Economics 314 Spring 2019
Project #6 Assignment Due: 9am, Wednesday, March 20

*Partner assignments*

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*Problems*

**1. Steady-state growth and inflation in the new Keynesian IS/LM model.** Suppose that the economy is growing at constant rate $g$ in the steady state and that the money supply is increasing at constant rate $\mu$. Assume that prices are perfectly flexible.

a. Show that if the discount factor $\beta$ in the utility function is $\frac{1}{1+\rho}$, then the new Keynesian IS curve (without deleting the constant term as Romer does in moving from equation (6.7) to (6.8)) can be written as $\ln Y_t = \ln Y_{t+1} - \frac{1}{\theta}(r_t - \rho)$.

b. In the steady state, $\ln Y_{t+1} - \ln Y_t = g$. What is the steady-state equilibrium value of the real interest rate? Does the LM curve affect this rate? How does the equilibrium interest rate compare to the one we derived in the Ramsey growth model?

c. In the steady state, the inflation rate is constant at an equilibrium rate $\pi^*$. In class, we argued that the LM curve can be written as $r_t = \left(\frac{M_t}{P_t}\right)^{-\chi} (Y_t)^{\theta} - \pi^e_{t+1}$. With expected inflation equal to the steady state, this becomes $r_t + \pi^* = \left(\frac{M_t}{P_t}\right)^{-\chi} (Y_t)^{\theta}$. What is the steady-state rate of growth of the left-hand side of this equation from year to year? What is the steady-state rate of growth of the right-hand side, given that $M$ grows at $\mu$, $P$ grows at $\pi^*$, and $Y$ grows at $g$? What must the steady-state inflation rate be in order for the left-hand and right-hand sides to grow at the same rate in the steady state? Is the real money stock constant or changing over time in the steady state? Why?

d. Graphically, show what is happening to the IS and LM curves over time in the steady state and how the economy's equilibrium moves over time. Explain what is causing each of the curves to move (or not move).
e. Consider an alternative steady state with a higher rate of money growth $\mu'$. How would the long-run steady-state equilibrium rate of inflation, real interest rate, and nominal interest rate be different? How (if at all) would the paths of real output and the real money stock be different? Does that change in the money growth rate have any real effects? Explain.

2. **Work Romer's Problem 6.7.** This problem utilizes the *IS*/*MP* model, which Romer describes starting on page 262. One sometimes-serious constraint on monetary policy is that the nominal interest rate cannot (barring some compulsion to own bonds) ever be negative. That means that the central bank cannot ever set $i < 0$, hence it cannot set $r < -\pi$. Thus, the *MP* curve that reflects the central bank's interest-rate choice cannot fall below $r = -\pi$ and the lower-left end of the *MP* curve must become horizontal at $r = -\pi$ for levels of $y$ to the left of the level $\tilde{y}$ at which $r$ falls to $-\pi$ when moving along the curve.