BOSTON COLLEGE
Department of Economics

Macroeconomics Theory Comprehensive Exam
September 2, 2011

Directions:

There are four questions to this exam.

For each question, you will need **a separate bluebook** for your answers.

Please follow the instructions for each question carefully. Write your **Alias and question number** on the front of each blue book.

Please read the entire exam before writing anything.

NO QUESTION 1 & 2

(Schiantarelli)

Made up his questions the night before + added to exam the morning of.

Question 3:

Consider the following Dynamic New Keynesian (DNK) model.

Consumers face the problem:

$$\text{Max} \quad E_t \sum_{j=0}^{\infty} \beta^j \left[\log\left(C_{t+j}\right) + \chi \log\left(\bar{H} - H_{t+j}\right) \right]$$

s.t.

$$C_t + \frac{B_t}{P_{t\,t}} = \frac{W_t}{P_t} H_t + \left(1 + i_{t-1}\right) \frac{B_{t-1}}{P_t} + \Pi_t$$

with standard notation. C is a Dixit-Stiglitz aggregate of a continuum of consumption varieties C_j with elasticity of substitution $\theta > 1$. B represents private (inside) debt, and is zero in equilibrium. Assume an *ad-hoc* money demand function:

$$Y_t = \frac{M_t}{P_t}.$$

A firm producing output of type j has the production function:

$$Y_{jt} = Z_t H_{jt}.$$

There is no investment, so
$$Y_t = C_t.$$

Initially, suppose that prices are fully flexible. In that case, firm markups are constant and equal to $\frac{\theta}{\theta - 1}$.

For parts (a)-(c) only, monetary policy is given by $M_t = \bar{M}$, $\forall t$.

a) Derive the New Keynesian IS curve for this model.

b) Suppose there is a permanent increase in Z. What are the time paths of Y, H, i and P starting from time t? Make as rigorous an argument as you can. You should try to solve the model analytically.

Now suppose that due to frictions in changing prices, inflation follows the process:

$$\pi_t = \beta \pi_{t+1} + \kappa \left(Y_t - Y_t^f \right),$$

where Y^f is the flexible-price level of Y for the same value of Z, and $\kappa > 0$.

Note that in this case markups are not necessarily constant over time.

c) Under the assumption that prices change slowly, suppose there is a permanent increase in Z starting from period t. What are the time paths of Y, H, i and P starting from time t? You do not need to solve the model analytically. Make as rigorous an argument as you can.

d) Suppose that instead of following the rule $M_t = \bar{M}$, the monetary authority sets the money supply optimally in every period. Assume that the monetary authority wishes to minimize

$$E_t \sum_{j=0}^{\infty} \beta^j \left[\pi_t^2 + \phi \left(Y_t - Y_t^f \right)^2 \right]$$

where $\phi > 0$. How should an optimizing central bank set the money supply following an increase in Z? How will this new assumption change your answer to part (c)?

e) Suppose you wish to test whether the US economy is better described by the flexible-price or the sticky-price model. (You should allow for the possibility that the monetary authority follows policies other than $M_t = \bar{M}$.) Can you construct a test to discriminate between these two models based on the behavior of economic aggregates following a shock to Z? Be explicit about the assumptions necessary for your test to work.

Question 4:

Suppose that consumers maximize the utility function:

$$E_t \sum_{j=0}^{\infty} \beta^j \left[\frac{C_{t+j}^{1-\sigma}}{1-\sigma} + \chi \log\left(\bar{H} - H_{t+j}\right) \right]$$

subject to a standard budget constraint. Assume $\sigma \geq 0$.

Production is done by competitive firms, with the production function:

$$Y_t = \bar{K}^\alpha H_t^{1-\alpha}$$

where $\bar{K}$ is the fixed quantity of capital.

There is a government, which finances expenditures using lump-sum taxes. There is no investment, so

$$Y_t = C_t + G_t.$$

a) Derive the consumption Euler equation for these preferences.

b) The intuitive statement of the Permanent Income Hypothesis is that people want to smooth consumption over time—that is, to keep C_{t+1} the same as C_t. Show that the extent of actual consumption smoothing in general equilibrium depends on the size of σ. For what values of σ (small or large) will consumption generally be smooth in equilibrium?

c) Assume that shocks to G may be persistent, but are not permanent. For a given size and persistence of a shock to G, show that the effect on Y will be larger if σ is larger. Explain the economics behind this result.
Hint: For intuition, first work out the extreme cases where σ is very small or very large, and consider a 1-period shock.