Lecture Notes
Financial Market

Sumit Mishra[*]

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1. Money Demand

Suppose that your total wealth is ₹10,000, and you can only choose to divide this wealth into two bins.

1 **Money**: hard cash + bank deposits (these pay you no interest).

2 **Bonds**: interest-bearing financial instrument.

How do you allocate your total wealth into money and bonds? Your decision will depend upon two variables.

- The **Level of transaction**: If you spend ₹1,000 every month, you may want to keep another month's spending (just to be safe), So, you keep ₹2,000 in money, and ₹8,000 in bonds. If income doubles, by any chance, then you keep ₹4,000 in money, and ₹6,000 in bonds.

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- The **interest rate on bonds**: The higher the interest rate on bonds, the greater will be the pie allocated to bonds, and the ready cash box will shrink.

We can now define a function for money demand.

$$M^d = f(Y, i)$$

We know that money demand goes up as income goes up, but shrinks when interest goes up.

$$M^d = \underbrace{Y}_{+} \underbrace{L(i)}_{-} \tag{1}$$

2. Determining the Interest Rate

We assume that there are no checkable deposits in our model. We also hold the supply of money as fixed (the RBI decides on that). At equilibrium:

$$\text{Money supply} = \text{Money demand}$$

$$M = Y \cdot L(i) \tag{2}$$

- Money supply is independent of interest rate.
- When the interest rate goes up, money supply goes down.

Scenarios:

1 $\uparrow Y \Rightarrow \downarrow i$

Increasing output leads to greater levels of transaction (more ready cash is required to meet this demand). The equilibrium interest rate goes up.Why? Because the money market goes into disequilibrium. At this point, money demand is greater than money supply at the original interest rate. Higher interest will bring the money demand back to match the money supply.

2 $\uparrow M^s \Rightarrow \downarrow i$

When the RBI pumps more money into the economy, there is a disequilibrium again. In order to accommodate this "glut" of cash, interest rate must keep falling until money demand matches the increased money supply. How does this process of changing money supply work?

- **Open Market Operation**: The RBI buys and sells bonds.
  * Purchase of bonds $\Rightarrow \uparrow M^s$
  * Selling of bonds $\Rightarrow \downarrow M^s$

3. Bond Prices and Bond Yields

Imagine you buy a bond in October 2019 that guarantees you ₹100 in October 2020. The interest rate on this particular financial instrument (given that the price of bond is P_B) is

$$i = \frac{100 - P_B}{P_B} \tag{3}$$

Rearranging terms in Equation 3, we get a nice relationship between the bond price and the prevalent interest rate in the economy.

$$P_B = \frac{100}{1+i} \tag{4}$$

4. Mechanics of Banking

Table 1 represents a basic structure of balance sheets of the RBI and different banks.

Central Bank	
Assets	**Liabilities**
Bonds	Reserves + Currency
Banks	
Assets	Liabilities
Reserves, Loans, Bonds	Deposits

Table 1

Supply of and Demand for Central Bank Money

We now turn our attention to determining interest rate by looking at the supply-demand for central bank money.

Demand for Central Bank Money

The demand for central bank money = to the demand for hard cash by people plus the demand for reserves by banks. Let's mathematize this demand. We know that the total money demand in the economy is given by Equation 1. This total money demand can be binned into two boxes- currency, and deposits. We label demand for currency as CU^d and that for deposits as D^d.

$$M^d = c \cdot M^d + (1-c) \cdot M^d$$
$$M^d = CU^d + D^d$$

The demand for deposits will lead to a demand for reserves (R^d) by banks (why?). We can write down that relationship.

$$R^d = \theta \cdot D \tag{5}$$

Now, using the money demand and deposit relationship, we can formulate a reserves-money demand relation. We modify equation 5.

$$R^d = \theta \cdot (1-c) \cdot M^d \tag{6}$$

We are now ready to compute the total demand for central bank money.

$$H^d = CU^d + R^d$$
$$H^d = c \cdot M^d + \theta \cdot (1-c) \cdot M^d$$

If you assume that the supply of central bank money is fixed (call it H). We are now ready to determine the interest rate in economy.

$$H = H^d$$
$$H = c \cdot M^d + \theta \cdot (1-c) \cdot M^d$$

Equation 7 is our money market equilibrium, and the interest rate determined is known as the **federal funds rate**.

$$H = [c + \theta \cdot (1-c)] \cdot M^d \tag{7}$$

Money Multiplier

Using equations 1 and 7, we can write the following equation

$$\frac{1}{[c + \theta \cdot (1-c)]} \cdot H = Y \cdot L(i) \tag{8}$$

Compare equation 8 with equation 2. Both represent money market equilibrium, but with one minor difference. Equation 8 tells you that the total money supply equals some multiple (greater than equal to 1) of central bank money (why?). The following term

$$[c + \theta \cdot (1 - c)] \tag{9}$$

represents the money multiplier[1].

Example: If the central bank money supply (H) = 100, and money multiplier = 4, then the total money supply in economy = $100 \times 4 = 400$.

[1]refer to my slides for detailed example of how money multiplier works