Problem Set 3  
Econ 100B

Problem sets are due to your GSI in Section on Wednesday April 27 or Thursday April 28. Do not leave problem sets in the GSI’s mailbox. Problem sets that are a day late lose half the credit; see the course syllabus for other details.

As always, your grade will be determined largely by the explanation you provide. Also, please label your graphs clearly, indicating the direction in which curves are shifting.

Part I. (3 points) Explain whether the following statements are true, false or uncertain.

1. (1 point) If investment does not depend on the interest rate, the IS curve is vertical.

   False. The equation for the IS curve is
   \[ Y = A_0/(1-MPE) - [(I_r + X_r \epsilon_r)/(1-MPE)]r \]

   So, even if I_r were zero, the IS curve would not be vertical.

2. (1 point) If credit card fraud goes up, interest rates will go up unless the Fed increases the money supply.

   True. If fraud goes up, credit card use is likely to go down and money demand will go up. With unchanged money supply, this will cause interest rates to go up. The Fed can increase the money supply and bring rates back down again.
3. (1 point) Shocks to the IS curve will not affect income very much if money demand is not very sensitive to interest rates.

LM curve is:

\[ r = -\left(\frac{M/P}{M_i} + \pi^e\right) + \frac{M_y}{M_i} Y. \]

If the coefficient of \( Y \) is relatively large, the curve will be relatively steep. For any shift in the IS curve, the effect on income will be smaller, the steeper the LM curve. Intuitively, for any increase in income, interest rates need to go up by more to clear the money market. The larger increase in interest rates, in turn, tends to dampen the expansionary effect of the shift in the IS curve (lowers investment and net exports).

A small \( M_i \) will tend to make the LM curve relatively steep, other things remaining the same. However, the coefficient on income also depends upon the income elasticity of money demand (or how much money demand reacts to income) and a small value of \( M_y \) could offset the effect of a small value of \( M_i \). Thus, we need to know both values to assess the validity of the statement above.

Part II. (3 points)

Consider the economy of Autarkia, an island that does not trade with any other country. Autarkical consumption is given by \( C = 200 + 0.75(Y-T) \) while the investment function is \( I = 200 - 25r \). Both government purchases and taxes equal 100.

a. (1/2 point) Graph the IS curve for this economy for \( r \) ranging from 1 to 8.

Please check all the calculations in this section.

IS curve is: \( Y = 1700 - 100r \)
Suppose the money demand curve is given by \((M/P)^d = Y - 100 \ r\). The money supply \(M\) is 1,000 and the price level \(P\) is 2.

b. \((1/2\ point)\) Graph the LM curve for \(r\) ranging from 0 to 8.

\[
\text{LM curve is: } Y = 500 + 100 \ r
\]

c. \((1/2\ point)\) What is the equilibrium level of income and the equilibrium real interest rate?

Equilibrium income is 1100 and \(r\) is 6%.

d. \((1/2\ point)\) Suppose government purchases rise to 150. What happens to the equilibrium interest rate and the level of income.

Equilibrium income rises to 1200 and \(r\) to 7%.
e. (1 point) Calculate what would happen to income if the price level was: (a) 1; (b) 4, and (c) 8. Assume government expenditures equal 100 here. Graph these combinations of P and Y along with the pair obtained for P=2 above. What curve is this?

For P = 1, Y = 1350, r = 3.5% (because M/P rises to 1000)
For P = 4, Y = 975, r= 7.25% (because M/P falls to 250)
For P = 8, Y = 912.5, r= 7.875% (because M/P falls to 125)

Plotting P against Y gives us the demand curve.
Assume that households become pessimistic about the future; perhaps the “new economy” isn’t all they thought it was going to be. Use the IS-LM framework to answer the following:

**a. (1 ½ points)** What would happen to equilibrium income and interest rates? Describe the process through which equilibrium is attained. (Recall that the underlying assumption is no change in the money supply.)

Consumption goes down; IS curve shifts down and to the left. With no change in the LM curve, interest rates and income fall.

**b. (1 ½ points)** Assume, instead, that the Fed was to follow a policy of keeping interest rates unchanged. What would happen to equilibrium income and interest rates? Compare your answer to **a** above.

Under this policy, the Fed contracts the money supply to offset the decline in income, causing the LM curve to shift up and to the left. This causes income to fall even further.
c. (1 point) Based on your analysis, does this appear to be a good policy or would you rather have the Fed follow another policy? Explain.

This is a bad policy because it intensifies the drop in income. If the Fed is concerned about the loss in output, it should increase the money supply instead; this will cause the LM curve to shift up and to the right, lowering interest rates and raising income.