

PROBLEM SET 6 WITH ANSWERS

Q.1

According to Peter Heather, a historian at the King's College London, during the Roman Empire, the German tribes east of the Rhine River produced no coins of their own but used Roman coins instead:

Although no coinage was produced in Germania, Roman coins were in plentiful circulation and could easily have provided a medium of exchange (already in the first century, Tacitus tells us, Germani of the Rhine region were using good-quality Roman silver coins for this purpose).

- a. What is the medium of exchange?
 - b. What does the author mean when he writes that Roman coins could have provided the German tribes with a medium of exchange?
 - c. Why would any member of a German tribe have been willing to accept a Roman coin from another member of the tribe in exchange for goods and services when the tribes were not part of the Roman Empire and were not governed by Roman law?
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- a. A medium of exchange refers to anything that is generally accepted in exchange for goods and services.
 - b. Because the German tribes widely used Roman coins as they bought and sold goods and services, the coins became the German tribes' medium of exchange.
 - c. A member of a German tribe was willing to accept the Roman coins as long as he or she believed that the coins were acceptable to other people in the tribe.

Q.2

Assume that the following asset values (in millions of dollars) exist in Ironmania: Bills and coins in circulation = \$700; Money market mutual funds (MMMFs) held by individuals = \$400; Corporate bonds = \$300; Iron ore deposits = \$50; Currency in commercial banks = \$100; Time deposits, including money market deposit accounts (MMDAs) = \$140; Demand deposits = \$1500 ; Small-denominated (less than \$100,000) time deposits = \$100; Coins in circulation = \$40.

a. What is M1 in Ironmania?

b. What is M2 in Ironmania?

Part a:

M1 equals bills and coins in circulation plus checkable deposits plus Coins in circulation.

$$\text{M1} = \$700 + \$1500 + \$40 = \$2240 \text{ million}$$

Part b:

M2 equals M1 plus Savings deposits, including Money market deposit accounts (MMDAs) plus Small-denominated (less than \$100,000) time deposits plus Money Market Mutual Funds (MMMFs) held by individuals.

$$\text{M2} = \$2240 + \$140 + \$100 + \$400 = \$2880 \text{ million}$$

Q.3

a.) The Third National Bank has reserves of \$20,000 and checkable deposits of \$100,000. The reserve ratio is 20 percent. Households deposit \$5000 in currency into the bank and that currency is added to reserves. What level of excess reserves does the bank now have?

b.) Suppose again that the Third National Bank has reserves of \$20,000 and checkable deposits of \$100,000. The reserve ratio is 20 percent. The bank now sells \$5,000 in securities to the Federal Reserve Bank in its district, receiving a \$5,000 increase in reserves in return. What level of excess reserves does the bank now have? By what amount does your answer differ from the answer to part a?

a. The first step is to calculate checkable deposits. This equals the original checkable deposits plus the new deposit, \$105,000 ($= \$100,000 + \$5,000$).

The second step is to calculate required reserves for the deposits, which equals the product of the required reserve ratio (decimal form) and checkable deposits.

$$\text{Required Reserves} = 0.20 \times \$105,000 = \$21,000$$

The third step is to calculate excess reserves, which equals actual reserves minus required reserves. Since the \$5,000 deposit was added to the original reserves of \$20,000 the new (actual) reserves equal \$25,000.

Excess Reserves = Actual Reserves - Required Reserves = \$25,000 - \$21,000 = \$4,000

b. The \$5,000 sale of securities is directly transferred into the reserves of the bank. This increases reserves by \$5000 to \$25,000 as above, but since this was a sale of securities there is no change in checkable deposits immediately following the transaction. The fact that checkable deposits have not changed implies that the required reserves have not change, so required reserves still equal \$20,000 \. Thus, excess reserves equal \$5,000 (= actual reserves - required reserves = \$25,000 0 - \$20,000).

Q.4

Suppose that Suerte Insurance Company buys a Treasury Bill from the Central Bank of Turkish Republic for 10,000 TL. It pays for the bill by writing a check on its account with A Bank. The T-account below shows the initial situation.

A Bank			
Assets		Liabilities	
Reserves	100,000 TL	Deposits	1,000,000 TL
Loans	900,000 TL		

- i) If the reserve requirement ratio is %10, what are the A Bank's required reserves initially? Does it have excess reserves initially?

$$\text{Required Reserves} = rr * \text{deposits} = 0.1 * 1,000,000 = 100,000 \text{ TL}$$

The bank has no excess reserves, and its reserves are equal to required reserves.

- ii) Show the immediate effect of the withdrawal from A Bank in the T-account above.

A Bank (after the withdrawal by Suerte)			
Assets		Liabilities	
Reserves	90,000 TL	Deposits	990,000 TL
Loans	900,000 TL		

- iii) What is the status of A Bank's reserves after the withdrawal? Are they sufficient to meet requirements?

$$\text{required reserves} = 0.1 * 990,000 = 99,000 \text{ TL}$$

No, actual reserves are less the required reserves.

- iv) A Bank reacts by calling in a loan it had made to Ms. Geller equal to the amount of its reserve deficiency. Ms. Geller repays the loan with funds she has just received from her grandmother's estate. She received those funds as a check drawn on B Bank, whose T-account is shown below. Show the effects of these transactions on those two banks.

B Bank (initial situation)			
Assets		Liabilities	
Reserves	50,000 TL	Deposits	500,000 TL
Loans	450,000 TL		

B Bank (After a check from grandma clears)			
Assets		Liabilities	
Reserves	41,000 TL	Deposits	491,000 TL
Loans	450,000 TL		

A Bank (after receiving loan payment)			
Assets		Liabilities	
Reserves	99,000 TL	Deposits	990,000 TL
Loans	891,000 TL		

- v) After this transaction, does A Bank have sufficient reserves? What about B Bank?

A Bank: ***Required Reserves = 0.1 * 990,000 = 99,000 TL.***

Yes, actual reserves are equal to required reserves.

B Bank: ***Required Reserves = 0.1 * 491,000 = 49,100 TL.***

No, actual reserves are less than required reserves. (41,000 < 49,100)

- vi) After all banks meet their reserve requirements, how much does this initial transaction of Suerte Insurance company change the money supply in the market? (Assume that there is no change in currency in circulation.)

$\Delta \text{in money supply} = \Delta \text{in deposits} + \Delta \text{in currency in circulation}$

$$\Delta \text{in deposits} = -10,000 * \left(\frac{1}{0.1} \right) = -100,000$$

$$\Delta \text{in } M^s = -100,000 + 0 = -100,000$$

Q.5

Suppose you received a gift of \$2000 cash on your 21st birthday. Further suppose you used it to purchase a bond with no expiration date that pays annual interest of \$100.

- a) What is the annual yield rate on your bond?

The annual yield rate is the percentage return on your bond. In this case, the yield rate is $\$100/\$2000 = 0.05$, or 5%.

- b) What will be the market price of your bond if the interest rate on newly issued bonds of similar risk rises to 6%?

If competitive bonds yield 6%, no one would willingly buy your bond unless it also yielded at least 6%. The price of your bond would have to fall to $\$100/.06 = \1666.67 to remain competitive.

- c) Alternatively, what will be the market price of your bond if the interest rate on newly issued bonds of similar risk falls to 4%?

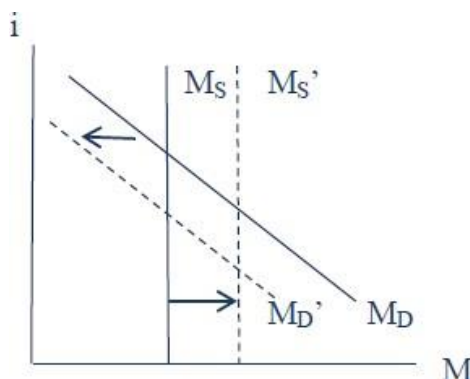
Since your bond is returning \$100 each year, at a price of \$2000 it would yield 5% and would be highly desirable compared to other assets yielding only 4%. Buyers will bid up the price until its yield matches those of similar risk. The selling price will rise to $\$100/.04 = \2500 .

Q.6

Illustrate the following situations using supply and demand curves for money. (Hint: Remember that the M_D is affected from changes in the price level and change in national income).

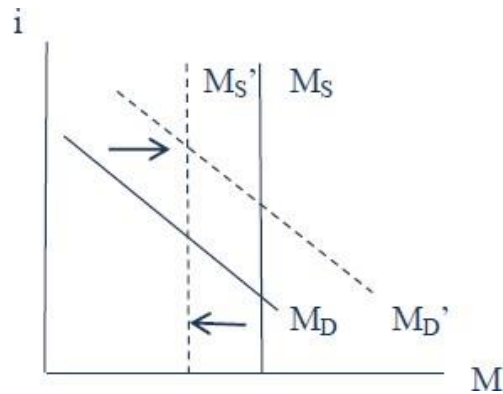
- a) During a recession, the CB buys bonds in the open market.

The money demand curve will shift to the left due to the recession. When the CB buys bonds, it increases the money supply, so the money supply curve will shift to the right.



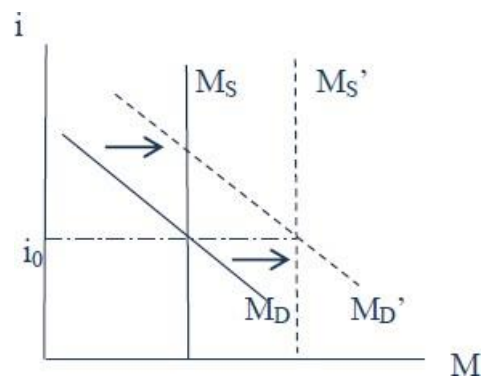
b) During a period of rapid inflation, the CB increases the reserve requirement ratio.

The money demand curve will shift to the right due to rapid inflation. The increase in the reserve requirement ratio causes a contraction in the money supply. Thus, the money supply curve will shift to the left.

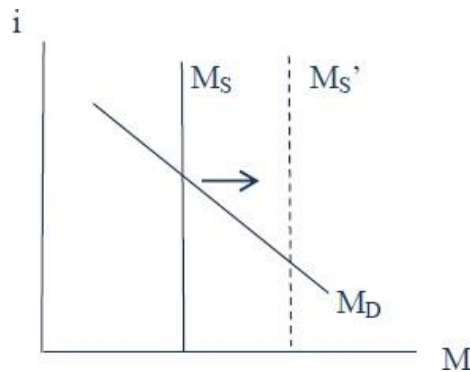


c) During a period of high inflation, the CB acts to hold interest rates constant.

The money demand curve will shift to the right due to a period of high inflation. To keep interest rates constant, the CB increases the money supply. Thus, the money supply curve will shift to the right.



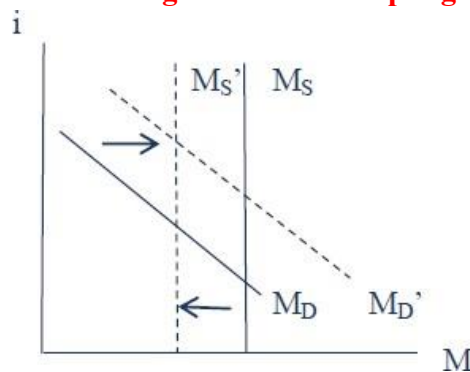
- d) During a period of no growth of GDP and zero inflation, the CB lowers the discount rate.



During a period of no growth in GDP and zero inflation, there is no shift in the money demand curve. When the CB lowers the discount rate, they encourage banks to borrow. Thus, it increases the money supply. The money supply curve will shift to the right.

- e) During a period of the rapid growth of real GDP, the CB increases the reserve requirement ratio.

The money demand curve will shift to the right due to the rapid growth of real GDP.



The CB increases the reserve requirement ratio and decreases the money supply. Thus, the money supply curve will shift to the left.

Q.7

The economy of Fairland is experiencing an inflationary gap. If the Central Bank of Fairland wishes to close this gap by using monetary policy tools it could carry out open market **sales** (purchases / sales) which would be a **contractionary** (expansionary / contractionary) monetary policy. Total reserves in the commercial banking system would **decrease** (increase / decrease). At the initial interest rate, there are an excess **supply of** (supply of / demand for) government bonds and excess **demand for** (supply of / demand for) money. The money supply curve should shift to the **left** (left / right). The quantity of money demanded will **decrease** (increase / decrease) and the interest rates will tend to **rise** (rise / fall) as the money market reaches its new equilibrium. Following this, investment expenditure will **decrease** (increase / decrease) which will have a(n) **contractionary** (expansionary / contractionary) effect on the level of real output. Alternatively, instead of using open market operations the central bank could have **increased** (increased / decreased) the required reserve ratio which would have **decreased** (increased / decreased) excess reserves held by banks.

Q.8

Consider an economy with the following information:

$$C = 200 + 0.8Y_D$$

$$I = 500 - 2000i$$

$$G = 210$$

$$NX = 30$$

$$T = 100 + 0.25Y$$

$$M^D = 850 - 1000i$$

$$M^S = 800$$

Where Y is output, Y_D is disposable income, C is consumption, T is net taxes, I is investment, G is government spending, NX is net export, i is interest rate, M^D is money demand and M^S is money supply.

a) What is the equilibrium interest rate?

To find the equilibrium interest rate, we need to look at the equilibrium in the money market.

$$\text{Eq'm condition} \rightarrow M^D = M^S$$

$$850 - 1000i = 800$$

$$i^* = 0.05$$

b) What is the equilibrium level of national income?

$$\begin{aligned}
 \text{Since } i &= 0.05, I = 500 - 2000(0.05) = 400 \\
 Y &= C + I + G + NX \\
 Y &= 200 + 0.8(Y - 100 - 0.25Y) + 400 + 210 + 30 \\
 Y &= 200 + 0.6Y - 80 + 400 + 210 + 30 \\
 0.4Y &= 760 \rightarrow Y^* = 1900
 \end{aligned}$$

c) Suppose the government wants national income to be \$2000 billion. What must be the level of investment for the equilibrium level of income to be \$2000 billion (if investment alone changes in response to the change in the interest rate)?

$$\begin{aligned}
 Y &= 2000 \\
 0.4Y &= 800 \\
 0.4Y &= 800 = 200 - 80 + I + 240 \\
 \text{The level of investment should be 440.} \\
 \text{or} \\
 \Delta Y &= 2000 - 1900 = 100 \\
 \Delta Y &= \Delta I * k \\
 k &= \frac{1}{1 - mpc + mpc * t + m} = \frac{1}{(1 - 0.8(1 - 0.25) + 0)} = 2.5 \\
 100 &= \Delta I * 2.5 \rightarrow \Delta I = 40 \\
 I_{\text{new}} &= 400 + 40 = 440
 \end{aligned}$$

d) What is the interest rate to attain the level of investment calculated in part (c)?

$$\begin{aligned}
 440 &= 500 - 2000i \\
 2000i &= 60 \\
 i &= 0.03 \\
 \text{It means that the interest rate should be 3 percent.}
 \end{aligned}$$

e) If the central bank pursues open market operations to attain \$2000 billion, should it buy or sell bonds?

From the money market: $M^D = 850 - 1000i = 820$
 $M^S = 800$, the level of interest rate should be equal to 3 percent. For the money market equilibrium M^S should be equal to 820.
 To decrease the interest rate to 0.03, the money supply should increase, so the CB should purchase bonds.

MULTIPLE CHOICE QUESTION

Q1) The major shortcoming of a barter economy is

- A) the requirement of a double coincidence of wants.
- B) the requirement of specialization and exchange.
- C) that goods and services are not traded.
- D) that money loses value from inflation.

Q2) The statement, "My iPhone is worth \$900" 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.

Q3) If whole tomatoes were money, which of the following functions of money would be the hardest for tomatoes to satisfy?

- A) unit of account
- B) store of value
- C) certificate of gold
- D) medium of exchange

Q4) Liquidity is defined as

- A) the ease with which a given asset can be converted to a store of value.
- B) the ease with which a given asset can be converted to a unit of account.
- C) the ease with which a given asset can be converted to a medium of exchange.
- D) the ease with which a given asset can be converted to a standard of deferred payment.

Q5) Fiat money

- A) has no or very little value except as money.
- B) is rarely used in modern economies.
- C) functions well only if can be redeemed for gold or other precious metals.
- D) serves well as a medium of exchange, but not as a store of value.

Q6) Which of the following is not counted in M1?

- A) checking account balances
- B) credit card balances
- C) coins in circulation
- D) currency in circulation

Q7) If a person withdraws \$500 from his/her time deposits and puts it in his/her demand deposits, then M1 will _____ and M2 will _____.

- A) increase; decrease
- B) increase; not change
- C) not change; increase
- D) not change; decrease

Please answer the next two questions referring to the table below.

Currency	\$1,000
Demand deposits	2,000
Time deposits	5,000
Small-Denomination Time Deposits	6,000
Money Market Fund Shares	7,000

Q8) M1 in this simple economy equals

- A) \$1,000.
- B) \$2,000.
- C) \$3,000.
- D) \$8,000.

Q9) Banks can make additional loans when required reserves are

- A) greater than total reserves.
- B) less than total reserves.
- C) less than total deposits.
- D) less than total loans.

Please answer the next four questions referring to the scenario below.

Imagine that Carmen deposits \$10,000 of currency into her demand deposit at Bank A and that the required reserve ratio is 20%.

Q10) As a result of Kristy's deposit, Bank A's reserves immediately increase by

- A) \$2,000.
- B) \$8,000.
- C) \$10,000.
- D) \$50,000.

Q11) As a result of Carmen's deposit, Bank A's required reserves increase by

- A) \$2,000.
- B) \$8,000.
- C) \$10,000.
- D) \$50,000.

Q12) As a result of Carmen's deposit, Bank A's excess reserves increase by

- A) \$2,000.
- B) \$8,000.
- C) \$10,000.
- D) \$50,000.

Q13) As a result of Carmen's deposit, Bank A can make a maximum loan of

- A) \$2,000.
- B) \$8,000.
- C) \$10,000.
- D) \$50,000.

Q14) As a result of Carmen's deposit, demand deposits in the banking system as a whole (including the original deposit) could eventually increase up to a maximum of

- A) \$8,000.
- B) \$10,000.
- C) \$50,000.
- D) \$100,000.

Q15) Suppose the required reserve ratio is 20 percent. If banks are conservative and choose not to loan all of their excess reserves, the real-world deposit multiplier is

- A) less than 5.
- B) equal to 5.
- C) greater than 5.
- D) equal to 20.

Q16) Which of the following best describes how banks create money?

- A) Banks charge higher interest rates on loans than they pay on deposits.
- B) Banks charge fees for providing financial advice.
- C) Banks create checking account deposits when making loans from excess reserves.
- D) Banks make loans from reserves.

Q17) Which of the following is an asset for a bank?

- A) deposits of its customers
- B) short-term borrowing
- C) shareholders' equity
- D) loans

Q18) If the central bank can act as a lender of last resort during a banking panic, banks can

- A) call in their loans to their customers and eventually restore the public's faith in the banking system.
- B) satisfy customer withdrawal needs and eventually restore the public's faith in the banking system.
- C) borrow more and more money from the central bank, and this will lower its reserves and decrease the public's faith in the banking system.
- D) encourage the public to borrow directly from the central bank, and this will worsen the banking panic.

Q19) Open market operations refer to the purchase or sale of _____ to control the money supply.

- A) corporate bonds and stocks by the Central Bank
- B) Treasury securities by the Central Bank
- C) corporate bonds and stocks by the Treasury
- D) Treasury securities by the Treasury

Q20) A decrease in the reserve requirement _____ bank reserves and _____ the money supply.

- A) increases; increases
- B) increases; decreases
- C) decreases; increases
- D) decreases; decreases

Q21) Which of the following is not a major function of the Central Bank?

- A) lender of last resort
- B) clearing checks between banks
- C) setting income tax rates
- D) controlling the money supply

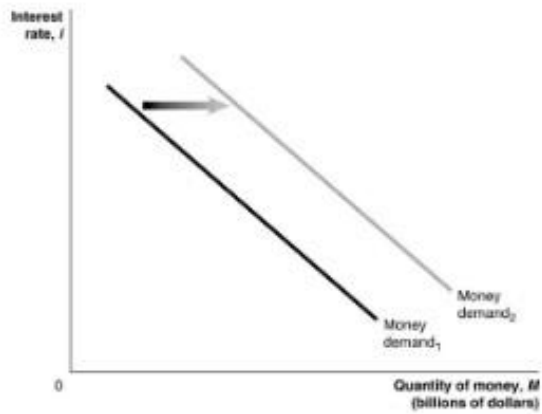
Q22) Monetary policy refers to the actions the Central Bank takes to manage

- A) the money supply and income tax rates to pursue its economic objectives.
- B) the money supply and interest rates to pursue its economic objectives.
- C) income tax rates and interest rates to pursue its economic objectives.
- D) government spending and income tax rates to pursue its economic objectives.

Q23) An increase in the interest rate

- A) decreases the opportunity cost of holding money.
- B) increases the opportunity cost of holding money.
- C) decreases the percentage yield of holding money.
- D) increases the percentage yield of holding money.

Please answer the next two questions referring to the figure below.



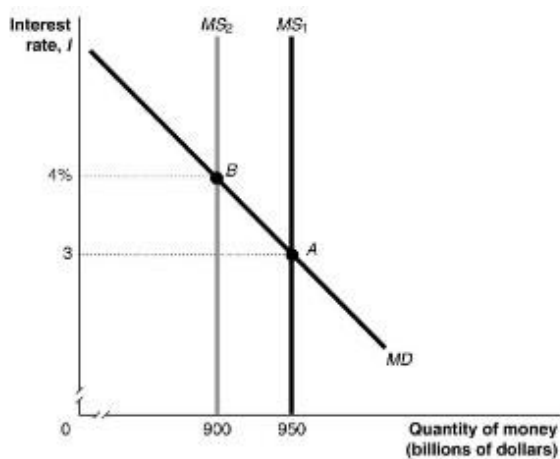
Q24) The money demand curve would move from *Money demand₁* to *Money demand₂* if

- A) real GDP increased.
- B) the price level decreased.
- C) the interest rate increased.
- D) the Central Bank sold Treasury securities.

Q25) The money demand curve would move from *Money demand₁* to *Money demand₂* if

- A) real GDP decreased.
- B) the price level increased.
- C) the interest rate decreased.
- D) the Central Bank sold Treasury securities.

Q26) In the figure below, the movement from point A to point B in the money market would be caused by



- A) an increase in the price level.
- B) a decrease in real GDP.
- C) an open market sale of Treasury securities by the Central Bank.
- D) a decrease in the required reserve ratio by the Central Bank.

Q27) Contractionary monetary policy on the part of the CB results in

- A) an increase in the money supply, an increase in interest rates, and an increase in GDP.
- B) a decrease in the money supply, an increase in interest rates, and a decrease in GDP.
- C) an increase in the money supply, a decrease in interest rates, and an increase in GDP.
- D) a decrease in the money supply, a decrease in interest rates, and a decrease in GDP.

Q28) Expansionary monetary policy on the part of the CB results in

- A) an increase in the money supply, an increase in interest rates, and an increase in GDP.
- B) a decrease in the money supply, an increase in interest rates, and a decrease in GDP.
- C) an increase in the money supply, a decrease in interest rates, and an increase in GDP.
- D) a decrease in the money supply, a decrease in interest rates, and a decrease in GDP.