25 MONEY, THE PRICE LEVEL, AND INFLATION
What is Money?

**Money** is any commodity or token that is generally acceptable as a **means of payment**.

A **means of payment** is a method of settling a debt.

Money has three other **functions**:

- Medium of exchange
- Unit of account
- Store of value
What is Money?

Medium of Exchange

A medium of exchange is an object that is generally accepted in exchange for goods and services.

In the absence of money, people would need to exchange goods and services directly, which is called barter.

Barter requires a double coincidence of wants, which is rare, so barter is costly.
What is Money?

Unit of Account - measurement

A *unit of account* is an agreed measure for stating the prices of goods and services.

Table 25.1 illustrates how money simplifies comparisons.

<table>
<thead>
<tr>
<th>Good</th>
<th>Price in money units</th>
<th>Price in units of another good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movie</td>
<td>$8.00 each</td>
<td>2 cappuccinos</td>
</tr>
<tr>
<td>Cappuccino</td>
<td>$4.00 each</td>
<td>2 ice-cream cones</td>
</tr>
<tr>
<td>Ice cream</td>
<td>$2 per cone</td>
<td>2 packs of jelly beans</td>
</tr>
<tr>
<td>Jelly beans</td>
<td>$1 per pack</td>
<td>2 sticks of gum</td>
</tr>
<tr>
<td>Gum</td>
<td>$0.50 per stick</td>
<td></td>
</tr>
</tbody>
</table>

Store of Value - durable

As a *store of value*, money can be *held for a time* and later exchanged for goods and services.
What is Money?

Money in the United States Today

Money in the United States consists of:

- **Currency** => note and coins
- Deposits at banks and other depository institutions

**Currency** is the notes and coins held by households and firms.
What is Money?

Official Measures of Money

The two main official measures of money in the United States are M1 and M2.

M1 consists of currency and traveler’s checks and checking deposits owned by individuals and businesses.

M2 consists of M1 plus time, saving deposits, money market mutual funds, and other deposits.
What is Money?

A Measure of Monetary Aggregates according to a Diamond Spectrum.
What is Money?

The figure illustrates the composition of M1…

and M2.

It also shows the relative magnitudes of the components.
What is Money?

Are M1 and M2 Really Money?

All the items in M1 are means of payment. They are money.

Some saving deposits in M2 are not means of payments — however for ATMs they are called liquid assets.

Liquidity is the property of being instantly convertible into a means of payment with little loss of value.
What is Money

Deposits are Money but Checks Are Not

In defining money, we include, along with currency, deposits at banks and other depository institutions.

But we do not count the checks that people write as money.

A check is an instruction to a bank to transfer money.

Credit Cards Are Not Money?

Credit cards are not money.

A credit card enables the holder to obtain a loan, but it must be repaid with money.
A **depository institution** is a firm that **takes deposits** from households and firms and **makes loans** to other households and firms.

**Types of Depository Institutions**

Deposits at three institutions make up the nation’s money. They are

- Commercial banks
- Thrift institutions
- Money market mutual funds
Depository Institutions

What Depository Institutions Do

The goal of any bank is to maximize the wealth of its owners.

To achieve this objective, the interest rate at which it lends exceeds the interest rate it pays on deposits.

But the banks must balance profit and prudence:

- Loans generate profit.
- Depositors must be able to obtain their funds when they want them.
Depository institutions engage in risky business. To make the risk of failure small, depository institutions are required to hold levels of reserves and owners’ capital equal to or that surpass the ratios laid down by regulation.

If a depository institution fails, deposits are guaranteed up to $250,000 per depositor per bank by the FDIC—Federal Deposit Insurance Corporation.

=> Malaysia we have PIDM
The Federal Reserve System (the Fed) is the central bank of the United States.

A central bank is the public authority that regulates a nation’s depository institutions and controls the quantity of money. -> monetary policy

The Fed’s goals are to keep inflation in check, maintain full employment, moderate the business cycle, and contribute toward achieving long-term growth.

In pursuit of its goals, the Fed pays close attention to the federal funds rate—the interest rate that banks charge each other on overnight loans of reserves.
The Federal Reserve System

The Fed’s Balance Sheet

On the Fed’s balance sheet, the largest and most important asset is U.S. government securities.

The most important liabilities are Federal Reserve notes in circulation and banks’ deposits.

The sum of Federal Reserve notes, coins, and depository institutions’ deposits at the Fed is the monetary base.
The Federal Reserve System

Table 25.3 shows the sources and uses of the monetary base in June 2012.

The Fed’s assets are the sources of monetary base.

The Fed’s liabilities are its uses of monetary base.
The Federal Reserve System

The Fed’s Policy Tools

To achieve its objectives, the Fed uses **three main policy tools:**

- Open market operations
- Last resort loans
- Required reserve ratios
Open Market Operations

An open market operation is the purchase or sale of government securities by the Fed from or to a commercial bank or the public.

When the Fed buys securities, it pays for them with newly created reserves held by the banks.

When the Fed sells securities, they are paid for with reserves held by banks.

So open market operations influence banks’ reserves.
The Conduct of Monetary Policy

An Open Market Purchase

Figure 25.2 shows the effects of an open market purchase on the balance sheets of the Fed and the Bank of America.

The open market purchase increases bank reserves.

An open market purchase of securities by the Fed results in an increase in reserves and an increase in the supply of money by an amount equal to the money multiplier times the change in reserves.
Open Market Purchase from a Bank

<table>
<thead>
<tr>
<th>Banking System</th>
<th>Federal Reserve System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
<td>Liabilities</td>
</tr>
<tr>
<td>Securities</td>
<td>- $100m</td>
</tr>
<tr>
<td>Reserves</td>
<td>+$100m</td>
</tr>
<tr>
<td>Securities</td>
<td>+$100m</td>
</tr>
<tr>
<td>Reserves</td>
<td>+$100m</td>
</tr>
</tbody>
</table>

Net result is that reserves have increased by $100
No change in currency
Monetary base has risen by $100
The Conduct of Monetary Policy

An Open Market Sale

This figure shows the effects of an open market sale on the balance sheets of the Fed and Bank of America.

The open market sale decreases bank reserves.
The Federal Reserve System

Last Resort Loans

The Fed is the lender of last resort, which means the Fed stands ready to lend reserves to depository institutions that are short of reserves.

Required Reserve Ratio

The Fed sets the required reserve ratio, which is the minimum percentage of deposits that a depository institution must hold as reserves.

The Fed rarely changes the required reserve ratio.
How Banks Create Money

Creating Deposits by Making Loans

Banks create deposits when they make loans and the new deposits created are new money.

The quantity of deposits that banks can create is limited by three factors:

- The monetary base
- Desired reserves
- Desired currency holding
How Banks Create Money

The Monetary Base

The *monetary base* is the sum of Federal Reserve notes, coins, and banks’ deposits at the Fed.

The size of the monetary base **limits the total quantity of money that the banking system can create** because

1. Banks have desired reserves
2. Households and firms have desired currency holdings

And both these desired holdings of monetary base depend on the quantity of money.
How Banks Create Money

Desired Reserves

A bank’s *actual reserves* consists of notes and coins in its vault and its deposit at the Fed.

The *desired reserve ratio* is the ratio of the bank’s reserves to total deposits that a bank *plans* to hold.

The *desired reserve ratio* exceeds the *required reserve ratio* by the amount that the bank determines to be prudent for its daily business.
How Banks Create Money

**Desired Currency Holding**

People hold some fraction of their money as currency. So when the total quantity of money increases, so does the quantity of currency that people plan to hold. Because desired currency holding increases when deposits increase, currency leaves the banks when they make loans and increase deposits. This leakage of reserves into currency is called the *currency drain*.

The ratio of currency to deposits is the *currency drain ratio*. 
How Banks Create Money

The Money Creation Process

The money creation process begins with an increase in the monetary base.

The Fed conducts an open market operation in which it *buys securities from banks*.

The Fed pays for the securities with newly created bank reserves.

Banks now have more reserves but the same amount of deposits, so they have excess reserves.

Excess reserves = Actual reserves – desired reserves.
**excess reserves**  The difference between a bank’s actual reserves and its required reserves.

\[
\text{excess reserves} \equiv \text{actual reserves} - \text{required reserves}
\]
The size of the money multiplier depends on

\[ \text{Money multiplier} = \frac{1 + \frac{C}{D}}{\frac{R}{D} + \frac{C}{D}} \]

In our example, \( \frac{C}{D} \) is 0.5 and \( \frac{R}{D} \) is 0.1, so

\[ \text{Money multiplier} = \frac{1 + 0.5}{0.1 + 0.5} \]
Mathematical Note: The Money Multiplier

The size of the money multiplier depends on

\[
\text{Money multiplier} = \frac{1 + C/D}{(R/D + C/D)}
\]

In our example, \(C/D\) is 0.5 and \(R/D\) is 0.1, so

\[
\text{Money multiplier} = \frac{1 + 0.5}{0.1 + 0.5}
\]

\[
= \frac{1.5}{0.6}
\]

\[
= 2.5
\]

When \(C/D = 0 \Rightarrow 1/RD\)
The Money Multiplier

The quantity of money created depends on the desired reserve ratio and the currency drain ratio.

The smaller these ratios, the larger is the money multiplier.

The money multiplier is the ratio of the change in the quantity of money to the change in the monetary base.

For example, if the Fed increases the monetary base by $100,000 and the quantity of money increases by $250,000, the money multiplier is 2.5.
If the Fed’s money supply behavior is not influenced by the interest rate, the money supply curve is a vertical line.

Through its three tools, the Fed is assumed to have the money supply be whatever value it wants.
The Money Market

How much money do people want to hold?

The Influences on Money Holding

The quantity of money that people plan to hold depends on four main factors:

- The price level
- The *nominal* interest rate
- Real GDP
- Financial innovation
The Money Market

The Price Level (+ve)

A rise in the price level increases the quantity of nominal money but doesn’t change the quantity of real money that people plan to hold.

Nominal money is the amount of money measured in dollars.

Real money equals nominal money price level.

The quantity of nominal money demanded is proportional to the price level—a 10 percent rise in the price level increases the quantity of nominal money demanded by 10 percent.
The Money Market

The *Nominal* Interest Rate (-ve)

The nominal interest rate is the **opportunity cost of holding wealth** in the form of money rather than an interest-bearing asset.

A rise in the nominal interest rate on other assets decreases the quantity of real money that people plan to hold.

Real GDP (+ve)

An increase in real GDP increases the volume of expenditure, which increases the quantity of real money that people plan to hold.
The Money Market

Financial Innovation (+ve)

Financial innovation that lowers the cost of switching between money and interest-bearing assets decreases the quantity of real money that people plan to hold.

If it were easy, quick and inexpensive to cash in financial assets, the little reason for holding money

The Demand for Money

The demand for money is the relationship between the quantity of real money demanded and the nominal interest rate when all other influences on the amount of money that people wish to hold remain the same.
Figure 25.4 illustrates the demand for money curve.

A rise in the interest rate brings a decrease in the quantity of real money demanded.

A fall in the interest rate brings an increase in the quantity of real money demanded.
Shifts in the Demand for Money Curve

Figure 25.5 shows that a decrease in real GDP or a financial innovation decreases the demand for money and shifts the demand curve leftward.

An increase in real GDP increases the demand for money and shifts the demand curve rightward.
Money Market Equilibrium

Money market equilibrium occurs when the quantity of money demanded equals the quantity of money supplied.

Adjustments that occur to bring about money market equilibrium are fundamentally different in the short run and the long run.
Short-Run Equilibrium

Figure 25.6 shows the demand for money.

Suppose that the Fed uses open market operations to make the quantity of money $3 billion.

The equilibrium interest rate is 5 percent a year.
If the interest rate is 6 percent a year, …

the quantity of money that people are willing to hold is less than the quantity supplied.

People try to get rid of the “excess” money they are holding by buying bonds.

This action lowers the interest rate.
If the interest rate is 4 percent a year, …

the quantity of money that people plan to hold exceeds the quantity supplied.

People try **to get more money** by selling bonds.

This action raises the interest rate.
Initially, the interest rate is 5 percent a year.

If the Fed increases the quantity of money, people will be holding more money than the quantity demanded.

They buy bonds.

The increased demand for bonds raises the bond price and lowers the interest rate.
Initially, the interest rate is 5 percent a year.

If the Fed decreases the quantity of money, people will be holding less money than the quantity demanded.

They sell bonds.

The increased supply of bonds lowers the bond price and raises the interest rate.
The Money Market

Long-Run Equilibrium

The price level adjusts to make the quantity of real money supplied equal to the quantity demanded.

If in long-run equilibrium, the Fed increases the quantity of money, the price level changes to move the money market to a new long-run equilibrium.

In the long run, nothing real has changed.

Real GDP, employment, quantity of real money, and the real interest rate are unchanged.

In the long run, the price level rises by the same percentage as the increase in the quantity of money \( \Delta P = \Delta M \)
The Money Market

Long-Run Equilibrium

In the long run, the loanable funds market determines the real interest rate.

The nominal interest rate equals the equilibrium real interest rate plus the expected inflation rate.

In the long run, real GDP equals potential GDP, so the only variable left to adjust in the long run is the price level.
The Money Market

The Transition from the Short Run to the Long Run

Start in full-employment equilibrium:

If the **Fed increases the quantity of money by 10 percent**, the nominal interest rate falls.

As people **buy bonds (excess money)**, price increases and the **real interest rate** falls.

As the real interest rate falls, **consumption expenditure and investment increase**. **Aggregate demand increases**.

With the economy at full employment, the **price level** rises.
The Money Market

As the price level rises, the quantity of real money decreases.

Thus......

The nominal interest rate and the real interest rate rise.

As the real interest rate rises, expenditure plans are cut back and eventually the original full-employment equilibrium is restored.

In the new long-run equilibrium, the price level has risen 10 percent but nothing real has changed.