Some Answers

1) Consider the impact of an increase in thriftiness in the Keynesian cross. Suppose the consumption function is $C = a + c(Y - T)$, where $a$ is a parameter called *autonomous consumption* and $c$ is the marginal propensity to consume.

**a.** What happens to equilibrium income when the society becomes more thrifty, as represented by a decline in $a$.

*If society becomes more thrifty – meaning that for any given level of income people save more and consume less – then the planned-expenditure function shifts downward. Equilibrium income falls.*

**b.** What happens to equilibrium saving? Why do you suppose this result is called the *paradox of thrift*?

*Equilibrium saving remains unchanged. The national accounts identity tells us that saving equals investment ($S=I$). In the Keynesian cross model, we assumed that desired investment is fixed. This assumption implies that investment is the same in the new equilibrium as it was in the old. We can conclude that saving is exactly the same in both equilibria.*

*The paradox of thrift is that even though thriftiness increases, saving is unaffected. Increased thriftiness leads only to a fall income. For an individual, we usually consider thriftiness a virtue. From the perspective of the entire economy as represented here, however, thriftiness is a vice.*

**c.** Does this paradox arise in the classical model of Chapter 3? Why or why not?

*In the classical model of Chapter 3, the paradox of thrift does not arise. In that model, output is fixed by the factors of production and the production technology, and the interest rate adjusts to equilibrate saving and investment, where investment depends on the interest rate. An increase in thriftiness decreases consumption and increases saving for any level of output; since output is fixed, the saving schedule shifts to the right. At the new equilibrium, the interest rate is lower, and investment and saving are higher.*

2) Suppose that the money demand function is

$$\left(\frac{M}{P}\right)^d = 1,000 - 100r,$$
where \( r \) is the interest rate in percent. The money supply \( M \) is 1,000 and the price level \( P \) is 2.

a. Graph the supply and demand for real money balances.

\[
\begin{align*}
\text{(M/P)}^d & \quad \text{(M/P)}^s \\
\text{M/P} & \\
\end{align*}
\]

*The downward sloping line represents the money demand function. With \( M = 1000 \) and \( P = 2 \), the real money supply is 500. The real money supply is independent of the interest rate and is, therefore, represented by the vertical line.*

b. What is the equilibrium interest rate?

\[ r = 5 \]

c. Assume that the price level is fixed. What happens to the equilibrium interest rate if the supply of money is raised from 1,000 to 1,200?

\[ r = 4 \]

d. If the Fed wishes to raise the interest rate to 7 percent, what money should it set?

*Set real money supply equal to real money demand. Setting the price level at 2 and substituting \( r = 7 \), we find \( M = 600 \). So, for the Fed to raise interest rates from 5 percent to 7 percent, it must reduce the nominal money supply from 1000 to 600.*

3) a. Suppose that there is a sudden increase in the demand for money – that is, at the same levels of \( r \) and \( Y \) people want to hold more money. What would happen to the money demand curve and the LM curve? Illustrate graphically.
The money demand curve shifts to the right. Money supply on the other hand remains fixed – what this means is that the cost of holding money (the interest rate) rises so that demand still equals supply in the money market. This also implies that for every level of output, interest rates will be higher. So the LM will have shifted to the left.

b. Suppose that Congress decides to reduce the budget deficit by cutting government spending. What would happen to the Keynesian Cross and the IS curve? Illustrate graphically.

Because G is lowered, the Keynesian cross shifts down, lowering planned expenditures and output. This also means that for each interest rate possible, output is higher in the goods market. So the IS curve will have shifted to the right.

4) How would each of the following changes affect the shape of the IS curve?

a. the MPC gets bigger.

It flattens.

b. investment becomes more sensitive to changes in the interest rate.

It likewise flattens.

5) Monetary policy and fiscal policy often change at the same time.

a. Suppose that the government wants to raise investment but keep output constant. In the IS-LM model, what mix of monetary and fiscal policy will achieve this goal?

The government should adopt a loose monetary policy and a tight fiscal policy. In the new equilibrium, the interest rate is lower, so that investment is higher. The tight fiscal policy – reducing government purchases for example – offsets the effect of this increase in investment on output.

b. In the 1980s, the U.S. government cut taxes and ran a budget deficit while the Fed pursued a tight money policy. What effect should this policy mix have?

The policy mix in the early 1980s did exactly the opposite. Fiscal policy was expansionary, while monetary policy was contractionary. Such a policy mix shifts the IS curve to the right and the LM curve to the left. The real interest rate rises and investment falls.
6) The Fed is considering two alternative monetary policies:
   - holding the money supply constant and letting the interest rate adjust, or
   - adjusting the money supply to hold the interest rate constant.

In the IS-LM model, which policy will better stabilize output under the following conditions? Explain your answers.

First note that if the Fed adjusts the money supply to hold the interest rate constant, the effective LM curve is HORIZONTAL.

a. All shocks to the economy arise from exogenous changes in the demand for goods and services.

This means that all shocks are to the IS curve. Since when holding the money supply constant implies an upward sloping LM curve, it should be clear that output fluctuates less if the Fed follows a policy of keeping the money supply constant.

b. All shocks to the economy arise from exogenous changes in the demand for money.

Changes in the demand for money shifts the LM curve. But note that with a horizontal LM curve, LM cannot shift left or right. Therefore the Fed should adjust the money supply to hold interest rates constant, thereby stabilizing output.

7) Suppose that the demand for real money balances depends on disposable income. That is, the money demand function is \( M/P = L(r, Y-T) \). Using the IS-LM model, discuss whether this change in the money demand function alters the following:

a. The analysis of changes in government purchases.

The analysis of changes in government purchases is unaffected by making money demand dependent on disposable income instead of total expenditure. Thus the analysis is the same as in the standard case – IS shifts right.

b. The analysis of changes in taxes.

A tax cut causes disposable income to increase at every level of income \( Y \). The IS curve shifts to the right, as in the standard case. But now the tax cut also increases money demand, so the LM curve shifts to the LEFT. The net effect on output is therefore ambiguous.