

## IS-LM: EQUILIBRIUM IN THE GOODS AND MONEY MARKET

Please type your answers and write your TA's name and section time on your answer sheet.

### I. True, False or Uncertain. Explain your answer in three lines and use graphs where necessary.

- a) Since an expansionary monetary policy (an increase in the money supply) results in lower interest rates and higher investment in equilibrium, it shifts the IS curve to the right.
- b) Monetary policy is more effective the more responsive investment demand is to interest rates. Show graphically and provide economic intuition.
- c) Fiscal policy is more effective the more responsive money demand is to interest rates. Show graphically and provide economic intuition.
- d) An increase in the price level causes the AD curve to shift to the left because the price increase causes money demand to increase which causes interest rates to rise and therefore reduces planned investment and output.

### II. Freiland is a closed economy (not open to trade), which is characterized by the following equations:

$$\begin{aligned}C &= 100 + 0.5Y^d \\I &= 60 - 5r \\G &= T = 80 \\M^d &= 400 + Y - 10i\end{aligned}$$

where  $r$  is the real interest rate and  $i$  is the nominal interest rate, both in percent. Prices do not change in this economy. Therefore, inflation is zero (i.e.,  $i=r$ ).

- a) Assume that the Fed sets the nominal interest rate at 3% and keeps it at that level. Find consumption, investment and output in equilibrium. How could the Fed guarantee that the nominal interest rate is 3%? (ie what is the money supply consistent with a nominal interest rate of 3% in equilibrium?) Show that, in equilibrium, total savings (private

plus public) equals investment.

b) The Fed Chairman of Freiland decides to set money supply equal to 500:  $M^s = 500$ . Plot  $M^s$  and  $M^d$  in  $(i, M)$  space for  $Y = 300$ . What is the equilibrium level of the interest rate and money supply? How would your answer change if  $Y=200$ . Provide economic intuition for the difference.

c) Derive the IS curve algebraically: the combination of  $Y$  and  $i$  at which the goods market is in equilibrium. Also derive the LM curve algebraically: the combination of  $Y$  and  $i$  at which the money market is in equilibrium. Is the slope of the IS curve related to the MPC? Provide economic intuition as to how the relationship works.

d) Plot the IS and LM curve in  $(i, Y)$  space. Combining these two, find the equilibrium level of  $(i, Y)$ : that is the level of interest rate and output at which both the money and goods markets are in equilibrium?

e) The Prime Minister of Freiland decides to build an Olympic Stadium in an effort to attract the 2012 Summer Olympics. As a result, government expenditure increases to 200, without a change in taxes or the money supply. Derive the new IS and LM curves algebraically and show the difference with (d) in a graph. Explain the difference using economic intuition.

f) Suppose that the Fed Chairman decides to respond to the increase in government spending by increasing the money supply by 100 (from 500 to 600). Derive the new IS and LM curves algebraically and show the difference with (d) and (e) in a graph. What is the new, equilibrium level of interest rate and output? Explain the difference using economic intuition.

### III. Stock Pricing

An inventor creates a machine that will produce 5 iPods per year indefinitely starting next year. iPods are worth \$100 and will always be worth this much.

a) Suppose that the nominal interest rate is 5% and will remain at that level forever. If the inventor offered to sell you the machine for \$9000, would you accept?

b) Suppose the interest rate rose to 10% (and would stay at that level forever). Would you change your mind?

c) If the interest rate is  $i$ , what is the present value of the machine? Is the relationship between the interest rate and the value of the machine negative? Provide economic intuition.

**IV. Using the AS-AD framework, discuss the consequences of the following events. Use graphs in your answers.**

- a) The price of oil jumps by 50% due to worries about interruptions to supply in the Middle East.
- b) Increased money supply in a booming economy.
- c) Decreased government spending in a booming economy.
- d) Increased government spending in a recessionary economy.