SOLVED QUESTIONS

1. Use the IS-LM model to predict the effects of each of the following shocks on income, the interest rate, consumption and investment. In each case, explain what the Central Bank should do to keep income at its initial level.

a) After the invention of a new high-speed computer chip, many firms decide to upgrade their computers systems.

The invention of the new high-speed chip increases investment demand, meaning that at every interest rate, firms want to invest more. The increase in the demand for investment goods shifts the IS curve out and to the right, raising income and employment. The increase in income from the higher investment demand also raises interest rates. This happens because the higher income raises demand for money; since the supply of money does not change, the interest rate must rise in order to restore equilibrium in the money market. The rise in interest rates partially offsets the increase in investment demand, so that output does not rise by the full amount of the rightward shift in the IS curve. Overall, income, interest rates, consumption and investment all rise. If Central Bank wants to keep output constant, then it must decrease the money supply and increase interest rates further in order to offset the effect of the increase in investment demand. When the Central Bank decreases the money supply, the LM curve will shift up and to the left. Output will remain at the same level and the interest rate will be higher. There will be no change in consumption and no change in investment. The interest rate will increase by enough to completely offset the initial increase in investment demand.

b) A wave of credit card fraud increases the frequency with which people make transactions in cash.

The increased demand for cash shifts the LM curve up. This happens because at any given level of income and money supply, the interest rate necessary to equilibrate the money market is higher. The upward shift in the LM curve lowers income and raises the interest rate. Consumption falls because income falls, and investment falls because the interest rate rises due to the increase in money demand. If the Federal Reserve wants to keep output constant, then they must increase the money supply in order to lower the interest rate and bring output back to its original level. The LM curve will shift down and to the right and return to its old position. In this case, nothing will change.

c) A best seller titled Retire Rich convinces the public to increase the percentage of their income devoted to saving.

At any given level of income, consumers now wish to save more and consume less. Because of this downward shift in consumption function the IS curve shifts inward or downward. Income, interest rates, and consumption all fall while investment rises. Income falls because at every level of the interest rate planned expenditure falls. The interest falls because the fall in income reduces demand for money, since the supply of money is unchanged the rate interest rate must fall to restore money market equilibrium as Md shifts downward while Ms is constant. Consumption falls both because of the shift in consumption function and income falls. Investment rises due to lower interest rates and partially off-sets the effect on output due to fall in consumption. If the Central Bank wants to keep output constant then they must increase the money supply Ms which will reduce the interest rate but increase the output back to its original level. Hence, LM curve will shift downward where output reaches back to its original level and here consumption will be lower, investment will be higher, and interest rates will be lower.

2. Use the following information to answer this set of questions. An economy can be described by the following equations:

C = 200 + 0.75(Y – T); I = 200 – 25r; G = 100 and is constant and exogenously determined
T = 100 and is constant and exogenously determined
The demand for real money balances = M/P = Y – 100r; M = money supply = 1000
P = price level = 2

a. Write an equation for the IS and LM curve for this economy.
b. What is the equilibrium interest rate, equilibrium level of output, consumption and investment for this economy given the above information?
c. Suppose that the money supply is increased to 1200. What is the new equilibrium level of interest rate and the new equilibrium level of output for this economy given this change? What is the new equilibrium level of consumption?
d. Suppose that the initial information is true (no change in the money supply). If government purchases increase to 150, what is the change in output predicted by the Keynesian Cross diagram? What is the actual change in output based upon the IS-LM model?

a. Write an equation for the IS and LM curve for this economy.

IS: Y = 200 + 0.75(Y – T) + G + I
Y = 200 + 0.75Y -0.75(100) + 100 + 200 – 25r
Y = 500 + 0.75Y -75 – 25r
.25Y = 425 – 25r
Y = 1700 – 100r

Supply of real money balances = demand for real money balances

1000/2 = Y – 100r
Y = 500 + 100r

b. What is the equilibrium interest rate, equilibrium level of output, consumption and investment for this economy given the above information?

500 + 100r = 1700 – 100r
200r = 1200
r = 6

Y = 500 + 100 (6)
Y = 1100

C = 200 + 0.75(Y – T)
C = 200 + 0.75(1100 – 100)
C = 200 + 0.75(1000) = 200 + 750
C = 950

I = 200 – 25r = 200 – 25(6)
I = 200 – 150
I = 50

c. Suppose that the money supply is increased to 1200. What is the new equilibrium level of interest rate and the new equilibrium level of output for this economy given this change? What is the new equilibrium level of consumption?

The new LM curve is Y = 600 + 100r and the IS curve is Y = 1700 – 100r. Thus,

600 + 100r = 1700 – 100r
200r = 1100
r = 5.5

Y = 600 + 100(5.5)
Y = 1150

C = 200 + 0.75(Y – T)
C = 200 + 0.75(1150 – 100)
C = 987.50

d. Suppose that the initial information is true (no change in the money supply). If government purchases increase to 150, what is the change in output predicted by the Keynesian Cross diagram? What is the actual change in output based upon the IS-LM model?

The change in output predicted by the Keynesian Cross diagram is equal to (1/(1 – MPC)) (change in government spending) or (1/0.25) (50) = 200.

The actual change in output based upon the IS-LM model will be less than this. To see this you need to first write the new IS curve:

Y = C + I + G'
Y = 200 +0.75(Y – T) + I + G'
Y = 200 + 0.75Y – 0.75(100) + 200 – 25r + 150
0.25Y = 475 – 25r
Y = 1900 – 100r

Then, combine this IS curve with the LM curve to have

1900 – 100r = 500 + 100r
1400 = 200r
r = 7

Thus, Y = 1900 – 100r
Y = 1900 – 100(7)
Y = 1200

The change in output is from the initial level of 1100 to the new level of 1200, or a change of 100 which is less than that predicted by the Keynesian Cross diagram.

6. 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.

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

   c. Does this paradox arise in the model where output is fixed? Why or why not?

Answer 6.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 (by the way, how much does this income fall by 1/ (1-MPC) times the decline in a).

Answer 6.b.: *Equilibrium saving remains unchanged. The national accounts identity tells us that saving equals investment, or 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 in income. For an individual, we usually consider thriftiness a virtue. From the perspective of the Keynesian cross, however, thriftiness is a vice.

Answer 6.c.: 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 savings are higher.

7. A bond pays out $100 in one year:
   a. What is the interest rate on the bond if its price is $75?
   b. What is the price of the bond today if the interest rate is 8%?

   (4 Points)

Answer 7.a.: *A bond promise to pay $100 in one year. Hence the face value of the bond is $100. If its price of bond today is $75*
Interest rate on the bond = ($100 / $75) - 1
Interest rate on the bond = 33.33%

Answer 7.b.: *If the interest rate is 8%.*
The price of bond = Face value of bond / (1 + Interest rate)
The price of bond = $100 / (1+ 0.08)
The price of bond = $100 / 1.08
The price of bond = $92.59 or $92.60

Note: Interest rate = (Face value of bond / Price of bond) - 1