assume $Ef(x_t, \theta)$ is a vector moment condition which has expectation 0 for $\theta = \theta_0$ and you have observations $x_1, ..., x_T$.
a) Explain how the GMM estimator works.
b) Explain the Hansen test of overidentifying restrictions. (The formula, when is it valid, what is the asymptotic distribution under the null. What is the null hypothesis?)

2. Is there any problem involved in estimating dynamic panel data models with cross-sectional fixed effects? Explain what it is and the order of magnitude of the bias.

3. Assume that there are two states of the world and a consumer has utility 1 in the first state of the world and 4 in the second state of the world.
Find the expected value of $\Sigma_{t=0}^{\infty}\beta^t u(c_t)$ given a discount factor $\beta = .5$, initial probabilities $\pi_0' = (.4, .6)$, and a transition matrix P, where

$$P = \begin{pmatrix} 1 & 0 \\ .5 & .5 \end{pmatrix}.$$

4. a) Calculate and plot the impulse response functions for the model

$$\begin{pmatrix} x_{1t} \\ x_{2t} \end{pmatrix} = \begin{pmatrix} u_{1t} \\ u_{2t} \end{pmatrix} + \begin{pmatrix} 1 & 0 \\ .3 & .2 \end{pmatrix}\begin{pmatrix} u_{1t-1} \\ u_{2t-1} \end{pmatrix} + \begin{pmatrix} 1 & 0 \\ 0 & .5 \end{pmatrix}\begin{pmatrix} u_{1t-2} \\ u_{2t-2} \end{pmatrix},$$

where the error terms are independent.
b) If the variance of u_1 is 1 and the variance of u_2 is 2, and u_1 and u_2 are independent calculate the variance decomposition for x_1 and x_2.

5. Dynamic Programming.
a) Set up the Dynamic Programming problem as we did in class. Explain all functions.
b) Write the growth model with labor and capital as a Dynamic Programming problem.
c) Write down the Bellman equation. (Explain the definition of all terms.)