Money

- **Functions of Money:**
  - **Medium of exchange** - Accepted as payment for goods and services
  - **Used to store value** - Saved money can be used later for future needs
  - **Unit of account** - Used to express prices of goods and services

- **Measures of Money:**
  - **M1** – All currency except held at banks + traveler’s checks + checking a/c deposits of individuals and firms
  - **M2** – M1 + time deposits + saving deposit + money market mutual fund balances

- **NOT counted as money:**
  - Outstanding Checks since it just a transfer or medium of money from one owner to other instead of real money
  - Credit card transactions
    - Short term loan till the bill due date
    - Does not increase money supply
Types of Depository Institutions

• **Commercial banks** – Accept deposits from savers and loan to borrowers
  – Deal in short term securities (treasury bills): Investment in long terms securities (treasury and corporate bonds)
  – Under *fractional reserve banking* system, banks are required to deposit a portion of deposits either with Reserve Bank or/and keep a specific portion in cash/secured securities

• **Thrifts and thrift institutions:**
  – **Saving & loan associations (S&L)** – both checking and saving accounts, issue all kinds of loans
  – **Saving banks** – only saving accounts, issue primarily home loans
  – **Credit unions** – for specific group of individuals

• **Money market mutual funds:** Manages pooled funds invested in short term debt (<1 yr maturity)
  – Securities to preserve the funds value and get returns
  – Investment management firm
• Broadly there are following 4 economic functions of depository institutions—
  • **Acting as Financial Intermediaries** – Receive deposits which are used to provide loans; Loans are provided at lower rate than what borrowers could have raised outside
  • **Provide Liquidity** -- offers long term loans from short term deposits
  • **Risk Monitoring** – Institutions have better understanding and mechanism to monitor risk compared to individuals
  • **Pooling of Individual Risks** – Minimize risk by pooling individual loans in well diversified portfolios
Financial regulation, deregulation and innovation

- **Impact of financial regulations:**
  - **Cash reserves:** Institutions need to retain a minimum percentage of deposits (depends on accounts) as cash or deposit with central bank.
  - **Proportion of various types of loans** – Institutions have restrictions on various types of loans (depends on institutions)
  - **Types of deposits** – Institutions have restriction on different types of deposits (ex: saving, checking).
  - **Share of owner’s capital** – A minimum amount should be maintained as institution owners’ capital (equity) so that owner manages the risk of the asset portfolio better.

- **Impact of Bank-deregulation:** High competition between banks and thrifts & low barriers to entry to other institution to compete with banks

- **Financial innovations:** New financial products (e.g. : Variable mortgages and S&Ls, New type of accounts , Technology innovations (computerization, internet, ATM)

- **Impact of Financial innovations:**
  - Declining savings account deposit caused money market mutual fund to grow substantially
  - Checking account deposits shifted from banks to thrifts & cost of transactions reduced significantly
Goal of Central Bank

- Manage the money supply with a perfect balance to have low inflation & promote economic growth
- **Three tools** available to attain such goals:
  - **Bank Rate**: (discount rate): Rate of interest which a central bank charges on the loans and advances to commercial banks and other financial intermediaries
    - Lower rate makes reserves less costly to banks encouraging lending => decrease interest rates
  - **Cash Reserve**: % of deposits that banks retain in cash or deposit with Fed
    - Increasing % => decreases funds available for lending => increase interest rates
    - Decreasing % => increases funds available for lending => decreases interest rates
    - Works well if banks are willing to lend, and customers are willing to borrow
  - **Open Market Operations**: Fed buy or sell treasury securities in open market
    - On buying securities, money supply increased as cash replaces securities and interest rates decrease
    - On selling securities, cash is sucked out of the system and money supply is decreased increasing interest rates
    - Fed's most commonly used tool to achieve the federal funds target rate
Creation of Money

• **Fractional reserve banking system**
  – Based on Required Reserve Ratio banks reserve fraction of its deposits and loan the remaining amount
  – The borrowed money is spent and the receiver of such spent money Deposits part of the money with banks
  – Again part of the deposits (after reserves) are put for borrowing
  – This cycle of ‘borrow-deposit-borrow’ stops when excess reserve available with institutions for borrowing is zero. The above cycle expand money supply in the economy

• Amount of loans a bank can generate with new deposits
  – Amount of new deposit / reserve ratio

• **Example:** Suppose 10% of the deposit is to be reserved;
  – $100 is the deposit. excess reserve = $90 which can be lent;
  – Suppose the borrower spends it in certain things & the receiver deposits the entire money in the bank;
  – now the bank can lend 0.90*90 = $81
  – Similarly in total, $100 of new deposit can increase money supply by $1,000 ($100 /0.10)
Relation between monetary base, money multiplier, and the quantity of money

- **Monetary Base**: Bank deposits, Money in circulation
- When the Fed uses open market operations to expand the monetary base,
  - Quantity of money increases with a **multiplier effect due to concept of reserve ratio**
  - **Currency drain** which is part of the increase in the money supply which people hold as currency instead of depositing
- Hence money multiplier, for a change in the monetary base, depends on both the required reserve ratio and the currency drain
  \[\text{Money Multiplier} = \frac{1+c}{r+c}\]
  - where \(c\) is currency as a percentage of deposits (currency drain)
  - \(r\) is the required reserve ratio
- The relation among the monetary base, the money multiplier, and the quantity of money can be stated as:
  \[\text{Change in quantity of money} = \text{Change in Monetary Base} \times \text{Money Multiplier}\]
Factors affecting Demand of money

• Following 4 factors influence demand for money:
  
  • **Interest rates:** Causes changes in preference to hold cash by firms and individuals (F&I) and demand for money
    • At high interest rates, F&I holds less money and buy interest assets as opportunity cost of holding money is high
    • At low interest rates, F&I holds more money due to low opportunity cost of holding money
    • This characteristics of demand of money causes demand curve to have downward slope which indicates demand of money increases at low interest rates
  
  • **Inflation:** Increase in inflation increases demand for money since F&I needs more money to fulfill their needs
    
    • If real GDP ↑ => Money Demand Curve ↑
      – More goods and services are produced, bought and sold
      – More money is needed for the same and demand of money increases
      – Shifts money demand curve up
  
  • **Financial Innovation** like credit/debit cards, proliferation of ATMs, internet banking etc. reduces demand for money
Money Demand Curve

- **Downward sloping demand curve** for money
- Vertical (perfectly inelastic) supply curve, \( i^* \) = equilibrium interest rate
  - Supply of money is determined by the central bank (Fed or RBI) which is independent of the interest rate.

![Diagram of Supply & Demand for Money]

The equilibrium interest rate \( i^* \), equates the demand & supply for money.
Interest rate determination

• The equilibrium interest rate (EIR), $i^*$, is the interest rate where
  – **Demand** to hold real money = **real money supply**
• If interest rates are higher than EIR, there is excess supply which causes purchase of securities => reduces supply => reduces interest rates to EIR
  – Vice versa occurs when interest rates are lower than EIR

![Diagram showing Interest Rate, Money Supply, Demand for Money, and Real Money, illustrating Disequilibrium in Money Market.]

At $i_{\text{high}}$, there is excess supply of money, leading to purchases of securities
At $i_{\text{low}}$, there is excess demand of money, leading to sells of securities

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If Central Bank wants to decrease short-term interest rates

- **Buy securities** in the open market => increases the real money supply and bank reserves => further increase in the real money due to multiplier impact => shifts real money supply curve to right

- Excess supply of money balances decreases interest rates

If Central Bank wants to increase interest rates, **sell securities** in the open market

*Increase in money supply decreases the interest rates*
Effect of increase in money supply at full employment GDP

- Increase in AD increases real GDP > full-employment GDP,
  - **Cost of money and other productive resources** will rise which
    - Causes SAS shift to move upward and intersects demand curve at full employment GDP level (LAS) hence GDP returns to full employment GDP. Hence there is only a temporary increase in GDP
  - **But price level (rate of inflation) increases and move upward to LAS**
Quantity theory of money

- **Equation of exchange**: Money supply (M) x Velocity (V) = GDP = Price (P) x Real Output (Y) \((MV=PY)\)
  - Velocity: Nominal GDP / Money Supply
    - Represents average number of times each dollar is used to buy goods and services in an year
- **Quantity theory of money** (QTM) states that increase in money supply will cause a proportional increase in prices (inflation) since
  - Velocity (V) and real output (Y) change very slowly
  - This can be understood by rearranging equation of exchange where
    - \(P = \frac{MV}{Y}\)
- Monetarists believe \(M\) should be increased only at the growth rate of real output (Y) so as to maintain price stability.
- In the long run the QTM will describe the results of money supply growth in excess of the growth rate of real output. If real GDP grows at 3% over time and the money supply is increasing at 5%, we can expect long-run inflation of 2% (5% - 3%).