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

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves</td>
<td>100</td>
</tr>
<tr>
<td>Loans</td>
<td>200</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
</tr>
<tr>
<td>Notes</td>
<td>300</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves</td>
<td>Deposits</td>
</tr>
<tr>
<td>$100       $1,000</td>
<td></td>
</tr>
<tr>
<td>Loans</td>
<td></td>
</tr>
<tr>
<td>$900</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>$1,000</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

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.
- 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 it 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

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 remolds 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:

<table>
<thead>
<tr>
<th>Bank number</th>
<th>receives deposit of</th>
<th>holds 10% as reserves</th>
<th>makes new loans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1,000</td>
<td>$100</td>
<td>$900</td>
</tr>
<tr>
<td>2</td>
<td>900</td>
<td>90</td>
<td>810</td>
</tr>
<tr>
<td>3</td>
<td>810</td>
<td>81</td>
<td>729</td>
</tr>
<tr>
<td>4</td>
<td>729</td>
<td>73</td>
<td>656</td>
</tr>
<tr>
<td>&amp; so on</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Totals:</td>
<td>$10,000</td>
<td>$1,000</td>
<td>$9,000</td>
</tr>
</tbody>
</table>
To calculate changes we can

- use a spreadsheet on the computer
- use of the result from college algebra that for any fraction x,
  \[1 + x + x^2 + x^3 + \ldots = \frac{1}{1-x}\]
- At each stage, the next quantity is .90 of the previous quantity

Total New Deposits

- \[= \$1,000 \cdot (1 + .90 + .90^2 + .90^3 + \ldots)\]
- \[= \$1,000 \cdot \frac{1}{1-.90}\]
- \[= \$1,000 \cdot \frac{1}{.10}\]
- \[= \$1,000 \cdot 10\]
- \[= \$10,000\]

Total Required reserves

- \[= \$100 \cdot (1 + .90 + .90^2 + .90^3 + \ldots)\]
- \[= \$100 \cdot 10\]
- \[= \$1,000\]
Total Loans

\[ = 900 \times (1 + 0.90 + 0.90^2 + 0.90^3 + ...) \]
\[ = 900 \times 10 \]
\[ = 9,000 \]

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 \times (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!