Money Creation

- Three groups affect the money supply:
  - The **central bank** conducts monetary policy.
  - **Depository institutions** (banks) accept deposits and make loans.
  - **The public** (people and firms) holds money as currency and coin and as bank deposits.

Agenda

- Principles of Money Supply Creation
- The Federal Reserve System
- Monetary Policy Tools

Money Creation

- A central bank can print money:
  - Central bank can print money to buy real assets from the public.
    - This is how money gets into circulation.
    - People accept money if they believe other people will accept it in exchange.
    - The government usually decrees that the paper money is **legal tender**.
Money Creation

• A central bank can print money:
  ➢ The central bank’s assets are the real assets it buys from the public.
  ➢ The central bank’s liabilities are the money it issued to the public.
    • That money is called the monetary base, or high-powered money

Money Creation

• Required conditions for money creation:
  ➢ The equivalence of cash and deposits.
  ➢ The redeposit of loan proceeds.
  ➢ The holding of (fractional) cash reserves.
  ➢ The presence of willing borrowers.
  ➢ The presence of willing lenders.

The Monetary Base

• Definitions:
  ➢ BASE = CU + RES, where
    • BASE = Monetary Base,
    • CU = Currency held by the non-bank public, and
    • RES = Reserves held by banks.
      ➢ Required reserves.
      ➢ Excess reserves.

Components of the monetary base
Currency

- Definitions (continued):
  - $CU = cu \times DEP$, where
    - $DEP =$ deposits and
    - $0 < cu < 1$ and is determined by the public.
    - Currency held is a fraction of deposits.

Bank Reserves

- Definitions (continued):
  - $RES = res \times DEP + ex \times DEP$, where
    - $DEP =$ deposits and
    - $0 < res < 1$ and is determined by the central bank.
      - Reserve requirement ratio, the legal minimum.
    - $0 < ex < 1$ and is determined by commercial banks.
      - Excess reserve ratio, reserves above the legal minimum.
    - Reserves held are a fraction of deposits.

The Monetary Base

- Relationships:
  - $BASE = CU + RES$
  - $BASE = cu \times DEP + res \times DEP + ex \times DEP$
  - $BASE = (cu + res + ex) \times DEP$
    - or
  - $DEP = BASE / (cu + res + ex)$
    - If $cu + res + ex < 1$, then $DEP > BASE$.

The Money Supply

- Definitions (continued):
  - $M = CU + DEP$, where
    - $M =$ Money supply
      - $M1 =$ currency + checking deposits.
      - $M2 = M1 + savings deposits.
      - $M3 = M2 + institutional deposits (no longer published).
The Money Supply and the Monetary Base

• Relationships (continued):
  ➢ \( M = CU + DEP \)
  ➢ \( M = cuDEP + DEP \)
  ➢ \( M = (1 + cu)DEP \)

The Money Supply and the Monetary Base

• Relationships (continued):
  ➢ If \( M = (1 + cu)DEP \) and \( DEP = BASE/(cu + res + ex) \), then:
    ➢ \( M = (1 + cu)BASE/(cu + res + ex) \)
    ➢ \( M = [(1 + cu)/(cu + res + ex)] \times BASE \)

The Money Supply and the Monetary Base

• Each unit of the monetary base allows
  \[ \frac{(1 + cu)}{(cu + res + ex)} \]
  units of money to be created.

➢ The monetary base is called high-powered money because each unit of the base that is issued leads to the creation of more than one unit of money.

The Monetary Base & the Money Multiplier

• The term:
  \[ \frac{(1 + cu)}{(cu + res + ex)} \]

is called the money multiplier.

➢ As long as \( res + ex < 1 \), then the money multiplier will be \( > 1 \).

➢ There is a different money multiplier for each definition of money.
Monetary Base, Money Multiplier, and Money Supply

<table>
<thead>
<tr>
<th>Monetary Base, Money Multiplier, and Money Supply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency, $\text{CU}$</td>
<td>$741.2$ billion</td>
</tr>
<tr>
<td>Bank reserves, $\text{RES}$</td>
<td>$71.0$ billion</td>
</tr>
<tr>
<td>Monetary base, $\text{BASE}$ ((=\text{CU} + \text{RES}))</td>
<td>$812.2$ billion</td>
</tr>
<tr>
<td>Deposits, $\text{DEP}$</td>
<td>$636.4$ billion</td>
</tr>
<tr>
<td>Money supply, $M (=\text{CU} + \text{DEP})$</td>
<td>$1377.5$ billion</td>
</tr>
<tr>
<td>Reserve–deposit ratio, $\text{res} (=\text{RES}/\text{DEP})$</td>
<td>0.1116</td>
</tr>
<tr>
<td>Currency–deposit ratio, $\text{cu} (=\text{CU}/\text{DEP})$</td>
<td>1.1647</td>
</tr>
<tr>
<td>Money multiplier $[\text{cu} + 1]/(\text{cu} + \text{res})$</td>
<td>1.70</td>
</tr>
<tr>
<td>Ratio of money supply to base, $M/\text{BASE}$</td>
<td>1.70</td>
</tr>
</tbody>
</table>

Source: Federal Reserve Statistical Releases H.3 and H.6, August 3, 2006. Deposits are transactions deposits plus travelers’ checks, and the money supply is M1. Data are for June 2006. For recent data and historical series, see www.federalreserve.gov/releases.

Money Creation

- Peculiarities:
  - Gold discoveries.
    - and $\text{BASE}$.
  - Bank panics.
    - and $\text{cu}$.
  - Credit crunches.
    - and $\text{et}$.

The Federal Reserve System

- Created by an Act of Congress.
  - on December 23, 1913.
  - The nation’s central bank.

- Responsibilities:
  - Functions as the government’s bank.
  - Regulates and supervises banks and thrifts.
  - Acts as lender of last resort.
  - Implements monetary policy.

The Federal Reserve System

- Consists of:
  - Board of Governors
    - In Washington, DC
  - 12 regional Federal Reserve Banks
    - Located throughout the country
  - Federal Open Market Committee (FOMC)
The Federal Reserve System

• The Board of Governors:
  ➢ 7 members with overlapping 14-year terms.
    • Appointed by the President.
    • Confirmed by the Senate.
  ➢ Chairman and Vice Chairman with 4-year terms.
    • Designated by the President.
    • Confirmed by the Senate.

• Regional Bank Presidents:
  ➢ Appointed by regional Federal Reserve Bank’s Board of Directors.
    • Renewable 5-year terms.
  ➢ Approved by the Board of Governors.

• Independent within the Government.
  ➢ Independent:
    • Appointment of Governors.
    • Appointment of Bank Presidents.
    • Financed from its own resources.
      ➢ Surplus turned over to Treasury.
  ➢ Within the government:
    • Ultimately responsible to Congress.
Federal Open Market Committee

- Created by an Act of Congress.
  - On March 1, 1936.
  - Primary decision-making body for monetary policy.

- Consists of 12 voting members:
  - 7 members of the Board of Governors.
  - President of the New York Federal Reserve Bank.
    - Has operational responsibility for open market operations.
  - 4 other regional Federal Reserve Presidents.
    - Serve on an annually rotating basis.
  - And 7 non-voting members:
    - The other regional Federal Reserve Presidents.

- Meetings:
  - 8 per year at 5 – 8 week intervals.
    - Minimum of 4 meetings per year.
    - Also have conference calls if economic development warrant.
  - Provides direction for open market operations to the New York Federal Reserve Bank.
Federal Open Market Committee

• Meetings (continued):
  ➢ Issues a policy statement following the conclusion of each meeting announcing.
    • Any policy action taken.
    • The policy directive.
      ➢ Symmetrical.
      ➢ Asymmetrical.
      ➢ Economic strength/weakness
      ➢ Inflation
    • The vote.

• Releases minutes 3 weeks following the meeting.
• Releases semi-annual Monetary Policy Report:
  • Typically, in February and July.
  • Presented by Chairman to Congress.
• Releases meeting transcripts after a 5-year lag.

The Federal Reserve’s balance sheet

• The Federal Reserve’s balance sheet:
  ➢ Assets:
    • U.S. Treasury securities
    • Federal agency securities
    • Gold
    • Loans to depository institutions
    • Other assets (mostly foreign exchange reserves)

• Liabilities:
  • Currency outstanding.
  • Deposits by depository institutions.
  • Addendum: Banks’ reserves are vault cash plus banks’ deposits at the Fed.
The Balance of the Federal Reserve System

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>$11.0</td>
</tr>
<tr>
<td>Loans to depository institutions</td>
<td>$1.3</td>
</tr>
<tr>
<td>U.S. Treasury securities</td>
<td>$764.8</td>
</tr>
<tr>
<td>Other assets</td>
<td>$107.2</td>
</tr>
<tr>
<td>Total</td>
<td>$856.5</td>
</tr>
</tbody>
</table>

Addenda
- Reserves = deposits of depository institutions + vault cash = $70.8 billion
- Monetary base = currency held by the nonbank public + reserves = $573.9 billion

Monetary Policy Tools

- The Federal Reserve can change the monetary base, and therefore the money supply, through one of 3 monetary policy tools:
  - Open Market Operations
  - Discount Window Lending and the Discount Rate
  - Reserve Requirements

Monetary Policy Tools

- Open Market Operations:
  - The primary method for changing the monetary base and the money supply is through open-market operations.
  - Open market operations involve the central bank’s buying and selling of U.S. government securities in the open market.
    - Conducted by the New York Federal Reserve Bank.
  - When the central bank buys U.S. government securities in the open market, it will increase money in circulation, expand the monetary base and, therefore, increase the money supply.
    - This is an open-market purchase.
    - By increasing RES, the BASE increases, and this increases $M^\circ$ through the money multiplier, and reduces the federal funds rate.
Monetary Policy Tools

- **Open Market Operations:**
  - When the central bank sells U.S. government securities in the open market, it will reduce money in circulation, decrease the monetary base and, therefore, reduce the money supply.
    - This is an open-market sale.
    - By decreasing RES, the BASE decreases, and this decreases M* through the money multiplier, and increases the federal funds rate.

- **The Federal Funds Rate:**
  - The interest rates that banks pay to each other to borrow excess reserves.
    - Very closely influenced by the Federal Reserve.
  - While the fed funds rate is not a particularly important influence on the economy by itself, movements in the funds rate (and expectations about future funds rates encouraged by any change) influence the broad spectrum of interest rates and financial asset prices in the economy.

- **Discount Lending and the Discount Rate:**
  - **Discount window lending** is the central bank lending reserves to banks to meet reserve requirements.
  - The **discount rate** is the interest rate banks pay on borrowings from the Federal Reserve.
    - Set by the Board of Governors based on requests from the Boards of Directors from the regional Federal Reserve Banks.
  - Discount window lending was set up to halt financial panics by acting as a lender of last resort through the discount window.
Monetary Policy Tools

- Discount Lending and the Discount Rate:
  - A discount window loan increases the monetary base and, through the money multiplier, increases the money supply.
  - An increase in the discount rate would discourage discount window borrowing, reduce the monetary base and, through the money multiplier, decrease the money supply.

Monetary Policy Tools

- Discount Lending and the Discount Rate:
  - Discount window lending and the discount rate are now relatively unimportant.
    - Because such borrowings are bank initiated, the central bank acts in a relatively passive manner.
    - In addition, banks rarely use the discount window.

Monetary Policy Tools

- Reserve Requirement Ratio:
  - The reserve requirement ratio is the legal minimum fraction of each type of deposit that must be held by depository institutions as cash reserves.
    - Set by the Board of Governors.
    - This is for required reserves.

Monetary Policy Tools

- Reserve Requirement Ratio:
  - An increase in the reserve requirement ratio forces depository institutions to hold more reserves, which reduces the money multiplier, and shrinks the money supply for any given monetary base.
Monetary Policy Tools

• Reserve Requirement Ratio:

  ➢ Although a theoretically powerful way to change the money supply, in practice the reserve requirement ratio is relatively unimportant.
  
  • Because they are rarely changed.

Factors affecting the money supply

| Factor | Effect on monetary base, $B_D$ | Effect on money multiplier, $(1 + \frac{1}{\text{res}})$ | Effect on money supply, $M$
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>An increase in the reserve-deposit ratio, $\text{res}$</td>
<td>Unchanged</td>
<td>Decrease</td>
<td>Decrease</td>
</tr>
<tr>
<td>An increase in the currency-deposit ratio, $\text{cu}$</td>
<td>Unchanged</td>
<td>Decrease</td>
<td>Decrease</td>
</tr>
<tr>
<td>An open-market purchase</td>
<td>Increase</td>
<td>Unchanged</td>
<td>Increase</td>
</tr>
<tr>
<td>An open-market sale</td>
<td>Decrease</td>
<td>Unchanged</td>
<td>Decrease</td>
</tr>
<tr>
<td>An increase in reserve requirements</td>
<td>Unchanged</td>
<td>Decrease</td>
<td>Decrease</td>
</tr>
<tr>
<td>An increase in discounts</td>
<td>Increase</td>
<td>Unchanged</td>
<td>Increase</td>
</tr>
<tr>
<td>An increase in the discount rate</td>
<td>Decrease</td>
<td>Unchanged</td>
<td>Decrease</td>
</tr>
</tbody>
</table>

Note: The relationship among the money supply, the money multiplier, and the monetary base is $M = (1 + \frac{1}{\text{res}}) \times \text{cu}$.
The Money Supply

• Why the Fed Can’t Control Ms Exactly:
  ➢ Commercial banks and borrowers determine \( \text{exc} \).
    • Fed must forecast \( \text{ex} \), then adjust BASE (and/or \( \text{res} \)) to accommodate.
    • Sometimes it is difficult to predict \( \text{ex} \).
      ➢ The influence of deposit shifts between reserve categories.

• Multiple definitions of money:
  • \( \text{M1} \)
  • \( \text{M2} \)