Economics 302 Menzie D. Chinn
Spring 2010 Social Sciences 7418
University of Wisconsin-Madison

Problem Set 3

Due ***in lecture*** on Wednesday, March 17th. Be sure to put your name on your problem set. Put "boxes" around your answers to the algebraic questions.

1. Given the following economy:

$Y = AD = C + I + G$	$M^s/P = M^d/P$
$C = a_0 + bY_d$	$M^s/P = M_0/P_0$
$Y_d \equiv Y - T$	$M^d/P = kY - hR + j(\$Wealth/P_0)$
$T = TA_0$	$\$Wealth \equiv M + B$
$I = e_0 - dR$	
$G = GO_0$	$BuD \equiv G - T$; the price level is fixed

1.1 Derive equilibrium income (for period 0).
1.2 Analyze the implications of running a budget deficit for one period (in period 1) induced by increasing government spending by ΔGO, *starting from budget balance*. Draw an IS-LM diagram clearly indicating what happens.
1.3 Suppose after that period of running the deficit, government spending is reduced (in period 2) so as to balance the budget. Show what happens, in an IS-LM diagram. What is true about output relative to what it was before the government spending increase?

2. Suppose that we are operating under the old system (pre-October 2008), where the Fed does *not* pay interest on reserves, and the required reserve ratio is 0.12 for deposits and there are no excess reserves. Suppose also that the total demand for currency is equal to 0.3 times deposits.

2.1 If total reserves are $40 billion, what is the level of the money supply?
2.2 By how much does the money supply change if the Fed increases the required reserve ratio to 0.20? Assume that total reserves are unchanged at $40 billion.
2.3 By how much does the money supply change if the Fed buys $1 billion of government bonds in the open market? (Keep the required reserve ratio at 0.12).

3. Consider an economy with a "credit channel", i.e., one with a banking system. This economy is described in the handout "The Financial and Economic Crisis…". The CC curve is given by:

$$Y = \overline{\alpha}(A_0 - dR - \gamma\rho) \quad (5)$$

$$\rho = \varphi_0 + \varphi_1 R + \varphi_2 Y - \varphi_3[m(\mathrm{Re}\,s)(1-r)] + \varphi_4 Z \quad (7)$$

Notice that an increase in [m(*Res*)] will decrease ρ and hence shift out the CC curve; and an increase in Z will increase ρ and hence shift in the CC curve.

The LM curve is given by:

$$R = \frac{\mu_0}{h} - \frac{1}{h}\left(\frac{m(\mathrm{Re}\,s)}{P}\right) + \frac{k}{h}Y \qquad (4)$$

Notice that like the standard IS-LM model, the LM curve is shifted out by anything that increases [$m(Res)$].

3.1 Show graphically what happens when government spending is increased.

3.2 Show graphically what happens if all physical investment projects are suddenly perceived to be more risky than they previously were.

3.3 Show graphically what happens if the Fed increases the amount of reserves in the economy by undertaking open market operations. You can assume the interest rate paid on reserves is zero, and the money multiplier is constant.

4. Suppose the economy is initially described by the following equations (aggregate demand and price adjustment, respectively):

$$Y_t^{AD} = 5101.2 + 2.888\left(\frac{M_t}{P_t}\right)$$

$$\frac{P_t - P_{t-1}}{P_{t-1}} \equiv \pi_t = 1.2\left(\frac{Y_{t-1} - 9000}{9000}\right)$$

Where $M_t = 1350$ for time period t = 1, and potential GDP is $Y_t^* = 9000$.

4.1 Plot the aggregate demand curve and the *long run* aggregate supply curve.

4.2 If $P_t = 0.5$ for period t = 1, then what is Y_1? Does this place upward or downward pressure on prices?

4.3 Compute the path of the economy – that is, calculate GDP, the price level, and inflation -- for each year until GDP is within 1 percent of potential.

4.4 Diagram the economy's path on the demand curve plotted in part 1.1. Then draw your own version of Figures 9.3 and 9.4. (You may assume that inflation was initially zero, i.e., $\pi_t = 0$ for t= 0, and for t=1.

4.5 Assume now that the inflation process is given by $\pi_t = \pi_{t-1} + 1.2\left(\frac{Y_{t-1} - 9000}{9000}\right)$. Compute the path of the economy for the first fives years, and diagram the economy's path as in part 1.4. Now is there overshooting?

4.6 What does the π_{t-1} term in the price adjustment equation in part 1.5 represent? Explain the relationship between this term and overshooting.

5. Suppose the economy has the aggregate demand schedule and price adjustment schedule:

$$Y_t = 5101.2 + 2.888\left(\frac{M_t}{P_t}\right)$$

$$\frac{P_t - P_{t-1}}{P_{t-1}} \equiv \pi_t = \pi_{t-1} + 1.2\left(\frac{Y_{t-1} - 9000}{9000}\right) + Z_t$$

Where Z is an exogenous price shock, and potential GDP is $Y_t^* = 9000$.

5.1 Graph the aggregate demand schedule for $M_t = 1350$. Graph the price adjustment schedule (a.k.a., the Phillips curve). Find the inflation rate for $Z = 0$ and expected inflation of zero.

5.2 Suppose the economy starts with a price level of 1.0 and zero expected inflation. A price/supply shock of 5 percent occurs in the first year ($Z_1 = 0.05$). No further price/supply shocks occur ($Z_t = 0$ in all future years). Trace the path of the economy back to potential by computing the values of the price level, GDP, unemployment and expected inflation in each year for five years.

5.3 Repeat the calculations for the following monetary accommodations: The money supply is 5 percent higher starting in the second year. Compare this new path for inflation and unemployment with the original path.

5.4 Suppose, instead, that monetary policy tries to limit inflation by contracting the money stock by 5 percent starting in the second year. Repeat the calculations and compare with the original path.

5.5 Now suppose there is no price shock ($Z_t = 0$ for all t) but the economy starts with expected inflation of 3 percent. Compare the path to potential. How much excess unemployment (over the natural rate of 6 percent) occurs in the process returning to potential? Use Okun's law.