Macroeconomic Theory (ECON 8106)

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Problem Set 5

Due Date: December 13th, 2016

Please hand in one physical copy per group and write the names of your group
members on the first page.

Question 1:

Consider a standard cash-credit economy. The utility function is strictly increasing, strictly
concave, and continuously differentiable. You may also assume that the cash-in-advance
constraint is always binding.

a. Fix $R_t = R$. Suppose A_0 is given and $\dfrac{T_t}{P_t}$ is fixed. Are real allocations uniquely identified?
   Is the price level pinned down?

b. Suppose that the real transfers can vary with the price level. Specifically, let $\dfrac{T_t}{P_t} = \dfrac{B_0}{P_0}$. In
   other words, the taxes levied by the government depend on the initial level of government
   debt. Are real allocations uniquely identified? Is the price level pinned down?

Question 2:

Consider a New Keynesian model with shocks to technology and to the nominal interest
rate. Let the technology of the monopolistic competitors be given by

$$Y_t(i) = A_t N_t(i)^{1-\alpha}$$
$$A_t = \rho^a A_{t-1} + \epsilon_t^a$$

and each atomistic monopoly has a $1 - \theta$ probability of being able to set its price in a given
period. The policy rule is given by an interest rate rule:

$$i_t = \rho + \phi_\pi \pi_t + \phi_y(y_t - y) + \nu_t$$
$$\nu_t = \rho^\nu \nu_{t-1} + \epsilon_t^\nu$$

where pi_t is inflation (i.e. $\pi_t = p_t - p_{t-1} = lnP_t - lnP_{t-1}$), y_t is logged output and y is the
log of target output. ν_t is the monetary shock.

a. Define an equilibrium in this model.

b. Log-linearize the model around a 0 inflation steady state. Derive the 3 equation model:
   The Phillips Curve, the Dynamic IS equation, and the Policy Rule.

c. Derive conditions under which the linear system has a unique bounded solution.

d. Show that there also exist, under those same conditions, an unbounded solution.

e. If the conditions are not satisfied, show that there is a continuum of solutions.

f. How this nominal determinacy relates to whether or not there is a unique set of real allocations?

g. Explain the difference between the result in (f) and the results on determinacy in the cash-credit economies. What is the intuition behind this?