797N – Macro 3
Fall 2015

Problem set 2

1. According to Lucas (1981, p. 242),

   "The worker who loses a job in prosperous times does not *volunteer* to be in this situation: he has suffered a capital loss. Similarly, the firm which loses an experienced employee in depressed times suffers an undesired capital loss. Nevertheless, the unemployed worker at any time can always find *some* job at once, and a firm can always fill a vacancy instantaneously. That neither typically does so *by choice* is not difficult to understand gven the quality of the jobs and the employees which are easiest ti find. Thus there is an involuntary element in *all* unemployment in the sense that no one chooses bad luck over good; there is also a voluntary element in all unemployment, in the sense that however miserable one's current work options, one can always choose to accept them."

   Doesn't this argument convincingly refute Keynesian claims of "involuntary unemployment" as a distinct category? If not, why not?

2. (Midterm 2014) Formalizing (a part of) Keynes's argument in chapter 19 of the *General Theory*, Tobin (1975) showed that an increase in price flexibility need not be stabilizing. A modified 2D version of Tobin's system can be written

$$\dot{p} = p[A_p(Y - Y^*) + x] \tag{1}$$
$$\dot{x} = A_x(\hat{p} - x) \tag{2}$$

   where Y and p denote real output and the price level; x is the expected rate of inflation; Y^* is 'full employment'; A_p and A_x are positive constants and, using standard notation, 'dots' and 'hats' denote time derivatives and rates of growth. Real output (Y) is determined by aggregate demand (E).

   Now assume (unlike Tobin) that aggregate demand is given by

$$E = Y^* - \gamma(i - x); \qquad \gamma > 0 \tag{3}$$

   where i is the nominal rate of interest.

   (a) Consider three monetary policy regimes::

      i. the monetary authorities maintain a constant nominal rate of interest, i

ii. the monetary authorities maintain a constant real rate of interest $r = i - x = \bar{r} \gtreqless 0$

iii. the monetary authorities set the nominal interest rate using the policy rule

$$i = (1 + \beta)\hat{p}; \qquad \beta > 0 \tag{6}$$

(b) Analyze the dynamics of prices, inflationary expectations and real output in each of the three cases. [Hint: Use (1) and the policy rule to derive an equation for $\hat{p}$ in terms of x, and substitute the solution into the dynamic equation for x].

(c) Discuss the intuition behind the results in 1

(d) Comment briefly on how the properties of case (c) would be affected by a liquidity trap.

3. (Midterm 2013) Consider a simple IS-M(onetary)P(policy) model:

$$\begin{aligned} y &= \alpha - \beta(i - x) && \text{IS} \\ i &= a + by + cx && \text{Taylor rule} \end{aligned}$$

where x is expected inflation. Inflation is determined by

$$\dot{p} = A(y - y^*) + x$$

where p is the log of the price level and a dot over a variable denotes time derivative. Inflation expectations are adaptive,

$$\dot{x} = \lambda(\dot{p} - x)$$

(a) Solve the model for y, given the state variable x.

(b) Derive an equation for the change in x.

(c) Find the stationary solution(s) of x.

(d) State the conditions for stability and interpret the conditions.

(e) Discuss the relation between this model and the Tobin formalization of the 'Keynesian stability problem'.

(f) Now introduce a lower bound on the nominal interest rate i, $i \geq i_0 \geq 0$.

i. Can the stationary 'natural' level of output ($y = y^*$) be achieved and maintained at any (positive or negative) rate of inflation?

ii. Assuming a stationary solution with $i \geq i_0$, does the lower bound have any implications for the stability properties of the solution?