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Discussion Session 3 (Chapter 4 & 5) Solutions

PART A: LONG QUESTIONS

1. Suppose that the household nominal income for an economy is £50,000 billion and the demand for money in this economy is given by

$$M_d = £Y(0.2 - 0.8i)$$

Solution:

- a. $i = 0.01$: money demand = £9,600; $i = 0.05$: money demand = £8,000
 - b. When $i = 0.01$ $M_d = £7,680$. The demand for money falls by 20%.
When $i = 0.05$ $M_d = £6,400$. The demand for money falls by 20%.
 - c. Independent of the interest rate, an increase (decrease) in income leads to the same percentage increase (decrease) in money demand. This effect is independent of the interest rate. As the interest rate rises, the demand for money declines. This is because households' demand for bonds would increase when financial instruments such as bonds pay lower interest, hence making demand for money more attractive.
 - d. The central bank should lower the interest rate to increase the demand for money.
2. Suppose that a person's yearly income is \$60,000. Also suppose that this person's money demand function is given by

$$M^D = Y(0.35 - i)$$

$$M^S = 15000$$

- a. What is this person's demand for money when interest rate is 5% and 10%?
- b. Explain relationship between i and M^D .
- c. Graph M^S and M^D and calculate the equilibrium i .
- d. How would the money market equilibrium be affected if Central Bank targets an interest rate of 5%?

Solution:

$$a) M^D = \$Y(0.35 - i) \quad \text{where } \$Y = 60000$$

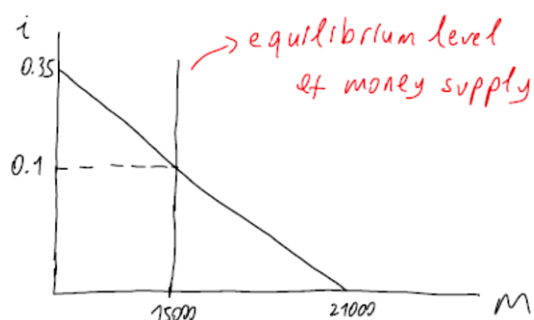
$$\text{If } i = 0.05 \Rightarrow M^D = 60000(0.35 - 0.05) \\ M^D = 18000$$

$$\text{If } i = 0.1 \Rightarrow M^D = 60000(0.35 - 0.1) \\ M^D = 15000$$

$$b) M^D = \$Y(0.35 - i)$$

Money demand decreases when interest rate increases because bonds, which pay interest, become more attractive. That is, the higher interest rate means the higher opportunity cost of holding money, so people demand less money. There is a negative relation with interest rate and money demand.

c)



$$\text{At equilibrium } M^S = M^D \Rightarrow 15000 = 60000(0.35 - i) \\ \Rightarrow i = 0.1 //$$

d) What if $i = 0.05$

$$\text{At eqm. } M^S = M^D \\ M^S = 60000(0.35 - 0.05) \\ M^S = 18000 //$$

3. All units are millions of US dollars.

- $C = 200 + 0.25 Y_d$

- $I = 150 + 0.25Y - 1000i$
 - $T = 200$
 - $G = 250$
 - $(M/P)^s = 1600$
 - $(M/P)^d = 2Y - 8000i$
- a. Find the equation for aggregate demand (Z).
 - b. Derive the IS equation.
 - c. Derive the LM equation.
 - d. Solve for equilibrium real output, interest rate, C and I.
 - e. Graph the IS – LM diagram of the above with correct labels.
 - f. Let nominal money supply increase to 1840. Find equilibrium Y, i, C and I. What happens to Y, i, C and I when the Central Bank increases money supply through open market operations.
 - g. Let government expenditure increase to 400. Find equilibrium Y, i, C and I. What happens to equilibrium Y, i, C and I when government expenditure increases.
 - h. There is a sudden drop in consumer confidence and c_0 drops from 200 to 100. How can the government counterbalance the drop in GDP using government spending as a policy instrument?

Solution:

a.

$$\begin{aligned}
 Z &= C + I + G \\
 &= 200 + (0.25)Y_d + 150 + 0.25Y - 1000i + 250 \\
 &= 600 + 0.25(Y - 200) + 0.25Y - 1000i \\
 &= 550 + 0.5Y - 1000i
 \end{aligned}$$

$$Z = 550 + 0.5Y - 1000i$$

b.

$$\text{IS eqn} \leftrightarrow \text{Goods market eqn} \leftrightarrow Y = Z$$

$$\begin{aligned}
 Y &= Z \\
 &= 550 + 0.5Y - 1000i
 \end{aligned}$$

$$0.5Y = 550 - 1000i$$

$$\begin{aligned}
 Y &= 1100 - 2000i \\
 i &= (1100 - Y) \left(\frac{1}{2000} \right)
 \end{aligned}$$

c.

LM eqn $\leftrightarrow$ money (financial) market eqm $\leftrightarrow M^s = M^d$

$$M^s = M^d$$

$$\left(\frac{M}{P}\right)^s = \left(\frac{M}{P}\right)^d$$

$$1600 = 2Y - 8000i$$

$$2Y = +1600 + 8000i$$

$$\boxed{\begin{aligned} Y &= +800 + 4000i \\ i &= \frac{Y}{4000} - \frac{1}{5} \end{aligned}}$$

d.

eqm $\leftrightarrow$ where IS & LM intersect

$$IS: Y = 1100 - 2000i$$

$$LM: Y = +800 + 4000i$$



$$1100 - 2000i = +800 + 4000i$$

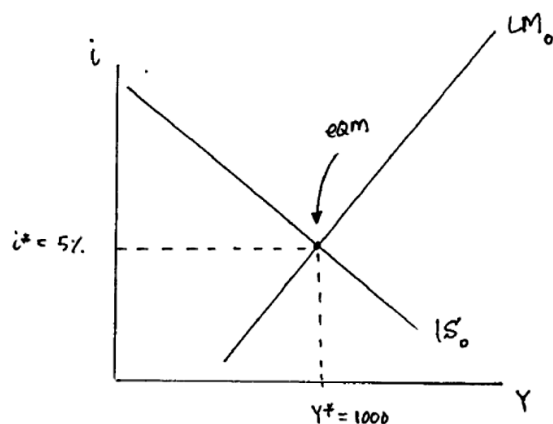
$$300 = 6000i$$

$$0.05 = i$$

$$Y = 1100 - 2000(0.05) = 1000$$

$$\boxed{\begin{aligned} Y^* &= 1000 \\ i^* &= 5\% \\ C &= 400 \\ I &= 350 \end{aligned}}$$

e.



when graphing be sure to
always have correct axis labels!

f.

Money mkt eqm $\rightarrow M^s = M^d$

$$1840 = 2Y - 8000i$$

$$2Y = 1840 + 8000i$$

$$Y = 920 + 4000i \quad \text{new LM}$$

$$i = 3\%$$

$$Y = 1040$$

$$C = 410$$

$$I = 380$$

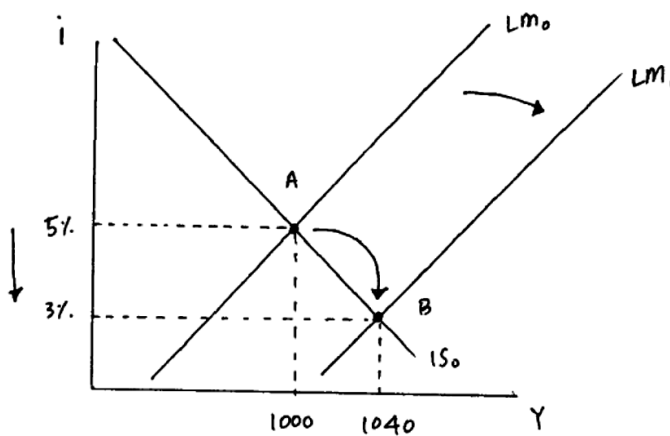
IS-LM eqm $\rightarrow 920 + 4000i = 1100 - 2000i$

$$6000i = 180$$

$$i = 3\%$$

Expansionary monetary policy reduces i , increases Y , C , & I .

* notice that IS stayed the same.
only LM eqn changed & shifted.



Expansionary
Monetary policy

A = old equilibrium

B = new equilibrium



g.

Goods mkt
equilibrium

$$Y = Z$$

$$Y = 1400 - 2000i \quad \text{new IS}$$

IS-LM

$$1400 - 2000i = 800 + 4000i$$

$$600 = 6000i$$

$$10\% = i$$

$$i = 10\%$$

$$Y = 1200$$

$$C = 450$$

$$I = 350$$

↑

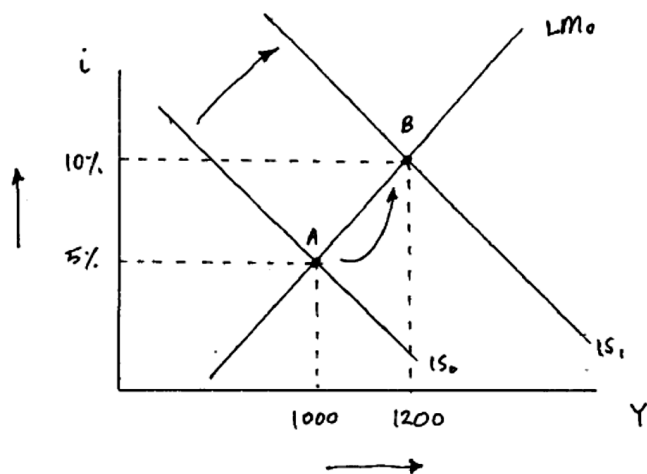
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no

change

* note: with fiscal expansion, nothing is happening to LM.



h.

$c_g \downarrow \rightarrow c \downarrow \rightarrow Z \downarrow \rightarrow Y \downarrow \rightarrow IS$ shifts down and to the left

The government can $\uparrow Z$ by ① $\uparrow G$ by 100 $\rightarrow Z \uparrow \rightarrow Y \uparrow$

② $\downarrow T \rightarrow Y_d \uparrow \rightarrow c \uparrow \rightarrow Z \uparrow \rightarrow Y \uparrow$

PART B: SHORT QUESTIONS

TRUE/FALSE/UNCERTAIN (Explain it.)

1. The price of bonds increases when the interest rate rises.

False

$$\text{Price of Bonds} = \frac{\$100}{1+i}$$

if \$100 was the face value of a bond

$$\begin{aligned} i \downarrow &\rightarrow P_B \uparrow \\ i \uparrow &\rightarrow P_B \downarrow \end{aligned}$$

* If a bond promises to pay \$100 in a year, its face value is \$100 & $P_B \leq 100$ if $i \geq 0$.

2. Interest rates will fall when the quantity of money demanded exceeds the quantity of money supplied.

False. Interest rates fall when the quantity of money supplied exceeds the quantity of money demanded.

3. An open market sell raises high-powered money.

False. It is contractionary monetary policy and decreases monetary aggregates.

4. An increase in the policy interest rate is a signal that the Central Bank wants a tighter monetary policy.

TRUE

MULTIPLE CHOICE

- 1) Which of the following will cause a rightward shift in the money demand curve?
 - A) an increase in the money supply
 - B) a reduction in the interest rate
 - C) a reduction in income
 - D) all of the above
 - E) none of the above**

- 2) If you expect interest rates to rise, you will want to be holding:
 - A) more money because bond prices will likely fall.
 - B) less money because bond prices will likely rise.
 - C) more money because bond prices will likely rise.
 - D) less money because bond prices will likely fall.**

- 3) The present value of an asset generally:
 - A) exceeds the future value.
 - B) equals the future value.
 - C) is less than the future value.**
 - D) has an ambiguous relationship with the future value.

- 4) The statement, "My iPhone is worth \$300" represents money's function as
 - A) a medium of exchange
 - B) a unit of account.**
 - C) a store of value.
 - D) a standard of deferred payment.
 - E) None of the above

- 5) The future value of an asset generally:
 - A) exceeds the present value.**
 - B) equals the present value
 - C) is less than the present value.
 - D) has an ambiguous relationship with the future value.

- 6) All of the following are reasons why people hold cash money *except*:
 - A) money can be used to buy goods.
 - B) emergencies.

- C) to avoid losses from changes in bond prices.
 - D) cash earns interest.**
- 7) Which one of the following occurs when a central bank pursues contractionary monetary policy?
- A) The central bank increases reserve requirement ratio and investment increases
 - B) The central bank decreases reserve requirement ratio and investment decreases
 - C) The central bank increases reserve requirement ratio and investment decreases**
 - D) The central bank decreases reserve requirement ratio and investment increases
- 8) Monetary policy is one of the two main macroeconomic tools governments use to control the aggregate economy. The other is:
- A) fiscal policy.
 - B) foreign policy.**
 - C) trade policy.
 - D) immigration policy.
- 9) If the Fed wants to increase the money supply, it can:
- A) buy bonds.**
 - B) sell bonds.
 - C) pass a law that interest rates rise.
 - D) pass a law that interest rates fall.
- 10) Central Bank sales of government securities:
- A) increase bank reserves and increase the money supply.
 - B) decrease bank reserves and decrease the money supply.**
 - C) decrease bank reserves and increase the money supply.
 - D) increase bank reserves and decrease the money supply.

Explanation: Open market sales of government securities reduce the reserves of the banking system. As reserves fall, banks must replenish them by either issuing fewer loans or calling in old loans, both of which reduce the money supply.”

- 11) When the Fed increases the reserve requirement, it:
- A) expands the money supply because banks have more available to lend.
 - B) expands the money supply because banks have less available to lend.
 - C) contracts the money supply because banks have more available to lend.
 - D) contracts the money supply because banks have less available to lend.**

Explanation: An increase in the reserve requirement forces banks to hold more of their deposits in the form of reserves, and this reduces the supply of credit.

- 12) If there are significant excess reserves, a liquidity trap:

- A) cannot exist.
- B) is inevitable.
- C) is possible.**
- D) Excess reserves and the liquidity trap are unrelated.

Explanation: When banks hold additional reserves that the Fed injects into the system, the Fed has less control over the money supply. A liquidity trap may result.

13) The discount rate is the interest rate:

- A) commercial banks charge their largest customers.
- B) the Fed charges on loans to individuals.
- C) the Fed charges on loans to commercial banks.**
- D) the interest rate commercial banks charge one another for overnight loans.

Explanation: The discount rate is the interest rate banks pay when they borrow from the Fed.

14) To achieve its target when the federal funds rate is above the target range, the Fed should:

- A) follow expansionary policy.**
- B) follow contractionary policy.
- C) buy foreign currency.
- D) do nothing.