

## 6. Monetary Policy

EE 212

Case & Fair, ch. 10-11; LCR, ch. 27-29, Froyen p.335-339

March 2013

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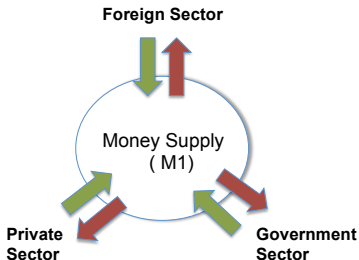
# 1. Introduction

- Financial sector is not the real sector, which produces final goods and services.
- It helps facilitating the real sector, by providing financial services (payment system, foreign exchange services, loans and deposits etc.)
- The presence of financial sector promotes saving and investment.
- Structure of financial market (depends on classification criteria)
  - Primary and Secondary market(classified by seasoning of the claims) :
    - New securities are sold to initial buyers : Primary market
    - Security that have been previously issued are resold: Secondary market
  - Organized and Unorganized market (classified by by formality)
    - Organized (must operate under certain rules and regulations)
    - Unorganized (operates under the agreement of the exchange partners)
  - Money and capital market (classified by maturity)
    - Short-Term (maturity < 1 year) Money Market

## 2. Supply of Money

- The demand for and the supply of money will determine equilibrium interest rate.
- Money is anything that is accepted as a *medium of exchange*.
- Functions of Money:
  - Medium of exchange
    - This promotes economic efficiency as it reduces transaction costs and it also allows people to specialize in what they do.
  - Unit of account
    - It reduces transaction cost by reducing the number of prices that need to be considered
  - Store of value
    - Money is used as a way to store purchasing power over time
    - This function is useful as we do not always want to spend our income immediately upon receiving it
    - It provides more liquidity (the relative ease with which an asset can be converted into a medium of exchange than other assets)

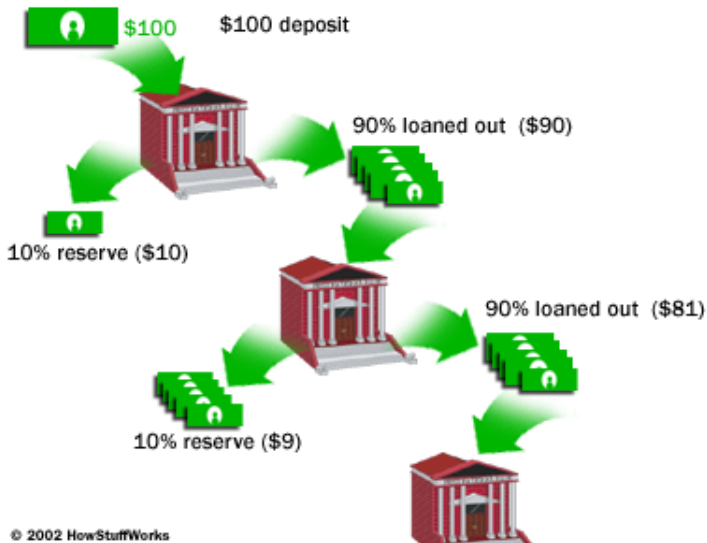
- Money Supply = total amount of “money” in the hand of public at a specific time. It is a stock concept.
- There are several standard measures of the money supply. The definitions of money differ by their liquidity or specifically how different they are from currency.
  - ① Narrow definition of money supply :  $M1 = \text{currency in circulation} + \text{demand deposits at commercial banks}$
  - ② Broader definition of money supply :  $M2 = M1 + \text{saving and time deposits at commercial banks}$
  - ③  $M3 = M2 + \text{savings of other financial institutions (specialized banks)}$
- The government and the central bank are in charge of the amount of currency in circulation. Only the central bank can issue the currency.
- This course will focus on only M1.



- Foreign Sector : export  $\Rightarrow$  MS  $\uparrow$  , import  $\Rightarrow$  MS  $\downarrow$ 
  - export  $\Rightarrow$  exporters receive USD  $\Rightarrow$  convert USD to Bht  $\Rightarrow$  M1  $\uparrow$
  - Trade surplus  $\Rightarrow$  MS  $\uparrow$ , Trade deficit  $\Rightarrow$  MS  $\downarrow$
- Government Sector : depends on how the government finance its deficits
  - 1 use saving (surplus from the past)
  - 2 borrow from abroad
  - 3 print more money
  - 4 borrow from private sector (issue bonds)

# Creation of Money

- Private Sector : creation of money
  - deposit more money into the bank  $\Rightarrow$  MS  $\uparrow$
  - deposit more money into the bank  $\Rightarrow$  MS  $\downarrow$
- Bank can create money many times out of the initial deposits.
- Fractional Reserve Banking System
  - Banks retains cash equal to only a portion of its deposits, as readily available reserves (currency on hand at the bank plus deposit accounts for that bank at the central bank)
  - Central bank imposes reserve requirements, minimum ratio of reserves to deposit commercial banks has to maintain.
  - Excess reserves are bank reserves in excess of the reserve requirement set by a central bank.
  - Banks can lend out excess reserves.
  - Bank loans goes to the public. The public may deposit the money back to the bank.
  - Total deposits is much greater than the initial deposits.



- How many times total deposits is greater than the initial deposits?
- Suppose initial case deposits =  $P = 100$ .
- Legal reserve ratio =  $rr = 10\%$ .
- $A$  = Excess cash reserve of the first bank
- Assumptions :
  - (1) Excess reserve is all loaned. The whole banking system must not keep excess cash reserve.
  - (2) One must deposit his money totally.

Bank	Deposits	Reserve (10%)	Loans
1	100	$(0.1 \times 100) = \dots\dots$	$(1 - 0.1) \times 100 = \dots\dots\dots$
2	90		
3	81		
...			
n			
Total			

- Total Deposits =  $100 + (1 - rr)100 + (1 - rr)^2 100 + (1 - rr)^n$   
=

- Assumes that  $n \rightarrow \infty$ .

- Sum of a geometric sequence :  $\sum_{k=0}^{\infty} ar^k = \frac{a}{1 - r}$ , where  $0 < r < 1$ .

- Total Deposits =  $\sum_{k=0}^{\infty} P(1 - rr)^k$  :  $a = \dots\dots\dots$ ,  $r = \dots\dots\dots$

- Total Deposits =  $\frac{P}{rr}$ .

- Money multiplier =  $\frac{1}{rr}$ ,

- Demand Deposits Created by Banking Sector ( $D$ ), the maximum amount of money that can be created

$$D = \frac{P}{rr} - P = \frac{(1 - rr)P}{rr} = \frac{A}{rr}.$$

- From the example,

- $P = \dots\dots\dots$ ,  $rr = \dots\dots\dots$ ,

- Total Deposits =

- Demand Deposits Created by Banking Sector ( $D$ )

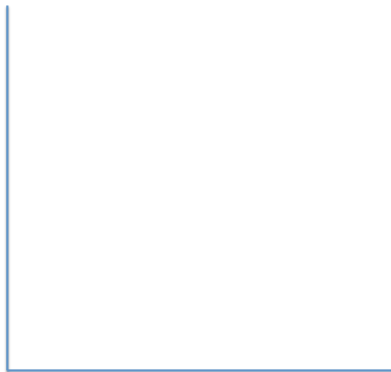
- In theory, the maximum amount of money that can be created is

$$D = \frac{P(1 - rr)}{rr} .$$

- In practice, the amount of money that can be created is .....

than  $\frac{P(1 - rr)}{rr}$ .

- Excess reserve is **not** all loaned.
- One **does not** deposit his money totally.
- The private sector (financial institutions and the public) plays an important role, which could change the money supply.



- Money Supply does not depend on the interest rate
- Money supply  $\uparrow$  , MS shifts to the right
- Money supply  $\downarrow$  , MS shifts to the left

- Given the other things remain constant, if each of this following situation happens, how will the money supply change?
  - 1 The central bank increases the legal reserve ratio ( $rr$ ).
  - 2 The central bank prints more money.
  - 3 The central bank issues bonds.
  - 4 The central bank gives loans to commercial banks and commercial banks provide more credits to the private sector.
  - 5 The public would like to hold more cash (less deposits).
  - 6 The public would like to hold more deposits (less cash).

### 3. Demand for Money

- Demand for money : the amount of wealth that everyone in the economy wishes to hold in the form of money balances
- liquidity = how easy an asset can be quickly converted in to the medium of exchange, with a little loss of value.
- Keynesian's Liquidity Preference Theory :
  - There are two main assets people use to store their wealth, Money and Bonds.
  - Opportunity cost of holding money = income that you could have earned if you hold the bonds (or deposit money in a bank), which is interest.
  - People hold the money because it provides liquidity.

- M1 = Currency in circulation + Demand Deposit
- Demand Deposit do not pay interest.
- Demand for Money consists of 3 components
  - ① Transaction demand for money ( $M_T^d$ ) : People want to hold money to meet their daily transaction
  - ② Precautionary demand for money ( $M_P^d$ ) : People hold some money to safeguard themselves from something that they cannot detect beforehand.
  - ③ Speculative demand for ( $M_S^d$ ) : People hold money for speculation
- $M^d = M_T^d + M_P^d + M_S^d$
- $M^d = f(Y, r, \dots)$
- $Y \uparrow M^d \dots\dots$
- $r \uparrow M^d \dots\dots$

- Bond : A prototypical bond is a contract that commits the issuers to make a specified sequence of payments until a specified terminal date.

Government Bond  
Pay 110 after one year

- Price of the bond is equal to 100. Interest rate is .....
- Price of the bond is increased, interest rate is .....
- Price of the bond is decreased, interest rate is .....

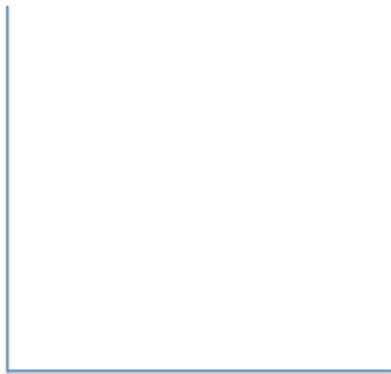
Bond price  $\uparrow \Rightarrow$  Interest rate ( $r$ )  $\downarrow$

- The relationship between money demand and interest rate



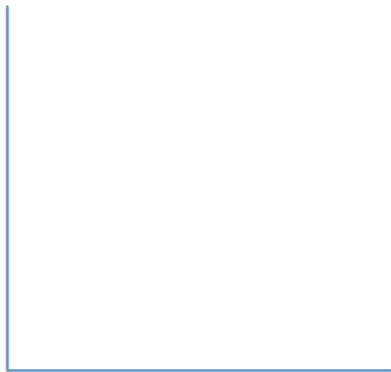
- An increase in interest rate would lead to ..... in the quantity demand for money, ceteris paribus (keep  $Y$  and other factors determining  $M^d$  constant).
- A decrease in interest rate would lead to ..... in the quantity demand for money, ceteris paribus (keep  $Y$  and other factors determining  $M^d$  constant).
- $\Delta r \Rightarrow$  movement along the Money Demand Curve

- Shift in  $M^d$

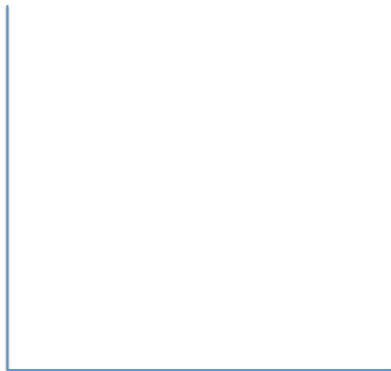


- An increase in national income ( $Y$ ) will lead to ..... in demand for money, ceteris paribus. (Money Demand shifts to the .....)
- An decrease in national income ( $Y$ ) will lead to ..... in demand for money, ceteris paribus. (Money Demand shifts to the .....)
- $\Delta Y \Rightarrow$  Shift in  $M^d$

## 4. Equilibrium in Money Market



- If interest rate is *lower* than the equilibrium interest rate,
- there will be excess money  
.....
- agents will ..... (buy/sell) more bonds,
- (bond demand/bond supply) will (rise/fall)
- then bond price..... (increases/decreases),
- therefore the interest rate  
.....  
(increases/decreases)



- If interest rate is *greater* than the equilibrium interest rate,
- there will be excess money  
.....
- agents will ..... (buy/sell) more bonds,
- (bond demand/bond supply) will (rise/fall)
- then bond price..... (increases/decreases),
- therefore, the interest rate  
.....  
(increases/decreases)

- Implicit function :  $M^s = M_0^S$  ,  $M^d = M_0^d - m^d r$ .

- Numerical Example:  $M^s = 400$  ,  $M^d = 800 - 50r$

- Given the other things remain constant, if each of this following situation happens, how would it affect equilibrium in the money market?
  - Real national income ( $Y$ ) increases
  - Money Supply increases
  - Price level increases
  - Real national income ( $Y$ ) decreases
  - Money Supply decreases
  - Price level decreases

## 5. Monetary Policy

- Monetary Policy to solve inflationary and deflationary gaps

### Tools to control money supply

- 1 Open Market Operation (OMO)
    - Buy government bonds
    - Sell government bonds
  - 2 Bank rate (rediscount rate = interest rate that the central banks charge the commercial banks when they borrow the money from the central bank.)
    - Bank rate  $\uparrow$
    - Bank rate  $\downarrow$
  - 3 Minimum Legal reserve requirement (rr)
    - rr  $\uparrow$
    - rr  $\downarrow$
- Monetary Policy  $\Rightarrow$  Money Supply  $\Rightarrow$  Y?

# Impact of money market to commodity market

## Goods Market

$$Y = C + I + G +$$

$$(X - M) = DAE$$

(determines  $Y$ )

$I$  depends on  $r$

( $r \uparrow$ ,  $I$ .....,  $DAE$ .....,

$Y$ .....)

( $r \downarrow$ ,  $I$ .....,  $DAE$ .....,

$Y$ .....)

## Money Market

$$M^s = M^d$$

(determines  $r$ )

Money Demand depends on  $Y$

( $Y \uparrow \Rightarrow M^d$ .....  $\Rightarrow r$ .....)

( $Y \downarrow \Rightarrow M^d$ .....  $\Rightarrow r$ .....)

## Monetary Policy Transmission Mechanism

- $MS \uparrow \Rightarrow$  Interest Rate ( $r$ ) .....  
 $\Rightarrow$  Investment ( $I$ ) .....  $\Rightarrow$  DAE shift .....  $\Rightarrow Y_E$  .....
- $MS \downarrow \Rightarrow$  Interest Rate ( $r$ ) .....  
 $\Rightarrow$  Investment ( $I$ ) .....  $\Rightarrow$  DAE shift .....  $\Rightarrow Y_E$  .....

## Types of Monetary Policy

1 Expansionary Monetary Policy : to increase money supply, to stimulate economy, used when there is ..... gap.

How?

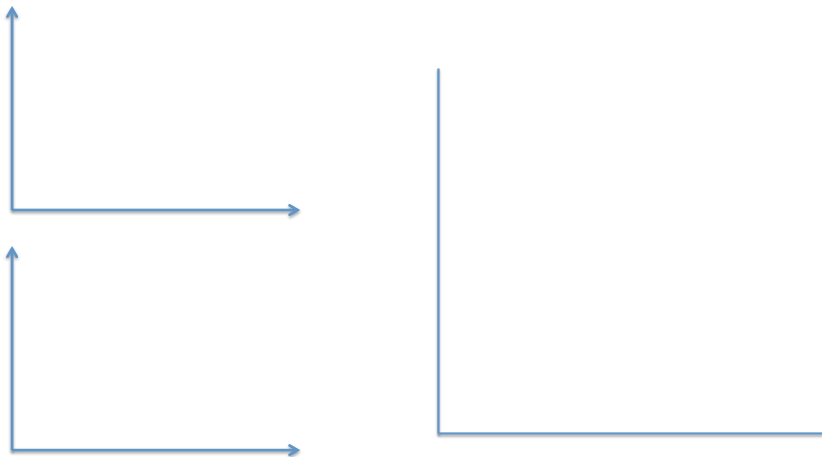
- OMO : ..... government bonds
- Bank rate/Rediscount rate .....
- Minimum Legal Reserve Requirement (rr) .....

2 Contractionary Monetary Policy : to decrease money supply, to slow down the economy, used when there is ..... gap.

How?

- OMO : ..... government bonds
- Bank rate/Rediscount rate .....
- Minimum Legal Reserve Requirement (rr) .....

- Expansionary Monetary Policy



- Contractionary Monetary Policy

