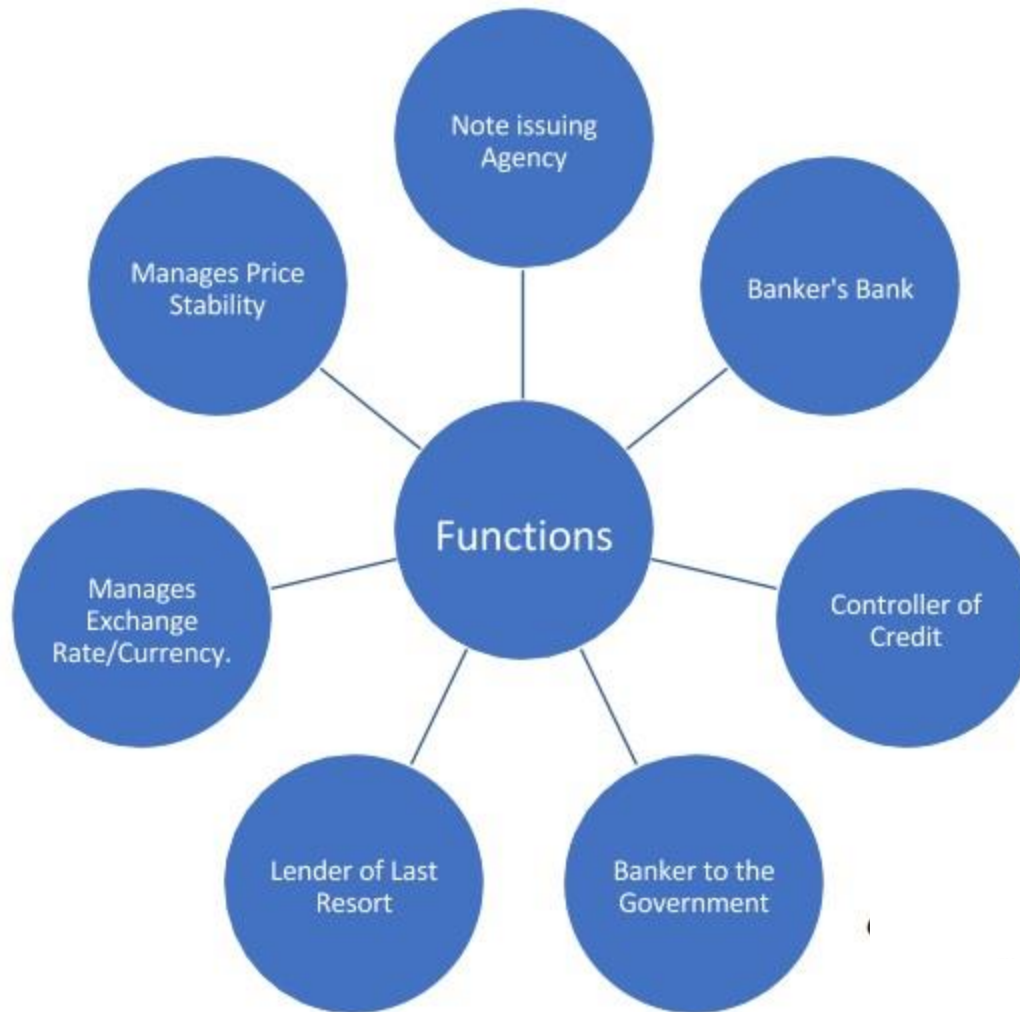


Monetary Policy



What is Monetary Policy?

- **Monetary policy** is the behavior of the apex bank concerning the **money supply**.
- **Interest rates** are the key area of Monetary Policy.
- Basis of Monetary Policy is that there is a long run relationship between the amount of money and inflation
- **Demand for Money** – the amount people wish to hold as cash as opposed to other assets
- **The Supply of Money** – the amount of money in circulation in the economy

Cont....

The Classical Quantity Theory of Money:

- **$MV = PY$**

- (where M = the money stock, V = velocity of circulation, P = price level and Y = level of national income

- More formally: **$M_d = kPY$** where:

- **P** is the price level
- **Y** is the level of real national income
- **M_d** is demand for money for transactions purposes
- **K** = proportion of national income held as transactions balances

- In equilibrium **$M_d = M_s$**

- So: **$P = 1/kY \times M$**
- A rise in **M_s** will lead to a proportional rise in **P**

Supply of Money

- Supply of money is a stock whose value can be measured on a particular date.
- **Narrow Money** – notes and coins in circulation (M0)
- **Broad Money** – Notes and coins plus money held in bank and building society accounts (M4)

In India

Four Measures of Money Supply:

$M1 = CU + D$ (Narrow Money)

$M2 = M1 +$ Savings deposits with post office savings banks

$M3 = M1 +$ Net time deposits of banks (interbank deposits are netted out) (Broad Money)

$M4 = M3 +$ total deposits with the post office savings organizations

CU: coins and notes held by the public; D: demand deposits of the public with the banks (interbank deposits are excluded)

For a Commercial Bank

- Deposits are liabilities.
- Loans, bonds and cash reserves are assets.
- Cash reserves for the banks include
Cash in hand + cash with RBI
- CRR is an important instrument of monetary control.

Assets

- Foreign Assets
- Gold
- Domestic assets (loan to GOI and banks)

Liabilities

- Currency
- Deposits of banks
- Deposits of GOI

For the RBI

Money Creation Processes

Liabilities of RBI (Monetary Base/Base Money/Reserve Money/High powered Money)

$B = CU + R$ (B stands for monetary base)

↑ in base money by Re I → more than Re I in money supply (Money Multiplier)

CU: Currency in circulation

R: Reserve by the banks at RBI

Asset Side Definition

- As RBI's assets and liabilities must be equal by balance sheet identity, it implies

$$B = FA + DC$$

FA: stock of foreign assets (+ gold) by RBI

DC: Domestic credit (Loans to GOI and commercial banks)

$$\text{Thus } B = CU + R = FA + DC$$



Initially, for simplicity, we assume

1. Public hold no currency ($CU = 0$), use cheques for payments
2. No dearth for demand for bank loans
3. Assets of banks consist of only commercial loans.

- Let the CRR be k .
- Fraction k of total deposits to be kept as reserve with RBI

Thus the equations are:

$$B = R \quad (1)$$

$$M_s = D \quad (2)$$

$$R = kD \quad (3)$$

$$\text{Thus, } M_s = (1/k) B$$

Money supply = Money Multiplier $(1/k)$ X Monetary Base

$1/k > 1$, because it is the inverse of fractional CRR.

Money Creation in Perpetuity

Money Creation

	New Deposits	New loans & investments	Cash reserve balances
Original Bank	\$100 M	\$80 M	\$20 M
2 nd generation bank	80	64	16
3 rd generation bank	64	51.2	12.8
4 th generation bank	51.2	41.0	10.2
5 th generation bank	40.9	32.8	8.2
6 th generation bank	32.8	26.2	6.5
7 th generation bank	26.2	21.0	5.2
8 th generation bank	21.0	16.8	4.2
9 th generation bank	16.8	13.4	3.4
10 th generation bank	13.4	10.7	2.7
Sum of first 10 banks	\$446 M	\$357 M	\$89 M
Sum or remaining banks	\$54 M	\$43 M	\$11 M
Total for Entire banking system	\$500 M	\$400 M	\$ 100 M

Monetary base = \$100 million (reserves)

Total quantity of money = \$500 million

Money creation in perpetuity

- Assuming $k = 10\%$, if government purchases goods worth of Rs 100 from A and pays him drawing a cheque on its account at the RBI.
- Total rise in $D = 100 + 90 + 81 + \dots$
 $= 100(1 + 0.9 + (0.9)^2 + (0.9)^3 + \dots)$
 $= 100 (1/1-0.9) = 1000$

Critical Assumption:

Banks can always find borrowers.

Relaxing the Assumption of “No Currency with the Public”

If we assume that desired currency holding is proportional to demand deposits,

$$CU = cD \text{ where } 0 < c < 1$$


$$B = CU + R = cD + R = (c + k)D$$

$$D = \left(\frac{1}{c + k} \right) B$$

$$M_s = CU + D = (1 + c)D = \left(\frac{1 + c}{c + k} \right) B$$

This money multiplier $\frac{1 + c}{c + k}$ is smaller than $1/k$.

Thus **c is a leakage.**

- 
- A smaller c implies less leakage.
 - Multiplier can be raised, if payments habit changes (from cash to cheque, credit cards, ATM)

M_s will rise if

- k (CRR) decreases.
- c (public's desired currency-deposit ratio) falls.
- B increases.

Numerical solutions

Q: In our economy, monetary liabilities of RBI is Rs 10,000 and govt money is Rs 2,000. The currency-deposit ratio is 0.33. RBI's money supply target is Rs 45,000.

- Find the reserve ratio, the RBI must impose on banks to achieve the money supply target.

Ans: High Powered Money = Monetary liabilities of RBI + govt money
 $= 10,000 + 2,000 = 12,000$

Currency-deposit Ratio = 0.33

Money supply: Rs 45,000

$$45,000 = 12,000 \left(\frac{1.33}{0.33 + k} \right)$$

$$45,000(0.33 + k) = 12,000 \times 1.33$$

$$45,000k = 15,960 - 14,850 \quad \text{Thus, } k = 1110/45,000 = 0.025$$

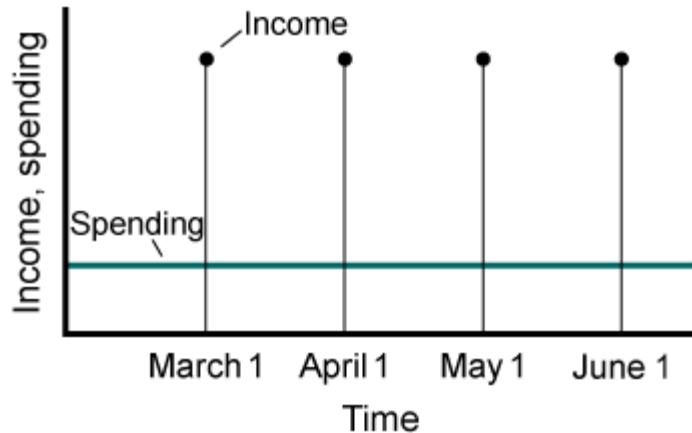
The Demand for Money

- The main concern in the study of the demand for money is:
 - How much of financial assets one wants to hold in the form of money, which does not earn interest, versus how much one wants to hold in interest-bearing securities, such as bonds.
- There is a trade-off between the liquidity of money and the interest income offered by other kinds of assets.
- The ***transaction motive*** is the main reason that people hold money—to buy things.

The Transaction Motive

- There are only two kinds of assets available to households: bonds and money.
- The typical household's income arrives once a month, at the beginning of the month.
- Spending occurs at a completely uniform rate—the same amount is spent each day.
- Spending is exactly equal to income for the month.

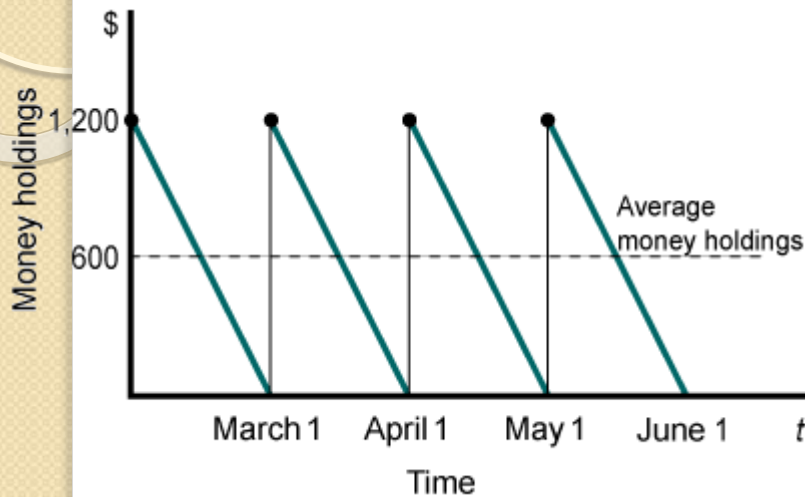
The Non-synchronization of Income and Spending



The mismatch between the timing of money inflow to the household and the timing of money outflow for household expenses is called the ***non-synchronization of income and spending***.

Income arrives only once a month, but spending takes place continuously.

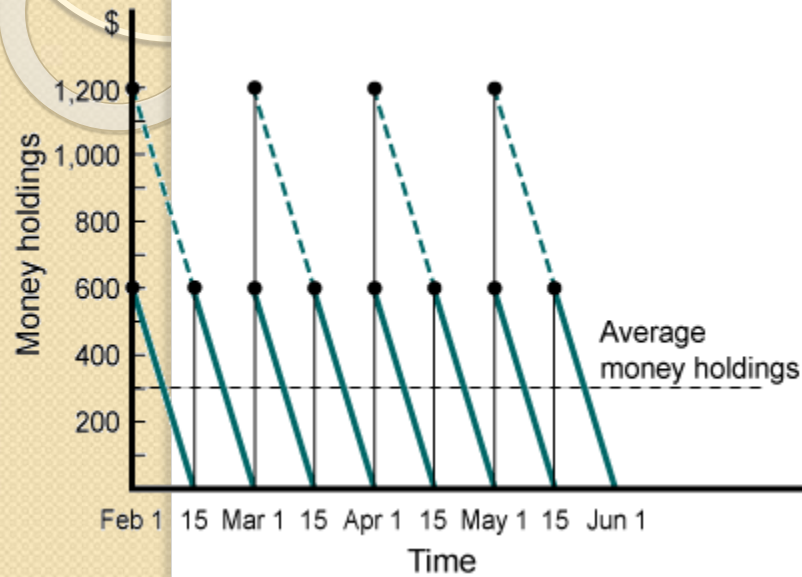
Money Management



A person could decide to deposit her entire paycheck (\$1,200) into her checking account at the start of the month and run her balance down to zero by the end of the month.

In this case, her average money holdings would be \$600.

Money Management



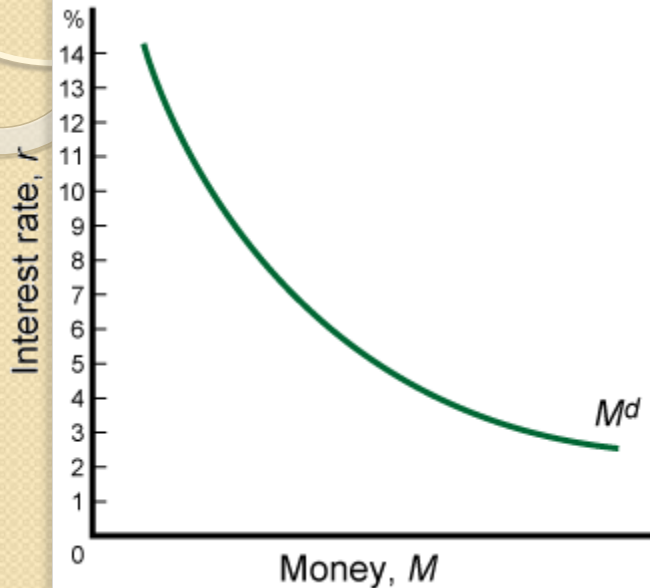
She could decide to deposit half of her paycheck (\$1,200) into her checking account, and buy a \$600 bond with the other half. At mid-month, she could sell the bond and deposit the \$600 into her checking account

Month over month, her average money holdings would be \$300.

The Optimal Balance

- There is a level of average money holdings that earns her the most profit, taking into account both the interest earned on bonds and the cost paid for switching from bonds to money. This level is his *optimal balance*.
 - An increase in the interest rate lowers the optimal money balance. People want to take advantage of the high return on bonds, so they choose to hold very little money.

The Speculation Motive



The *speculation motive*:
Because the market value of interest-bearing bonds is inversely related to the interest rate, investors may wish to hold bonds when interest rates are high with the hope of selling them when interest rates fall

The Speculation Motive

- If someone buys a 10-year bond with a fixed rate of 10%, and a newly issued 10-year bond pays 12%, then the old bond paying 10% will have fallen in value.
- Higher bond prices mean that the interest a buyer is willing to accept is lower than before.
- When interest rates are high (low) and expected to fall (rise), demand for bonds is likely to be high (low) thus money demand is likely to be low (high).

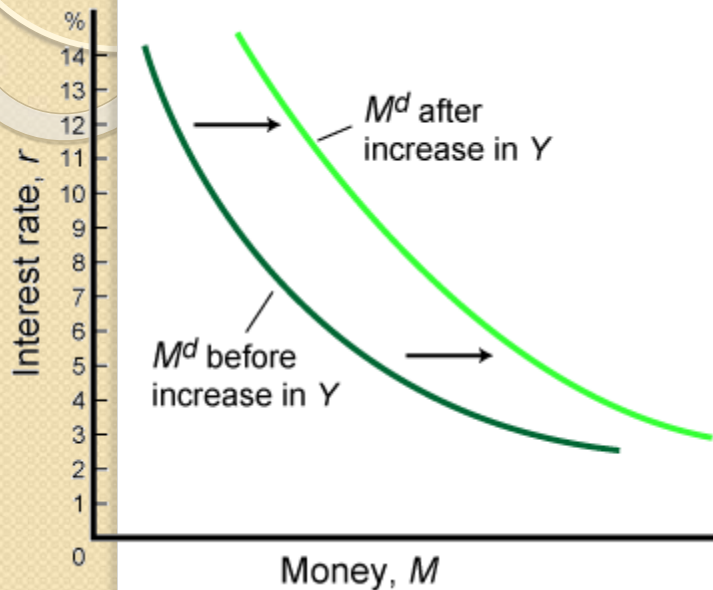
The Total Demand for Money

- The quantity of money demanded at any moment depends on the opportunity cost of holding money, a cost determined by the interest rate.
 - A higher interest rate raises the opportunity cost of holding money and thus reduces the quantity of money demanded.

Transactions Volume and the Price Level

- The total demand for money in the economy depends on the total dollar volume of transactions made.
- The total dollar volume of transactions, in turn, depends on the *total* number of transactions, and the *average* transaction amount.

Transactions Volume and the Price Level



When output (income) rises, the *total* number of transactions rises, and the demand for money curve shifts to the right.

Transactions Volume and the Price Level

- When the price level rises, the *average* dollar amount of each transaction rises; thus, the quantity of money needed to engage in transactions rises, and the demand for money curve shifts to the right.

The Determinants of Money Demand: Review

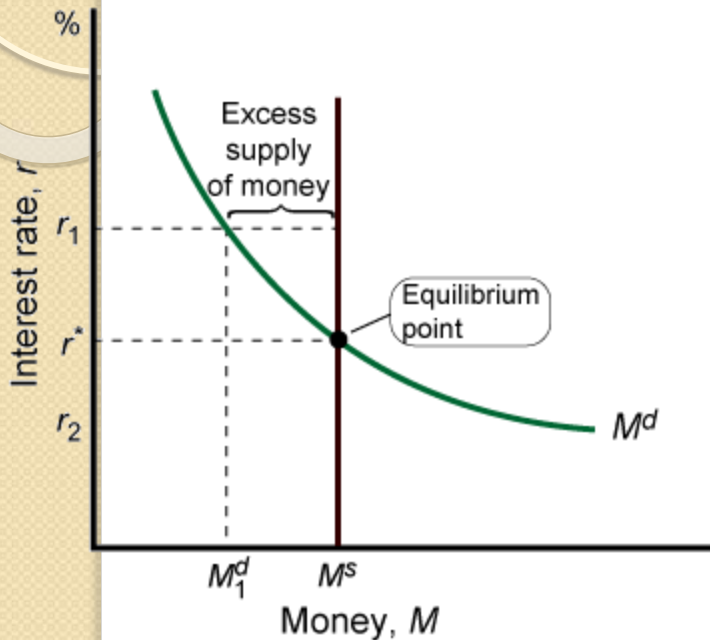
Determinants of Money Demand

- 1. The interest rate: r (negative effect)
- 2. The dollar volume of transactions (positive effect)
 - a. Aggregate output (income): Y (positive effect)
 - b. The price level: P (positive effect)

The Determinants of Money Demand: Review

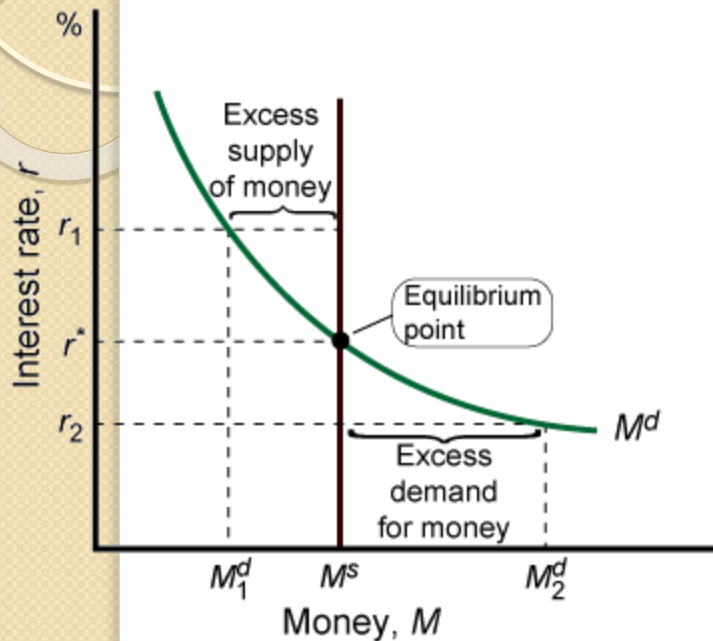
- Money demand answers the question:
 - How much money do firms and households desire to hold at a specific point in time, given the current interest rate, volume of economic activity, and price level?

The Equilibrium Interest Rate



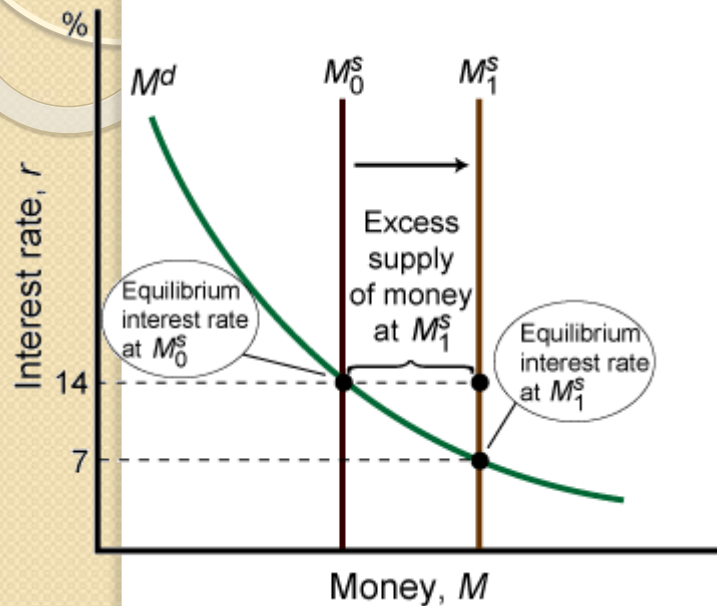
At r_1 , the amount of money in circulation is higher than households and firms wish to hold. They will attempt to reduce their money holdings by buying bonds.

The Equilibrium Interest Rate



At r_2 , households don't have enough money to facilitate ordinary transactions. They will shift assets out of bonds and into their checking accounts.

Changing the Money Supply to Affect the Interest Rate



An increase in the supply of money lowers the rate of interest.

The Demand for Money: A Numerical Example

Table

1 NUMBER OF SWITCHES ^a	2 AVERAGE MONEY HOLDINGS ^b	3 AVERAGE BOND HOLDINGS ^c	4 INTEREST EARNED ^d	5 COST OF SWITCHING ^e	6 NET PROFIT ^f
<i>r</i> = 5 percent					
0	\$600.00	\$ 0.00	\$ 0.00	\$0.00	\$ 0.00
1	300.00	300.00	15.00	2.00	13.00
2	200.00	400.00	20.00	4.00	16.00
3	150.00*	450.00	22.50	6.00	16.50
4	120.00	480.00	24.00	8.00	16.00
Assumptions: Interest rate <i>r</i> = 0.05. Cost of switching from bonds into money equals \$2 per transaction.					
<i>r</i> = 3 percent					
0	\$600.00	\$ 0.00	\$ 0.00	\$0.00	\$ 0.00
1	300.00	300.00	9.00	2.00	7.00
2	200.00*	400.00	12.00	4.00	8.00
3	150.00	450.00	13.50	6.00	7.50
4	120.00	480.00	14.40	8.00	6.40
Assumptions: Interest rate <i>r</i> = 0.03. Cost of switching from bonds into money equals \$2 per transaction.					

*Optimum money holdings. ^aThat is, the number of times you sell a bond. ^bCalculated as $600/(\text{col.1} + 1)$. ^cCalculated as $600 - \text{col.2}$.

^dCalculated as $r \times \text{col.3}$, where *r* is the interest rate. ^eCalculated as $t \times \text{col.1}$, where *t* is the cost per switch (\$2). ^fCalculated as $\text{col.4} - \text{col.5}$.



Tools of Monetary Control

- Open Market Operation
- Reserve Requirements
- Bank Rate/Discount Rate
- Liquidity Adjustment Facility

Open Market Operation

- Buying and selling of govt bonds
- If RBI buys bonds, it increases money supply.
- A part of this may be kept as currency
- Another part as deposits
- Each new money held as currency increases money supply exactly by the equal amount.
- Deposits increase reserve with banks and creates additional money.

Reserve Requirements

- Cash Reserve Ratio (Minimum amount that the banks must hold as reserve against deposits): **Affects money multiplier**
- SLR (Minimum amount of liquid assets the banks must have in the form of cash, gold and un-encumbered approved securities)
- Currently in India:
 - CRR: 3.5%
 - SLR: 18%

Bank Rate/Discount Rate

- The rate at which the RBI refinances other banks
- An indirect measure

Two roles

1. Effect on banks' borrowing and their reserves
2. Effect on interest rate leading to effect on reserve-deposit ratio and currency-deposit ratio (relationship is inverse)

Bank rate

4.25%

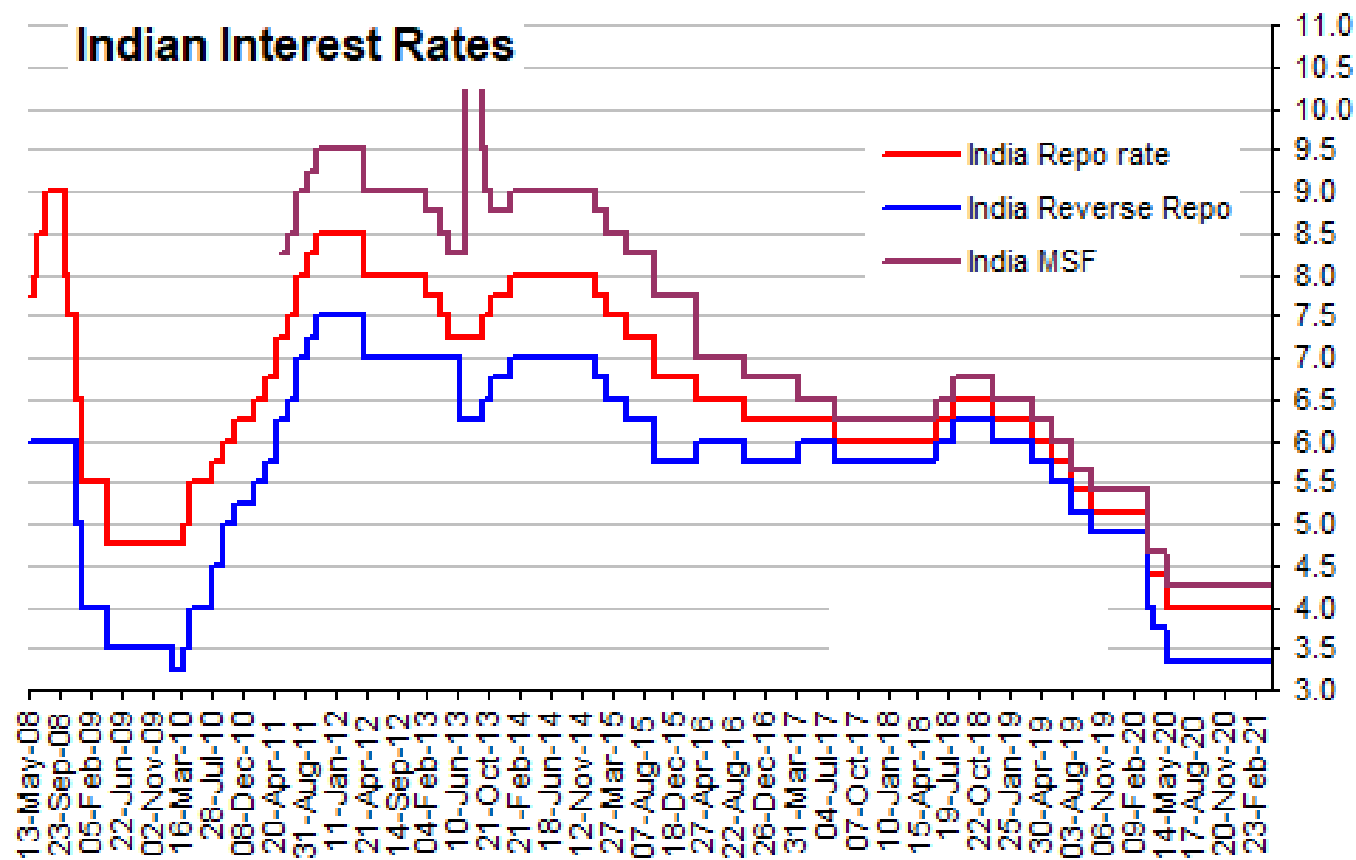
Liquidity Adjustment facility

- Repo rate: Rate at which RBI lends to banks (injection)
- Reverse repo rate: Rate at which RBI borrows from banks (sucking out)
- Transaction could be between 1-14 days.
- It brings stability in short-term interest rates.

Call Money rate:

- Rate at which short term funds are borrowed and lent in the money market.
- Duration of the call money is one day.
- Rate at which inter-banking transactions take place overnight.
 - ❖ loans to fill the asset liability mismatch
 - ❖ comply with the statutory CRR and SLR requirements
 - ❖ to meet the sudden demand of funds.

Currently in India: repo rate: 4%, reverse repo rate: 3.35%



MONETARY POLICY, REAL GDP, AND THE PRICE LEVEL

Cause-Effect Chain: Interest rate Effect on AD

- **Money supply affects interest rates**
- **Interest rates affect investment**
- **Investment is a component of AD**
- **Equilibrium GDP is changed**

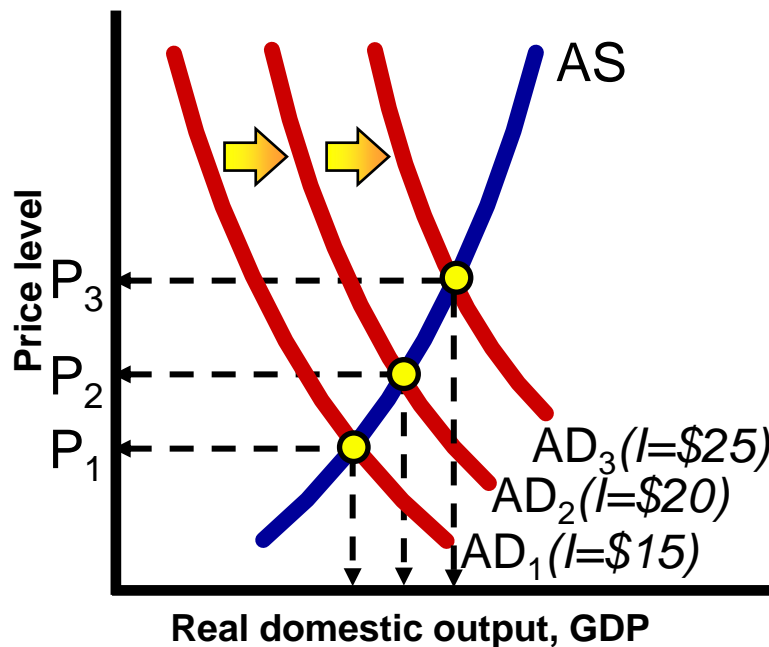
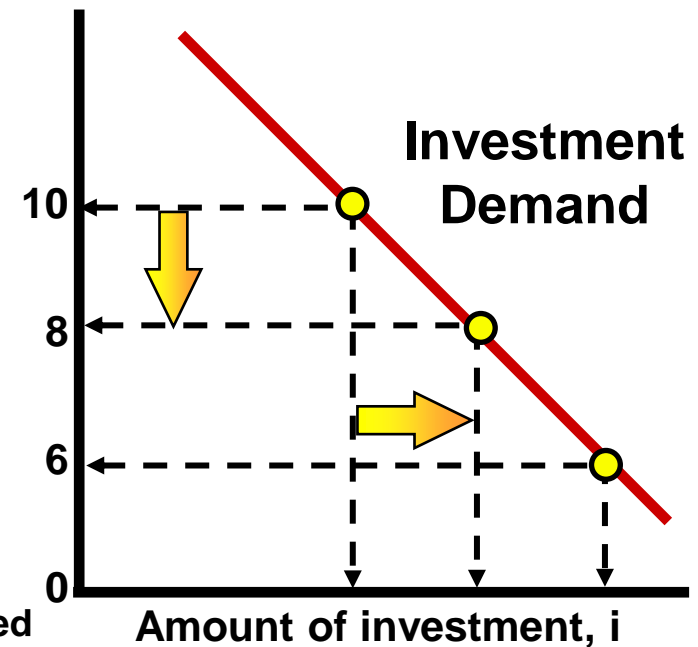
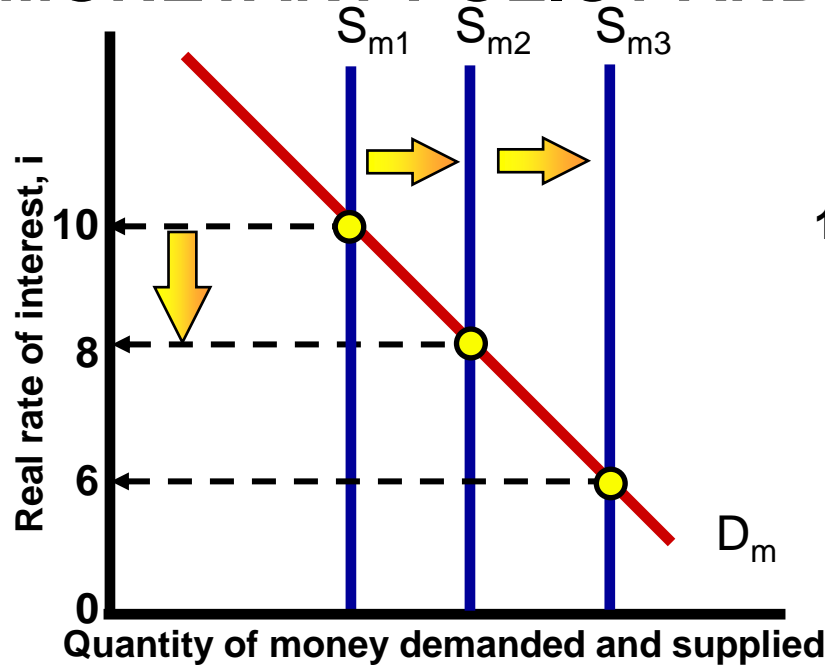
The Wealth Effect on AD

- A lower price raises the real value of household's money holding: wealth
- Higher real wealth leads to higher consumption spending
- Thus AD increases

The Exchange rate effect on AD

- A lower price reduces r
- Investors (bond seekers) move some of their funds overseas to earn higher returns.
- This movement of funds causes real value of domestic currency to fall against foreign currency.
- Domestic goods become less expensive relative to foreign goods.
- This stimulates exports leading to increase in AD.

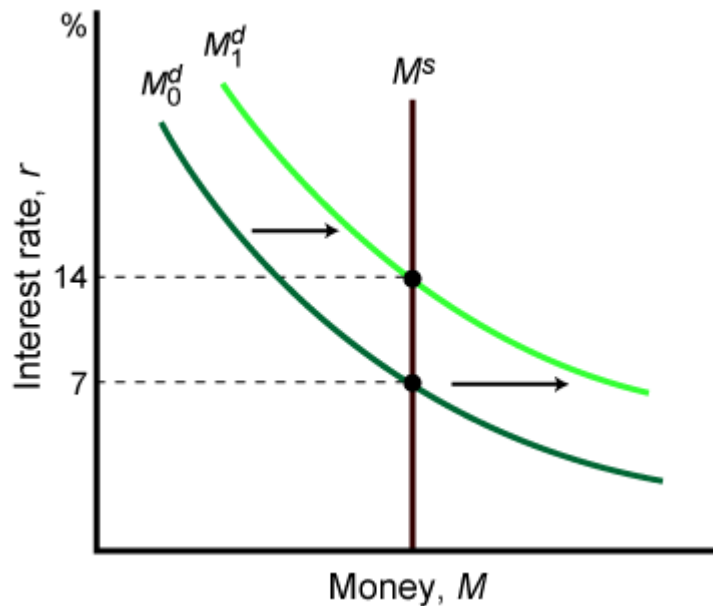
MONETARY POLICY AND EQUILIBRIUM GDP



If the Money Supply Increases to Stimulate the Economy...

- Interest Rate Decreases
- Investment Increases
- AD & GDP Increases with slight inflation
- Increasing money supply continues the growth – but, increases the Price Level.

Increases in Y and Shifts in the Money Demand Curve



An increase in aggregate output (income) shifts the money demand curve, which raises the equilibrium interest rate.

An increase in the price level has the same effect.

Targets of Monetary Policy

- High and Stable Employment
- Economic Growth
- Price Stability
- Financial Stability
- Stability in the Foreign Exchange Market

Ultimate Vs Intermediate targets

- Ultimate: Unemployment, Inflation, Growth of Real GDP
- Intermediate: Money Supply and Interest Rates

Financial Sector Reforms in India

Pre-reforms Scenario


- **Regulated interest rates**
- **Regulated financial investments**
- **Restrictions of banks**
- **Lack of competition**
- **Nationalized banks to perform social duties at the cost of profitability**
- **Cumulative rise in inefficiencies and NPAs**
- **RBI lacked autonomy**
- **GOI borrowed from RBI without limit through ad hoc treasury bill (basically overdraft)**
- **SLR was very high (with low interest rates)**
- **Household sector did not like to invest in these bonds.**
- **CRR and SLR: 60% in early 1990s**



Financial Sector Reforms (Narasimham Committee, 1991)

Post-reforms Scenario

- Lifting of regulations on interest rates on deposits and advances
- Reduction of barrier to entry of pvt banks
- Liberalization of branching regulations for both pvt and pub sector banks
- Reduction of the appropriation of loanable funds by the GOI through gradual decrease in CRR and SLR

- 
- Move from a direct instrument (Administered interest rates, reserve requirements) to indirect instruments (OMO, purchase and repurchase of govt securities)
 - GOI has no power to control interest rates
 - Automatic monetization of deficit is under scanner.
 - Monetized deficit (short and long term borrowing from RBI) as a % of GDP has fallen from 2% in 1980-91 to 0.5% in 1992-2004.



Current Issues in the Banking System

- Large NPA
- Obligatory advances to priority sector
- Competition from the NBFC and foreign players for the nationalized commercial banks
- Capital adequacy ratio to be optimized
- Rural market for banking
- Issues of financial inclusion
- Digitization



Thank You