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.
## Currency

- Definitions (continued):
  - \( CU = cu \cdot DEP \), where
    - \( DEP = \) deposits and
    - \( cu > 0 \) and is called the currency holding ratio.
      - Determined by the public.
  - Currency held is a proportion of deposits.

## Bank reserves

- Definitions (continued):
  - \( RES = res \cdot DEP + ex \cdot DEP \), where
    - \( DEP = \) deposits and
    - \( 0 < res < 1 \) and is called the required reserve ratio.
      - The legal minimum, determined by the central bank.
    - \( 0 < ex < 1 \) and is called the excess reserve ratio.
      - Above the legal minimum, determined by banks.
  - Reserves held are a fraction of deposits.

## The monetary base and deposits

- Relationships:
  - \( BASE = CU + RES \)
  - \( BASE = cu \cdot DEP + res \cdot DEP + ex \cdot DEP \)
  - \( BASE = (cu + res + ex) \cdot DEP \)
    - or
  - \( DEP = BASE / (cu + res + ex) \)

## The money supply

- Definitions:
  - \( M = CU + DEP \), where
    - \( M = \) Money supply
    - \( M1 = \) currency + checking deposits.
    - \( M2 = M1 + \) savings deposits.
    - \( M3 = M2 + \) institutional deposits (no longer published).
The money supply

• 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
    \[
    DEP = \frac{BASE}{cu + res + ex},
    \]
  then:
  ➢ \( M = (1 + cu)\frac{BASE}{cu + res + ex} \)
  ➢ \( M = \left[ \frac{(1 + cu)}{(cu + res + ex)} \right] * BASE \)

The money multiplier

• The term:
  \[
  \frac{(1 + cu)}{(cu + res + ex)}
  \]
  is called the **money multiplier**.
  ➢ If \( res + ex < 1 \), the money multiplier will be > 1.

The money multiplier

• 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.
Monetary base, money multiplier, and money supply

| Monetary base, BASE ( = CU + RES) | $812.2 billion |
| Bank reserves, RES | $710 billion |
| Currency, CU | $741.2 billion |
| Deposits, DEP | $636.4 billion |
| Money supply, M ( = CU + DEP) | $1377.5 billion |

Reserve/deposit ratio, res ( = RES/DEP) = 0.1116
Currency/deposit ratio, cu ( = CU / DEP) = 1.1647
Money multiplier, m = (cu + 1) / (cu + res) = 1.70
Ratio of money supply to base, M / BASE = 1.70

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 BASE.
  ➢ Bank panics.
    • and cu.
  ➢ Credit crunches.
    • and 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 monetary policy decision-making body.

Federal Open Market Committee

- 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.

Federal Open Market Committee

- Chairman:
  - Traditionally the Chairman of the Board of Governors.
- Vice Chairman:
  - Traditionally the President of the New York Federal Reserve Bank.

Federal Open Market Committee

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

• Meetings (continued):
  ➢ Policy statement follows meeting announcing:
    • Any policy action taken.
    • Summary of economic and inflationary conditions.
    • The policy bias.
      ➢ Symmetrical.
      ➢ Asymmetrical.
    • The vote.

Federal Open Market Committee

• Meetings (continued):
  ➢ 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)

The Federal Reserve’s balance sheet

• The Federal Reserve’s balance sheet:
  ➢ Liabilities:
    • Currency outstanding.
      ➢ Some is held in bank vaults and is called vault cash
      ➢ The rest is held by the public
    • 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>Currency</td>
</tr>
<tr>
<td>$11.0</td>
<td>$792.8</td>
</tr>
<tr>
<td>Loans to depository institutions</td>
<td>Vault cash</td>
</tr>
<tr>
<td>$1.3</td>
<td>$48.7</td>
</tr>
<tr>
<td>U.S. Treasury securities</td>
<td>Held by nonbank public</td>
</tr>
<tr>
<td>$764.8</td>
<td>$746.1</td>
</tr>
<tr>
<td>Other assets</td>
<td>Deposits of depository institutions</td>
</tr>
<tr>
<td>$107.2</td>
<td>$21.1</td>
</tr>
<tr>
<td>Total</td>
<td>Other liabilities and net worth</td>
</tr>
<tr>
<td>$806.5</td>
<td>$794.4</td>
</tr>
</tbody>
</table>

Addenda

Reserves = deposits of depository institutions + vault cash = $703.8 billion
Monetary base = currency held by the nonbank public + reserves = $873.9 billion

Note: Numbers may not add to totals shown owing to rounding.


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.

Monetary Policy Tools

- Open Market Operations:
  - When the Fed buys U.S. government securities in the open market, it will:
    - Increase bank deposits and reserves,
    - Expands the monetary base,
    - Increase the money supply through the money multiplier, and
    - Reduce the federal funds rate.
  - This is an open-market purchase.
Monetary Policy Tools

• Open Market Operations:
  ➢ When the Fed *sells* U.S. government securities in the open market, it will:
    • Decrease bank deposits and reserves,
    • Reduce the monetary base,
    • Decrease the money supply through the money multiplier, and
    • Increase the federal funds rate.
  ➢ This is an *open-market sale*.

Monetary Policy Tools

• The Federal Funds Rate:
  ➢ The interest rates that banks pay to one another 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.

Monetary Policy Tools

• 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.

Monetary Policy Tools

• Discount Lending and the Discount Rate:
  ➢ Discount window lending was set up to halt financial panics by acting as a *lender of last resort* through the discount window.
    • These loans must be collateralized.
Monetary Policy Tools

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

- 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.

- 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.

- 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 changes in the reserve requirement ratio is relatively unimportant.
  - Because it is rarely changed.

Factors affecting the money supply

<table>
<thead>
<tr>
<th>Factor</th>
<th>Effect on money base, BASE</th>
<th>Effect on money multiplier, (1 + r) / (1 + r)</th>
<th>Effect on money supply, M</th>
</tr>
</thead>
<tbody>
<tr>
<td>An increase in the reserve deposit ratio, res</td>
<td>Unchanged</td>
<td>Decrease</td>
<td>Decrease</td>
</tr>
<tr>
<td>An increase in the currency-deposit ratio, cu</td>
<td>Unchanged</td>
<td>Decrease</td>
<td>Decrease</td>
</tr>
<tr>
<td>An open-market sale of reserve requirements</td>
<td>Increase</td>
<td>Unchanged</td>
<td>Increase</td>
</tr>
<tr>
<td>An increase in reserve requirements</td>
<td>Decrease</td>
<td>Unchanged</td>
<td>Decrease</td>
</tr>
<tr>
<td>An increase in discount reserve balances</td>
<td>Unchanged</td>
<td>Decrease</td>
<td>Decrease</td>
</tr>
<tr>
<td>An increase in the discount rate</td>
<td>Increase</td>
<td>Unchanged</td>
<td>Increase</td>
</tr>
</tbody>
</table>

Note: The relationship among the money supply, the money multiplier, and the money base is

\[ M_t = \alpha (r_t + y) + \beta (r_{t-1} + y) \]

The Money Supply

- Why the Fed Can’t Control M* Exactly
  - The Fed doesn’t control M* directly but indirectly through its influence on:
    - Bank reserves, RES, and
    - The reserve requirement ratio, res.

The Money Supply

- Why the Fed Can’t Control M* Exactly
  - The public determines cu.
    - Fed must forecast cu, then adjust BASE (and/or res) to accommodate.
    - Sometimes it is difficult to predict cu.
      - Seasonal patterns.
      - The influence of foreigners.
The Money Supply

• Why the Fed Can’t Control M\textsuperscript{1} Exactly:
  
  ➢ Commercial banks and borrowers determine \( \text{ex} \).
    
    • 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.

The Money Supply

• Why the Fed Can’t Control M\textsuperscript{1} Exactly:
  
  ➢ Multiple definitions of money:
    
    • M\textsubscript{1}
    • M\textsubscript{2}