Lecture 10: Money and the Federal Reserve System

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Question: What Backs US Money?

- Answer: Nothing.
- This is true of essentially every currency in the world.
- For most of US history, US dollars could be converted to gold.
- In 1971, this ended.
- Sounds crazy… Is this a good idea?
What Money Is and Why It’s Important

- Without money, trade would require barter, the exchange of one good or service for another.

- Every transaction would require a double coincidence of wants – the unlikely occurrence that two people each have a good the other wants.

- Most people would have to spend time searching for others to trade with – similar to the job search problem in the previous chapter.

- This searching is unnecessary with money, the set of assets that people regularly use to buy goods & services from other people.
The 3 Functions of Money

- **Medium of exchange**: an item buyers give to sellers when they want to purchase goods & services

- **Unit of account**: the yardstick people use to post prices and record debts

- **Store of value**: an item people can use to transfer purchasing power from the present to the future
The 2 Kinds of Money

**Commodity money:**
takes the form of a commodity with intrinsic value

Examples: gold coins, cigarettes in POW camps, prisons (e.g. in the US)

Additional example: Chinese shell money, 16th – 8th century BCE
The 2 Kinds of Money

Fiat money:
money without intrinsic value, used as money because of government decree
Example: the U.S. dollar
Central Banks & Monetary Policy

- **Central bank**: an institution that regulates the money supply by means of *monetary policy*

- **Monetary policy**: the setting of the money supply by policymakers in the central bank

- **Central banks around the world**:
  - US: Federal Reserve
  - UK: Bank of England
  - Eurozone: European Central Bank
  - Switzerland: Swiss National Bank
The Structure of the Fed

The Federal Reserve System consists of:

- **Board of Governors** (7 members), located in Washington, DC
- **12 regional Fed banks**, located around the U.S.
- **Federal Open Market Committee (FOMC)**, includes the Board of Governors and presidents of some of the regional Fed banks. The FOMC decides monetary policy.

*Janet Yellen*
Chair of FOMC, Feb 2014 – present
The Structure of the Fed

Geographic Boundaries
of the Federal Reserve Districts

THE MONETARY SYSTEM
What the Fed Does

- Today we’ll discuss how the Fed *implements* monetary policy
  - That is, how the Fed changes the supply of money in the economy
- For the rest of the class, we will spend a lot of time talking about how the Fed *chooses* monetary policy
The Money Supply

- The **money supply** (or **money stock**): the quantity of money available in the economy

- What assets should be considered part of the money supply? Two candidates:
  - **Currency**: the paper bills and coins in the hands of the (non-bank) public
  - **Demand deposits**: balances in bank accounts that depositors can access on demand by writing a check

- Credit cards are **not** money
  - The credit card company spends money for you
Measures of the U.S. Money Supply

- **M1**: currency, demand deposits, traveler’s checks, and other checkable deposits.
  
  \[ M1 = \$2.58 \text{ trillion (September 2013)} \]

- **M2**: everything in M1 plus savings deposits, small time deposits, money market mutual funds, and a few minor categories.
  
  \[ M2 = \$10.82 \text{ trillion (September 2013)} \]

*The distinction between M1 and M2 will usually not matter when we talk about “the money supply” in this course.*
Other Measures in the U.S.

- **M3**: everything in M2 plus large, long term deposits (no longer tracked by the Fed)
- **M0**: all paper currency circulating
- **Monetary Base**: everything in M0 plus all the cash in the vaults of banks and bank reserves
Growth of M2 in Billions

M2 Money Stock (WM2NS)
Source: Board of Governors of the Federal Reserve System

Shaded areas indicate US recessions. 2013 research.stlouisfed.org
Growth of M1: 1975-now

M1 Money Stock (M1)
Source: Board of Governors of the Federal Reserve System

Shaded areas indicate US recessions.
2013 research.stlouisfed.org
Growth of M1: Last 10 years

M1 Money Stock (M1)
Source: Board of Governors of the Federal Reserve System

Shaded areas indicate US recessions.
2013 research.stlouisfed.org
What are the pros and cons of fiat money compared to gold?

- **Pros:**
  - Easy to adjust the money supply
  - Doesn’t distort the market for gold

- **Cons:**
  - Gives monetary authority (Fed) a lot of discretion
  - Essentially nothing stops them from printing as much money as they want

Whether or not fiat money is preferable depends on how much we trust the Fed.
How does the Fed change the money supply?

- The Fed is the “banker of banks”
- Essentially all banks have accounts with the Federal Reserve
- Banks can “withdraw” from these accounts to pay other banks or to order cash
- The Fed is also one of the regulators of banks
- One of their jobs is to make sure that banks are financially sound
  - That they can meet their debt obligations and return money to their depositors
Bank Reserves

- In a fractional reserve banking system, banks keep a fraction of deposits as reserves and use the rest to make loans.

- The Fed establishes reserve requirements, regulations on the minimum amount of reserves that banks must hold against deposits.

- Banks may hold more than this minimum amount if they choose.

- The reserve ratio, $R$
  
  $= \frac{\text{fraction of deposits that banks hold as reserves}}{\text{total reserves as a percentage of total deposits}}$
Bank T-account

- **T-account**: a simplified accounting statement that shows a bank’s assets & liabilities.

- Example:

<table>
<thead>
<tr>
<th>FIRST NATIONAL BANK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
</tr>
<tr>
<td>Reserves</td>
</tr>
<tr>
<td>Loans</td>
</tr>
</tbody>
</table>

- Banks’ liabilities include deposits, assets include loans & reserves.

- In this example, notice that \( R = \frac{$10}{$100} = 10\% \).
Banks and the Money Supply: An Example

Suppose $100 of currency is in circulation.

To determine banks’ impact on money supply, we calculate the money supply in 3 different cases:

1. No banking system

2. 100% reserve banking system: banks hold 100% of deposits as reserves, make no loans

3. Fractional reserve banking system
Banks and the Money Supply: An Example

**CASE 1**: No banking system

Public holds the $100 as currency.

Money supply = $100.
CASE 2: 100% reserve banking system

Public deposits the $100 at First National Bank (FNB).

FNB holds 100% of deposit as reserves:

<table>
<thead>
<tr>
<th>FIRST NATIONAL BANK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
</tr>
<tr>
<td>Reserves</td>
</tr>
<tr>
<td>$100</td>
</tr>
<tr>
<td>Loans</td>
</tr>
<tr>
<td>$ 0</td>
</tr>
</tbody>
</table>

Money supply

\[
= \text{currency} + \text{deposits} = \$0 + \$100 = \$100
\]

*In a 100% reserve banking system, banks do not affect size of money supply.*
Banks and the Money Supply: An Example

CASE 3: Fractional reserve banking system

Suppose $R = 10\%$. First National Bank loans all but 10\% of the deposit:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves</td>
<td>Deposits</td>
</tr>
<tr>
<td>$10$</td>
<td>$100$</td>
</tr>
<tr>
<td>Loans</td>
<td></td>
</tr>
<tr>
<td>$90$</td>
<td></td>
</tr>
</tbody>
</table>

Money supply = $190$ (!!!)

Depositors have $100$ in deposits,
Borrowers have $90$ in currency.
Banks and the Money Supply: An Example

CASE 3: Fractional reserve banking system

How did the money supply suddenly grow?

When banks make loans, they create money.

The borrower gets

- $90 in currency (an asset counted in the money supply)
- $90 in new debt (a liability)

A fractional reserve banking system creates money, BUT NOT WEALTH.
Banks and the Money Supply: An Example

CASE 3: Fractional reserve banking system

Suppose borrower deposits the $90 at Second National Bank (SNB).

Initially, SNB’s T-account looks like this:

<table>
<thead>
<tr>
<th></th>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves</td>
<td>$ 9</td>
<td>Deposits</td>
</tr>
<tr>
<td>Loans</td>
<td>$ 81</td>
<td>$ 90</td>
</tr>
</tbody>
</table>

If $R = 10\%$ for SNB, it will loan all but 10\% of the deposit.
Banks and the Money Supply: An Example

**CASE 3**: Fractional reserve banking system

The borrower deposits the $81 at Third National Bank (TNB).

Initially, TNB’s T-account looks like this:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves $8.10</td>
<td>Deposits $81</td>
</tr>
<tr>
<td>Loans $72.90</td>
<td></td>
</tr>
</tbody>
</table>

If $R = 10\%$ for TNB, it will loan all but 10\% of the deposit.
CASE 3: Fractional reserve banking system

The process continues, and money is created with each new loan.

Original deposit = $100.00
FNB lending = $90.00
SNB lending = $81.00
TNB lending = $72.90

\[ \text{Total money supply} = 1000.00 \]

In this example, $100 of reserves generates $1000 of money.
The Money Multiplier

- **Money multiplier**: the amount of money the banking system generates with each dollar of reserves
- The money multiplier equals $1/R$.
- In our example,
  \[ R = 10\% \]
  money multiplier = $1/R = 10$
  $100 of reserves creates $1000 of money
The Fed’s 3 Tools of Monetary Control

1. **Open-Market Operations (OMOs):** the purchase and sale of U.S. government bonds by the Fed.
   - To increase money supply, Fed buys government bonds, paying with new dollars.
     - which are deposited in banks, increasing reserves
     - which banks use to make loans, causing the money supply to expand.
   - To reduce money supply, Fed sells government bonds, taking dollars out of circulation, and the process works in reverse.
The Fed’s 3 Tools of Monetary Control

1. **Open-Market Operations (OMOs):** the purchase and sale of U.S. government bonds by the Fed.
   - OMOs are easy to conduct, and are the Fed’s monetary policy tool of choice.
   - Most OMOs are carried out by central bankers at the New York Fed.
The Fed’s 3 Tools of Monetary Control

2. Reserve Requirements (RR):
   affect how much money banks can create by making loans.
   
   ▪ To increase money supply, Fed reduces RR. Banks make more loans from each dollar of reserves, which increases money multiplier and money supply.
   
   ▪ To reduce money supply, Fed raises RR, and the process works in reverse.
   
   ▪ Fed rarely uses reserve requirements to control money supply: frequent changes would disrupt banking.
3. **The Discount Rate:**

   The interest rate on loans the Fed makes to banks

   - When banks are running low on reserves, they may borrow reserves from the Fed.

   - **To increase money supply,** Fed can lower discount rate, which encourages banks to borrow more reserves from Fed.

   - Banks can then make more loans, which increases the money supply.

   - **To reduce money supply,** Fed can raise discount rate.
The Fed’s 3 Tools of Monetary Control

3. **The Discount Rate:**
   - the interest rate on loans the Fed makes to banks

- The Fed uses discount lending to provide extra liquidity when financial institutions are in trouble, *e.g.* after the Oct. 1987 stock market crash.

- If no crisis, Fed rarely uses discount lending — Fed is a “lender of last resort.”
The Federal Funds Rate

- On any given day, banks with insufficient reserves can borrow from banks with excess reserves.
- The interest rate on these loans is the federal funds rate.
- The FOMC uses OMOs to target the fed funds rate.
- Many interest rates are highly correlated, so changes in the fed funds rate cause changes in other rates and have a big impact in the economy.
Problems Controlling the Money Supply

- If households hold more of their money as currency, banks have fewer reserves, make fewer loans, and money supply falls.

- If banks hold more reserves than required, they make fewer loans, and money supply falls.

- Yet, Fed can compensate for household and bank behavior to retain fairly precise control over the money supply.
Bank Runs and the Money Supply

- **A run on banks:**
  When people suspect their banks are in trouble, they may “run” to the bank to withdraw their funds, holding more currency and less deposits.

- Under fractional-reserve banking, banks don’t have enough reserves to pay off ALL depositors, hence banks may have to close.

- Also, banks may make fewer loans and hold more reserves to satisfy depositors.

- These events increase \( R \), reverse the process of money creation, cause money supply to fall.
Bank Runs and the Money Supply

- During 1929-1933, a wave of bank runs and bank closings caused money supply to fall 28%.
- Many economists believe this contributed to the severity of the Great Depression (by generating deflation).
- Since then, federal deposit insurance has helped prevent bank runs in the U.S.
- In the U.K., though, Northern Rock bank experienced a classic bank run in 2007 and was eventually taken over by the British government.