

Lecture Notes for Chapter 6 of

**MACROECONOMICS:**

An Introduction

Money, Banks,  
and  
The Federal Reserve

Copyright © 1999 - 2008 by Charles R. Nelson

02/15/08

---

---

---

---

---

---

---

---

**In this chapter we will discuss-**

- What money is.
- What money does.
- What kinds there are.
- How much there is.
- How it is created.
- What the Federal Reserve is.
- How the Fed controls money.

---

---

---

---

---

---

---

---

**What is money?**

- That which is accepted in payment
  - ↗ for goods & services
  - ↗ to settle debts.
- It is an asset, a special kind of asset
- Examples:
  - ↗ a \$20 dollar bill,
  - ↗ a personal check.

---

---

---

---

---

---

---

---

### We do not mean

- Income: "the average programmer makes \$150,000 per year."
- Wealth: "Bill Gates is worth \$90 billion."
- Debt: "US government owes \$5 trillion"
- These are examples of using money as a measuring stick, a unit of account.

---

---

---

---

---

---

---

---

### The money you hold consists of

- Currency, dollar bills and coins, and
- the balance in your checking account.

---

---

---

---

---

---

---

---

Three important uses of money:

---

---

---

---

---

---

---

---

### 1. The medium of exchange.

- Money avoids the costly and time consuming process of barter.
- Money is a fundamental invention like the wheel.
- No doubt in use on other planets!
- The oil that lubricates the wheels of commerce.

---

---

---

---

---

---

---

---

### 2. The unit of account

- Gives us a yardstick of value.
- Allows comparison of the costs and values of very different things, say the cost of a CD and theater ticket.
- We can compare incomes in dollars.
- Not so easy in a barter economy!

---

---

---

---

---

---

---

---

### 3. Money is a store of value.

- A reserve of purchasing power.
- The most liquid of all assets.
- How does inflation affect this use?
  - Steady predictable inflation?
  - Highly variable inflation?

---

---

---

---

---

---

---

---

### Assets vary in their liquidity -

- A house is valuable but not liquid.
- GE stock can be turned into cash in a few days, but value is uncertain.
- A T bond is very liquid; and price fluctuates less than a stock.
- A T bill is very, very liquid; quickly converted to cash, very stable in price.

---

---

---

---

---

---

---

---

### T bills are often referred to as "cash equivalents"

- On the balance sheets of firms
- "this mutual fund has 40% in cash"
- "cash" means T bills or similar.
- T bills and similar corporate securities are called "the money market."
- "Money Market Mutual Funds"
- But a T bill is not money! Why?

---

---

---

---

---

---

---

---

### Not all money is equally liquid

- A \$100 bill is more liquid than a T bill,
- but not as liquid as a \$20 bill.
- Try giving a cab driver a \$100 bill at 1 am in New York City.
- The U.S. \$20 is surely the most liquid of all assets on earth.
- It is also the most counterfeited!

---

---

---

---

---

---

---

---

# Kinds of money

---

---

---

---

---

---

---

---

## Commodity money

- Has intrinsic value.
- Examples:
  - ↗ metals such as copper,
  - ↗ silver and
  - ↗ gold
  - ↗ cigarettes (in prisoner-of-war camps)
  - ↗ cattle.

---

---

---

---

---

---

---

---

## What qualities make a good commodity money?

- Durability.
- Valuable in small sizes and weights.
- Divisible into varying sizes.
- Easily verified as genuine.
- Stable in value.
- Gold does very well on all five points.
- Almost all the gold that people have ever used is still in use!

---

---

---

---

---

---

---

---

## Coins

- Stamped by the government
- Standardized weight
- Immediately recognized value.
- Earliest minted by the Greeks ~ 600BC.
- But governments often cheated, diluting the gold content with cheaper metal
- Old, valuable coins quickly disappeared.

---

---

---

---

---

---

---

---

## Gresham's Law: bad money drives out the good.

- Sandwich coins introduced in 1960's, silver coins soon disappeared.
- Illegal to sell them, but many did.
- Coins minted today are token coins, metals they contain have little value.

---

---

---

---

---

---

---

---

## Paper money

- Invented in China, to Europe with Marco Polo ~1200.
- Claim on gold or silver from government or a bank.
- All paper money and coins today are . .

---

---

---

---

---

---

---

---

## Fiat Money

- Of value only because it is legal tender.
- Law says seller must accept it in payment for goods and services, & lenders in payment of debt.
- We accept it since know others will.
- All the paper money and coins in the world today are fiat money!
- Paper money and coins as currency.

---

---

---

---

---

---

---

---

## The Mint makes a mint!

- The government has a license to print money!
- Profit is difference between value of the coin or bill and cost of manufacture.
- Called Seigniorage.
- Why are small units coins and large denominations paper bills?

---

---

---

---

---

---

---

---

## Bank Money

- Checks.
- Personal checks are not legal tender and are not as liquid as currency.
- Money Market Mutual Fund checks
- Savings account transfers by phone.
- Savings accounts & other very liquid but not checkable are near money.

---

---

---

---

---

---

---

---

## How much "money" is there?

- Means: "What is the total of currency, checkable deposits, and savings accounts?"
- Does not mean:  
"What is the total of all assets?"  
"What is total income?"
- "Money" here means medium of exchange, not a yardstick of value.

---

---

---

---

---

---

---

---

## Quantity of Money in 2008:

- Currency = \$ 800 billion!
- plus checkable deposits = M1 = \$1,400b
- plus MMMF and savings = M2 = \$7,500b

---

---

---

---

---

---

---

---

## \$2,500 in currency per American!

- How much do you carry?
- Where is it all??
- Japanese carry more currency (Yen) than Americans do (dollars).
- Why?

---

---

---

---

---

---

---

---



### About 40% is abroad....

- Where local currency is unstable, where inflation is rampant.
- Argentina adopted US\$ as reserve.
- Stashed by corrupt regimes - \$600 Million in \$100 bills in Iraq.
- Also used to hide income from illegal businesses, and to avoid tax.

---

---

---

---

---

---

---

---

### Are Credit Cards Money?

- 'Plastic Money' is really a short-term loan.
- The monthly bill is still settled by payment of money.
- Will 'plastic' ever replace money?
- Credit cards have not replaced money, nor are money holdings smaller!

---

---

---

---

---

---

---

---

### A Brief History of Banking

- Banks are as old as civilization itself.
- In Middle Ages "usury" was banned.
- Banking revived in Italy during the Renaissance; "banco" means bench.
- The Medici family established their bank in Florence in the 1300's and accumulated great wealth and power, making Florence a center of the arts.

---

---

---

---

---

---

---

---

### Fractional reserve banking invented in England ~1600.

- Goldsmith had a vault for keeping valuables, so offered safekeeping.
- Gold and silver coins worth say £100 deposited, receipts or "notes" given.
- Notes only occasionally redeemed.
- Goldsmith's reserves, the coins in the vault, were equal to deposits, £100.
- why not lend out notes, say £200?

---

---

---

---

---

---

---

---

### The Goldsmith's Balance Sheet

Assets		Liabilities	
Reserves	100		
Loans	200	Notes	300
Total	300	Total	300

---

---

---

---

---

---

---

---

### Amazing!

- Goldsmith has created £200 from thin air
- That is fractional reserve banking.
- As long as borrowers continued to make payment on their loans, all was well.
- If loans were not repaid, the bank could not redeem its notes, and the bank failed.
- A bank holds illiquid assets (loans) while issuing liquid liabilities (notes).

---

---

---

---

---

---

---

---

### A Run on the Bank:

- The bank would fail if holders of its notes all demanded their coins at once.
- A "run" on the bank has always been a threat to any fractional reserve bank.
- Bank runs were common in 1800s,
- during the Great Depression of the 30s thousands of banks failed in the U. S.

---

---

---

---

---

---

---

---

### Banking in America

- The Coinage Act of 1792 established the dollar as the monetary unit for the US.
- amount of silver or gold in coins fixed.
- From 1834 to 1933 gold was \$20.67/oz
- Except for Civil War "greenbacks", paper money was issued by banks.
- Bank reserves were silver and gold

---

---

---

---

---

---

---

---

### The era of "wildcat" banking

- 1836 to 1864 new banks on frontier.
- notes of hundreds of banks circulated, all claiming to be "good as gold."
- bank's notes promised to pay in silver or gold, but exceeded banks' reserves.
- Magic of fractional reserve banking!

---

---

---

---

---

---

---

---

## The Gold Standard

- Gold was the more important of the two monetary metals and the system became known as the gold standard.
- That did not mean that all the money was backed by gold,
- but it did tie the quantity of money to the relatively fixed supply of gold.

---

---

---

---

---

---

---

---

## A modern bank's balance sheet:

<u>Assets</u>		<u>Liabilities</u>	
Reserves	\$100	Deposits	\$1,000
Loans	900		
Total	\$1,000	Total	\$1,000

---

---

---

---

---

---

---

---

## How it works:

- Reserves include currency in the vault and deposits at the Federal Reserve.
- The remaining \$900 has been lent out.
- Bank earns interest on loans
- pays interest on some deposits and
- provides services such as drive through
- and make a profit for shareholders.

---

---

---

---

---

---

---

---

## The Federal Reserve

- 19th century Americans viewed central bank as excessive concentration of power.
- Two early central banks were disbanded.
- The Bank of England, originally a private bank, was model for modern central banks.
- Our "Fed" was created in 1913 to stabilize the monetary system, be the banks' bank.

---

---

---

---

---

---

---

---

## Did the Fed stabilize banks?

- Ironically, the worst bank failures occurred in 1929 under Fed supervision.
- One factor: 12 district banks decentralized authority, which lead to inaction.
- Fed was reorganized in 1930s,
  - control centralized in Wash DC under the Board of Governors
  - as critics feared!

---

---

---

---

---

---

---

---

## The Fed today -

- The "monetary authority"
- empowered to issue U.S. currency.
- 7 Governors are appointed by the President, confirmed by the Senate,
- serve for 14 years.
- Chairperson is a governor, appointed by the President to 4 year term as Chair.
- Ben Bernanke is Chair now.

---

---

---

---

---

---

---

---

## The FOMC makes policy

- Federal Open Market Committee
- It meets 8 times a year
- Meetings are secret
- Members: all 7 governors plus 5 district bank presidents.
- President of the NY Fed always votes, represents NYC as center of finance.

---

---

---

---

---

---

---

---

## The Chairperson of the Fed

- Presides over meetings of the FOMC, a source of considerable power.
- Paul Volcker appointed by Pres. Carter to defeat inflation.
- Alan Greenspan appointed 1986.
- Presided for 20 years of prosperity and low inflation, becoming an icon.
- Succeeded by Ben Bernanke in 2006.

---

---

---

---

---

---

---

---

## The Secrets of the "Temple"

- Fed building looks like a Roman temple
- Chair's office is the inner sanctum
- Secrecy of its inner workings has always been a source of its power
- Recently more open due to pressure from Congress.
- FOMC now announces decisions immediately after meeting

---

---

---

---

---

---

---

---

Main functions of the Fed are:

---

---

---

---

---

---

---

---

1. Ensure growth in money and credit sufficient to

- Achieve long term growth,
- a high level of employment, and
- reasonable price stability.
- How? By using "Monetary Policy."
- That means managing supply of money and level of interest rates.

---

---

---

---

---

---

---

---

2. Supervise banks and bank holding companies

- Bank mergers,
- the soundness of banks,
- consumer protection,
- the scope of banks' activities.
- When a bank gets into trouble, the Fed usually arranges a "shotgun marriage" with a stronger bank.

---

---

---

---

---

---

---

---

### 3. Be the “lender of last resort”

- Fed is the banks’ bank.
- It lends to them in case of national crisis or bank failure.
- Since the Fed employs 247 economists, it is also known as "the employer of last resort."

---

---

---

---

---

---

---

---

### Federal Deposit Insurance Corp.

- FDIC founded in response to bank failures in the Depression of the 1930s.
  - ↗ to protect depositors and
  - ↗ stabilize the banking system
- FSLIC did the same for Savings and Loans
- Both created a “moral hazard”
  - ↗ a weak bank or S&L could attract deposits on the guarantee of the U.S. Gov’t.

---

---

---

---

---

---

---

---

### Banking until 1980....

- Banks protected by regulation that restricted competition. Generally operated in only one state.
- “Savings and Loans” were home mortgage lenders, typically small and local, offered only savings accounts.
- Banks and S&Ls paid low interest to depositors under “Regulation Q”.

---

---

---

---

---

---

---

---



### Banking was a "3-6-3" business:

- pay depositors 3%, charge 6% for loans, be on the golf course by 3pm!
- Today there are only 'banks' and competition is ferocious.
- Large banks operate nationally.
- What made the system change?

---

---

---

---

---

---

---

---

### The Savings and Loan Debacle

- In 1970s inflation devastated value of mortgages, an S&Ls main asset.
- Monetary Control Act of 1980 allowed S&Ls to compete with banks,
- Placed them under Fed control,
- Raised deposit insurance limits
- Garn-St.Germain Act of 1982 erased distinctions between banks and S&Ls.

---

---

---

---

---

---

---

---

### By 1980 inflation and high interest rates had....

- Devastated value of mortgage assets, raised cost of borrowed funds
- Many S&Ls engaged in risky lending..
- They bet the bank, and often lost it!
- Texas S&Ls alone "ate the FSLIC."
- Resulting bail out cost taxpayers many billions.

---

---

---

---

---

---

---

---

### How does banking look now?

- We have only 'banks'.
- Deposit insurance protection limited to \$100,000 per depositor.
- Banking is national and even international.
- Emergence of giant national banks; B of A has almost 10% of all deposits.
- Internet is making lending highly competitive!

---

---

---

---

---

---

---

---

### How the Fed Controls the Quantity of Money

- Through open market operations it can add or drain bank reserves.
- Fed buys or sells Treasury securities.
- Pays with money it creates by fiat.
- Boosted by "Money multiplication."

---

---

---

---

---

---

---

---

### Elements in the process:

- Banks hold some reserves.
- Required as a fraction of deposits
- Excess reserves kept to a minimum
- A bank that is short of reserves can
  - ↗ go to the "discount window" and borrow at the "discount rate" or
  - ↗ borrow from other banks in "fed funds market" at the "fed funds rate."

---

---

---

---

---

---

---

---

### A Fed open market operation:

- Fed prints up bills worth \$1,000, buys a T bill for \$1000 from someone.
- How can it do that?
- It has the authority to print money!
- Seller deposits the \$1000 in their bank.
- That bank now has \$1000 in new deposits.
- If the reserve requirement is 10%, it now has excess reserves of \$900.

---

---

---

---

---

---

---

---

### Why not loan out that \$900 to Joe Smith?

- Joe remodels his house, the contractor puts the \$900 in his bank account.
- Now that bank has \$900 in new deposits and \$810 in excess reserves.
- This process continues until the \$1,000 of new reserves is completely used up as reserves supporting new deposits:

---

---

---

---

---

---

---

---

### Here is how it plays out:

Bank number	receives deposit of	holds 10% as reserves	makes new loans
1	\$1,000	\$100	\$900
2	900	90	810
3	810	81	729
4	729	73	656
& so on ..	...	...	...
...	...	...	...
<b>Totals:</b>	<b>\$10,000</b>	<b>= \$1,000</b>	<b>+ \$9,000</b>

---

---

---

---

---

---

---

---

### To calculate changes we can

- use a spreadsheet on the computer
- use of the result from college algebra that for any fraction  $x$ ,
- $1+x+x^2+x^3+ \dots = 1/(1-x)$
- At each stage, the next quantity is .90 of the previous quantity

---

---

---

---

---

---

---

---

### Total New Deposits

- =  $\$1,000 \cdot (1 + .90 + .90^2 + .90^3 + \dots)$
- =  $\$1,000 \cdot (1/1-.90)$
- =  $\$1,000 \cdot (1/.10)$
- =  $\$1,000 \cdot 10$
- =  $\$10,000$

---

---

---

---

---

---

---

---

### Total Required reserves

- =  $\$100 \cdot (1 + .90 + .90^2 + .90^3 + \dots)$
- =  $\$100 \cdot 10$
- =  $\$1,000$

---

---

---

---

---

---

---

---

### Total Loans

- =  $\$900 \cdot (1 + .90 + .90^2 + .90^3 + \dots)$
- =  $\$900 \cdot 10$
- =  $\$9,000$

---

---

---

---

---

---

---

---

### Expansion continues until new \$1000 is in required reserves.

- With required reserve ratio of .10, \$1,000 supports \$10,000 of new deposits.
- The difference, \$9,000, is new loans.
- Change in Bank Deposits =
- Change in Reserves  $\cdot (1/\text{reserve ratio})$
- $(1/\text{reserve ratio})$  is *deposit multiplier*.

---

---

---

---

---

---

---

---

### To shrink the quantity of money, simply reverse.

- It sells U.S. Treasury securities, draining reserves from the banks.
- short of reserves, banks reduce loans outstanding until they can again meet the reserve requirement.
- When process is complete, deposits in the system have decreased by the decrease in reserves times the deposit multiplier.

---

---

---

---

---

---

---

---

**Fed owns Treasury securities worth over \$200 billion .**

- What do they do with all the interest they collect from the U.S. Treasury?
- They employ those 247 Ph.D. economists for one thing!
- Any surplus is recycled to the Treasury.

---

---

---

---

---

---

---

---

**The Fed has three tools for changing the quantity of money:**

---

---

---

---

---

---

---

---

**1. Open Market Operations.**

- Most frequently used,
- the Fed is buying and selling Treasury securities all the time.

---

---

---

---

---

---

---

---

## 2. The discount rate.

- Make it more or less expensive for banks to borrow at discount window.
- Not very important because banks are discouraged from borrowing anyway.
- A bargain, but banks that use it are put on list of "problem banks."

---

---

---

---

---

---

---

---

## 3. The required reserve ratio.

- A change from 5% to 6%, say, would force banks to increase reserves,
- shortage of required reserves,
- banks shrink loans to build reserves,
- so quantity of deposits shrinks.
- Used only very occasionally.

---

---

---

---

---

---

---

---

The End!

---

---

---

---

---

---

---

---