

# HE1002 Macroeconomics I

## Problem Sheet 9 – Problems & Solutions

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*Quantitative Research Society @NTU*

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### Problem 9-1

Determine whether each of the following would fulfill the three functions of money. If the item does not fulfill all three, name at least one function of money that it violates.

**Three functions of money:** (1) medium of exchange; (2) unit of account; (3) store of value

(a) Salt.

**Solution:**

**Yes, salt fulfills all three functions:**

- **Medium of exchange:** As long as people were willing to accept salt in exchange for goods and services.
- **Unit of account:** As long as people agreed on prices in terms of salt that goods and services would sell for.
- **Store of value:** Salt keeps for a long time.

(b) The barter system.

**Solution:**

**No, the barter system does not fulfill all three functions:**

- **Medium of exchange:** Requires double coincidence of wants (problem).
- **Unit of account:** No standard measure of value; hard to compare worth of different goods.
- **Store of value:** Many goods are perishable or lose value over time.

- (c) Baseball cards.

**Solution:**

**No, baseball cards do not fulfill all three functions:**

- **Medium of exchange:** Difficult to get everyone to accept baseball cards as payment.
- **Unit of account:** Volatile prices not suitable for gauging relative values.
- **Store of value:** Baseball cards can keep well over time, but value is volatile.

## Problem 9-2

Imagine you own a lawn-mowing business. Identify the main function of money exhibited in each situation below.

**Definitions:**

- **Medium of exchange:** When money is exchanged for a good or service.
- **Unit of account:** When we calculate values in dollar terms.
- **Store of value:** When we save dollars for later use.

- (a) You swipe your debit card to purchase gasoline for your lawn mower.

**Solution: Medium of exchange**

- (b) You stuff your earnings from mowing lawns into a piggy bank.

**Solution: Store of value**

- (c) You pay your friend Cornelius \$5 to help you mow lawns.

**Solution: Medium of exchange**

- (d) You calculate your net earnings for the year on your tax return.

**Solution: Unit of account**

- (e) You determine how much value your new lawn mower has added to your business.

**Solution: Unit of account**

## Problem 9-3

From 2004 to 2009, the country of Zimbabwe underwent hyperinflation, in which prices rise rapidly. The government began printing bills as large as 100 billion Zimbabwe dollars. Explain how this situation would have affected the characteristics of good money discussed in this chapter.

**Solution:**

**Characteristics of good money:** (1) stability of value; (2) convenience; (3) widely accepted

**Impact of hyperinflation:**

- **Stability of value:** Hyperinflation makes the value of money unstable.
- **Acceptability:** Unstable value lowers its acceptability.
- **Convenience:** The need to keep up with constant changes in value means that it is no longer convenient.

## Problem 9-4

Suppose you live in a country perfect for growing tulips and governed by King Balthazar, who proposes that you use the tulips for your currency. After all, says Balthazar, they are widely accepted in the community, they've been valuable for years, and they are highly portable. If you were Balthazar's economic advisor, would you recommend using the tulips? If yes, list the traits of good money they satisfy. If no, list the trait(s) of good money they do not satisfy.

**Solution:**

**No, I would not recommend using tulips as currency.**

**Traits of good money they do NOT satisfy:**

- **Unstable value:** Value would fluctuate due to changing demand for and supply of tulips.
- **Inconvenient:** Tulips are perishable, must be carefully handled, and must be stored within a small range of temperatures.

## Problem 9-5

Say whether each of the following is a type of M1 or M2, or both.

**Definitions (After May 2020):**

- **M1:** Cash + savings accounts deposits + checking account deposits + traveler's checks

- **M2:** M1 + time deposits (e.g., certificates of deposit under \$100,000) + money market mutual funds
- (a) Checkable deposits.    **M1 and M2**
- (b) Dollar bills.    **M1 and M2**
- (c) Money in your checking account.    **M1 and M2**
- (d) Money in your savings account.    **M1 and M2**
- (e) Certificates of deposit under \$100,000.    **M2 only**
- (f) Traveler's checks.    **M1 and M2**

## Problem 9-6

Which of the following statements are true regarding the differences between M1 and M2?

- (a) M1 includes cash and reserves, whereas M2 does not.    **FALSE**  
M2 includes everything in M1 plus other financial instruments.
- (b) M2 represents a broader measure of the money supply compared to M1.    **TRUE**  
M2 includes everything in M1 plus additional financial instruments.
- (c) Numerically, M1 is larger than M2.    **FALSE**  
M2 is larger than M1.
- (d) All items in M1 are more liquid than all items in M2.    **TRUE**  
M1 includes cash and checkable deposits that are readily accessible.
- (e) M2 includes savings deposits, whereas M1 does not.    **FALSE**  
Since May 2020, M1 includes savings deposits.
- (f) Checking account balances are part of M2 but not M1.    **FALSE**  
Checking account balances are part of M1 and thus also M2.

## Problem 9-7

You decide to take \$500 out of your piggy bank at home and place it in the bank. If banks hold 5 percent of deposits as reserves, how much can your \$500 increase the amount of money in the economy?

**Solution:**

When you deposit \$500 into your bank account:

- The bank holds 5% = \$25 in reserves
- The remaining \$475 can be loaned out
- When borrowed money is spent and redeposited, the process repeats (money multiplier effect)

**Money Multiplier:**

$$\text{Money Multiplier} = \frac{1}{RR} = \frac{1}{0.05} = 20$$

**Total deposits created:**

$$\$500 \times 20 = \$10,000$$

**Increase in money supply:**

$$\$10,000 - \$500 = \mathbf{\$9,500}$$

(The \$500 cash was already part of the original money supply, so we subtract it.)

## Problem 9-8

Assume that \$1 million is deposited in a bank and banks hold 15 percent of deposits as reserves. What is the money supply as a result? What would change if the reserve ratio was instead 30 percent?

**Solution:**

**With 15% reserve ratio:**

$$\text{Money Multiplier} = \frac{1}{0.15} = 6.67$$

$$\text{Total money supply} = \$1 \text{ million} \times 6.67 = \mathbf{\$6.67 \text{ million}}$$

**With 30% reserve ratio:**

$$\text{Money Multiplier} = \frac{1}{0.30} = 3.33$$

$$\text{Total money supply} = \$1 \text{ million} \times 3.33 = \mathbf{\$3.33 \text{ million}}$$

**Change:** Higher reserve ratio → smaller money multiplier → smaller money supply.

## Problem 9-9

The following quotation comes from remarks given by Ben Bernanke, former chairman of the Federal Reserve. The Federal Reserve has a dual mandate. Which mandate does the quote below refer to?

“The substantial ongoing slack in the labour market and the relatively slow pace of improvement remain important reasons that the Committee continues to maintain a highly accommodative monetary policy.”

**Solution:**

**The dual mandate refers to:** (1) price stability; (2) full employment

**This quote refers to the FULL EMPLOYMENT mandate.** The quote focuses on the labour market slack, indicating concern about unemployment.

## Problem 9-10

Look back to the POW camps described in the box on Cigarette Money. Who played the role of the central bank?

**Solution:**

**The Red Cross played the role of the central bank.** The central bank manages a nation's money supply. Since the Red Cross decided the number of cigarettes in circulation in POW camps, it functioned as the central bank.

## Problem 9-11

Which tool of monetary policy is most likely being described by each of the following statements?

- (a) It's the major way the Federal Reserve System enacts monetary policy.

**Solution: Open-market operations or Interest on reserve balances**

- (b) This tool goes through the Federal Reserve's role as lender of last resort.

**Solution: Discount window**

- (c) This tool is best for everyday monetary policy.

**Solution: Open-market operations or Interest on reserve balances**

- (d) A major disadvantage of this tool is that it requires that banks want to borrow from the Fed.

**Solution: Discount window**

## Problem 9-12

Name the monetary policy tool being used in each of the following examples.

- (a) The central bank buys government securities from banks.

**Solution: Open-market operations**

- (b) The central bank raises the cost of borrowing money.

**Solution: Discount rate**

- (c) The central bank raises the return that banks earn from holding reserves at the Fed.

**Solution: Interest on reserve balances**

## Problem 9-13

The economy is in recession and the Federal Reserve wants to increase the money supply. Should it increase or decrease the following?

- (a) Interest on reserve balances.

**Solution: DECREASE.** Lowering the interest paid on reserves makes it less attractive for banks to keep excess reserves, encouraging them to lend more.

- (b) The discount rate.

**Solution: DECREASE.** Lower rates make borrowing cheaper for banks, encouraging more lending.

- (c) Purchases of bonds in the open market.

**Solution: INCREASE.** Buying bonds injects money into the banking system, boosting reserves.

## Problem 9-14

Consider this scenario: The federal funds rate is equal to the interest on reserve balances since the demand curve for federal funds is flat where it intersects with the supply of reserves. If the Fed wants to raise the federal funds rate, which of the following policies would work?

- (a) Lower the discount rate.    **NO**

- (b) Purchase bonds in the open market.    **NO**

- (c) **Raise the interest on reserve balances. YES**

*IORB helps create a lower bound on the fed funds rate. Raising IORB will help raise the fed funds rate.*

- (d) Perform quantitative easing. **NO**

## Problem 9-15

Suppose that the interest rate on a 3-month government bond increases from 1 to 2 percent. According to the expectations hypothesis, what does this imply about the overnight interest rates between now and three months from now?

**Solution:**

**Answer:** The overnight interest rates are **expected to rise**.

**Explanation:** According to the expectations hypothesis, the interest rate on a longer-term bond reflects the average of expected future short-term interest rates. The rise in the 3-month bond rate from 1% to 2% implies investors expect overnight rates to increase over the next three months.

## Problem 9-16

Suppose that interest rates are at the effective lower bound, but the Fed wants to reduce long-term interest rates even further. Explain why each of the tools would or would not enable the Fed to do so.

- (a) Interest on reserve balances.

**Solution: NO.** The Fed funds rate is already close to zero, so lowering IORB won't help.

- (b) Quantitative tightening.

**Solution: NO.** Quantitative tightening involves selling bonds, which puts upward pressure on long-term interest rates (opposite of what we want).

- (c) Forward guidance.

**Solution: YES.** Communicating that rates will stay low for an extended period can lower long-term rates through expectations.

- (d) The discount rate.

**Solution: NO.** The Fed funds rate is already near zero, so the discount rate tool is ineffective.

- (e) Purchases of bonds in the open market.

**Solution: NO.** Open-market purchases aim to lower Fed funds rate, but it's already at the ELB.

- (f) Quantitative easing.

**Solution: YES.** Large-scale purchases of long-term Treasury or mortgage-backed securities directly lower long-term interest rates and are effective at the ELB.

## Problem 9-17

For each component of GDP below, describe the channels through which a rise in the interest rate affects expenditures.

- (a) Consumption.

**Solution:**

When interest rates increase, it is more expensive to borrow, and consumption tends to fall.

- (b) Investment.

**Solution:**

Interest rates affect the cost of borrowing for purchases of capital goods. When interest rates increase, investment tends to fall.

- (c) Government expenditures.

**Solution:**

The effect is not immediate, but higher interest rates increase the government's cost of funding its debt. Higher interest rate payments leave less money for government spending on goods and services.

- (d) Net exports.

**Solution:**

When U.S. interest rates increase, U.S. assets become more attractive. Demand for U.S. dollars increases, causing the dollar to appreciate. A stronger dollar makes U.S. exports more expensive and imports cheaper, so NX falls.

## Problem 9-18

What would happen to each of these components of the liquidity-preference model if the Federal Reserve decides to raise the reserve requirement?

- (a) Money supply.

**Solution:**

A higher reserve requirement means banks must hold more money in reserves and can lend out less. The money supply shifts **leftward (decreases)**.

- (b) Interest rates.

**Solution:**

The decrease in money supply will push interest rates **upward (increase)**.

- (c) Quantity of money in the economy.

**Solution:**

The equilibrium quantity of money will **fall (decrease)**.

- (d) Money demand curve.

**Solution:**

The money demand curve **does not shift**. There is a leftward movement along the money demand curve as interest rates rise.

## Problem 9-19

For each of the following situations, identify whether the Federal Reserve is likely to pursue an expansionary or a contractionary monetary policy.

- (a) The unemployment rate is at 0.5 percent.

**Solution:**

**Contractionary monetary policy.** Unemployment of 0.5% is far below the natural rate of 4%, indicating an overheating economy.

- (b) The economy is experiencing record growth in GDP.

**Solution:**

**Contractionary monetary policy.** Record growth indicates an overheating economy that needs to be cooled.

- (c) The unemployment rate is at 15 percent.

**Solution:**

**Expansionary monetary policy.** Unemployment of 15% is far above the natural rate, indicating the need to stimulate the economy.

- (d) Inflation has reached 10 percent, a recent high.

**Solution:**

**Contractionary monetary policy.** Inflation of 10% is far above the Fed's target of 2%, requiring contractionary action.

- (e) A hurricane recently demolished a major city, causing a major recession.

**Solution:**

**Expansionary monetary policy.** The recession requires stimulus to stimulate spending and create jobs.

## Problem 9-20

Using Figure 15P-1, answer the following questions.

- (a) Is this economy in recession, just right, or overheating?

**Solution:**

**Overheating.** Output is above potential output.

- (b) What is the correct monetary policy in this situation—expansionary or contractionary?

**Solution:**

**Contractionary monetary policy.** The economy is overheating and needs to cool down.

- (c) What is the effect on prices of that policy—will they increase or decrease?

**Solution:**

**Prices will DECREASE.** Contractionary monetary policy raises interest rates, reducing spending and shifting aggregate demand left, which reduces inflationary pressure.