Hanes' comp questions, June 2014 ANSWERS

4) Unless the price level can "jump," output cannot always remain at the natural rate. Demonstrate with an example. *6 pts. See notes, "Money."*

5) Consider two economies, A and B, both described by Romer's static imperfect-competition model, so that the representative household's utility function is:

$U = \left[\int_{i=0}^{1} C_i^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}} - \frac{1}{\gamma} L^{\gamma}$ where η is the elasticity of demand for an individual good.

The two economies are exactly the same, they even have the same money supply, *except* that the value of the utility-function parameter η is *bigger* in economy A.

Is each of the following higher in A, higher in B, or the same in both countries? No explanation necessary; just write "higher in A," "higher in B," "same in both," or "no way to know." *1 pt each.*
a) Real wage *Higher in A*
b) Nominal wage *No way to know.*

It depends on parameter magnitudes. This was really too hard a question; sorry. I meant to ask about the price level not the wage level. Price level is higher in B, but real wage is lower in B, so nominal wage is ambiguous.

c) Employment *Higher in A*
d) Output per worker *Same in both*
e) Leisure per worker *Higher in B*
f) Utility received by representative household. *Higher in A*

6) Consider the Mankiw-Reis "sticky information" model.
a) How are the assumptions of the sticky information model different from the assumptions of the Calvo "sticky prices" model? *3 pts. See notes.*
b) How is the Phillips curve derived from the sticky-information model different from the Phillips curve derived from the Calvo model, and similar to the Phillips curve derived from the Lucas supply function model? *3 pts. See notes. In both LSF and sticky-information PC, the "expectations" component is past expectations of current inflation.*

7) Consider the following model:

$y_t = {}_t y_{t+1}^e - sr_t$

$\pi_t = {}_t\pi_{t+1}^e + y_t + u_t \quad where \; u_t = \rho u_{t-1} + \epsilon_t$

$r_t = \pi_t$

where π is the inflation rate, y is the output gap, r is the gap between the real interest rate and the natural rate of interest, and ϵ is a mean-zero i.i.d. random variable.

Assume agents in the economy have rational expectation. They know the economy must eventually converge to a long-run steady state with $y = 0$, $\pi = \pi^e = 0$.

a) Solve for π_t in terms of u_t (not ϵ_t). Hint: begin by conjecturing that inflation follows an AR(1) process. *4 pts. See notes.*
b) Solve for i_t in terms of u_t.
4 pts. $i_t = r_t + {}_t\pi_{t+1}^e = \pi_t + \rho\pi_t = (1+\rho)\pi_t$ *and use answer to a).*

8) Consider an economy where:

$$y_t = {}_t y^e_{t+1} - sr_t + \epsilon^{IS}_t$$

$$\pi_t = {}_t \pi^e_{t+1} + y_t + \epsilon^{AS}_t$$

where π is the inflation rate, y is the output gap. ϵ^{IS} and ϵ^{AS} are uncorrelated with each other and are both mean-zero i.i.d. - there is *no persistence* in these shocks and they cannot be predicted in the previous period. The central bank chooses r_t to minimize a loss function:

$$L = E\left[\frac{1}{2}\pi^2 + \frac{1}{2}y_t^2\right]$$

Note that I have assumed nothing so far about the relative importance of the two shocks: the variance of ϵ^{IS} might be miniscule while the variance of ϵ^{AS} is big, or vice-versa. Also, I have assumed nothing about the central bank's information when it sets r_t : it might know the current values of both ϵ^{IS} and ϵ^{AS} , or know neither, or know the current value of one but not the other.
For each of the following cases, describe some circumstances under which that case could hold.

2 pts each.GODDAM IT, some of you talked about interest-rate rules and drew IS/MP graphs again. Did 't you look at the answers to the final exam?
a) r_t varies, is negatively correlated with y_t, positively correlated with π_t. Also, y_t is negatively correlated with π_t. *This happens if the CB can see the AS shock and shocks are predominantly AS, or if CB can see both AS and IS shocks and there are shocks of both types.*
b) r_t varies; y_t does not vary; π_t varies only to a miniscule degree. *This happens if CB sees IS shocks and IS shocks predominate.*
c) r_t is constant. y_t and π_t vary so that y_t is positively correlated with π_t. *This happens if CB sees niether type of shocks and IS shocks predominate, or there are shocks of both types (note that AS shocks do not affect output).*
d) r_t is constant. π_t varies. y_t varies only to a miniscule degree. *This happens of CB sees neither type of shock and AS shocks predominate (note that AS shocks do not affect output).*

9) "Standard" New Keynesian models have perfect capital markets, in which any household or firm can borrow freely at the interest rate set by the central bank. Two implications of those models are:
I. Shocks to the IS or spending equation must be due *either* to changes in government spending *or* to changes in the representative household's utility function parameters.
II. The magnitude of the response of output to a monetary policy shock (an exogenous disturbance to the interest-rate rule or central bank loss function) is entirely determined by the representative household's utility function parameters (the ones that matter for the Euler equation), any costs of adjusting the rate of capital investment, and the expected persistent of the shock.

At the end of the semester we considered three models of "imperfect" financial markets: the Bernanke Gertler Gilchrist model with asymmetric information between entrepreneurs and investors; the Diamond-Dybvig model of runs on financial intermediaries, and the Woodford model that embedded financial intermediaries in an IS/MP model.
a) How do the capital market "imperfections" described by those models change one's conclusions with respect to I? *3 pts.*
There are more sources of shock to IS:
- *any exogenous factor that changes wealth of entrepreneurs*
- *any exogenous factor that changes capital of financial intermediares*
- *exogenous bank runs, e.g. due to "sunspots."*

b) How do the capital market "imperfections" described by those models change one's conclusions with respect to II? *3 pts each.*
The response of output to an MP shock is also affected, and magnified, by "financial accelerator" factors. (You could also mention debt deflation here.)