797N – Macro 3
Midterm exam, October 2014

Answer one question from each of the two parts of this exam.

Part 1 (65%)

Question 1

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.

1. Consider three monetary policy regimes::
   (a) the monetary authorities maintain a constant nominal rate of interest, i
   (b) the monetary authorities maintain a constant real rate of interest $r = i - x = \bar{r} \gtreqless 0$
   (c) the monetary authorities set the nominal interest rate using the policy rule
   $$i = (1 + \beta)\hat{p}; \qquad \beta > 0 \tag{6}$$
   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).
2. Discuss the intuition behind the results in 1
3. Comment briefly on how the properties of case (c) would be affected by a liquidity trap.

Question 2

Wage setting may be influenced by fairness norms. Let w^* denote the fair real wage and assume that actual real wages (w) adjust gradually toward w^*,

$$\dot{w} = \lambda(w^* - w); \qquad \lambda > 0 \tag{1}$$

Firms maximize profits, there are diminishing returns to labor, and employment (L) is inversely related to the actual real wage,

$$L = g(w); \qquad g' < 0 \tag{2}$$

1. Assume first that the wage norm is an exogenously given constant. Analyze the dynamics of the real wage. Are there any stationary points? If so, what are the stability properties of the stationary point(s)? What are the dynamics of employment, L?

2. Now introduce endogenous changes in w^*. Let

$$\dot{w}^* = \mu(w - w^*); \qquad \mu > 0 \tag{3}$$

   (a) Briefly discuss the possible rationale for adaptive changes of this kind.

   (b) Find the set of stationary points for the two-dimensional dynamic system consisting of equations (1) and (3). Use a phase diagram to show that starting from any initial position, (w, w^*) will converge to a stationary solution.

   (c) Consider three different initial conditions, $(w_0, w_0^*), (w_1, w_1^*)$ and (w_2, w_2^*) and assume that $w_0 = w_2 > w_1, w_0^* = w_1^* < w_2^*$. How do the asymptotic values of w and L differ depending on the initial conditions?

   (d) Comment briefly on the implications of the results in c) for the effects of

      i. a temporary incomes policy.

      ii. an exogenous shock to the fair wage w^* (the dynamic adjustment in (3) left unchanged by the shock).

Part 2 (35%)

Question 3

The existence of a 'natural rate of unemployment' or 'NAIRU' is central to most macroeconomic theory.

- Discuss strengths and weaknesses of the empirical case for the natural rate hypothesis.

- Describe one theoretical argument against the natural rate hypothesis.

Question 4

Describe how changes in the 'agency problem' may have contributed to falling wages at the low income of the income distribution and rising wages at the high end.