9. MONEY & BANKING

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I Nature & Functions of Money

Money is a generally accepted, but not universally accepted, medium of exchange due to some historical and habitual reasons.
Its generality comes from habit but its acceptability is strengthened or institutionalized by law. As a result, nowadays money is **legal tender**, i.e. it is authorized to settle any debts and payments.

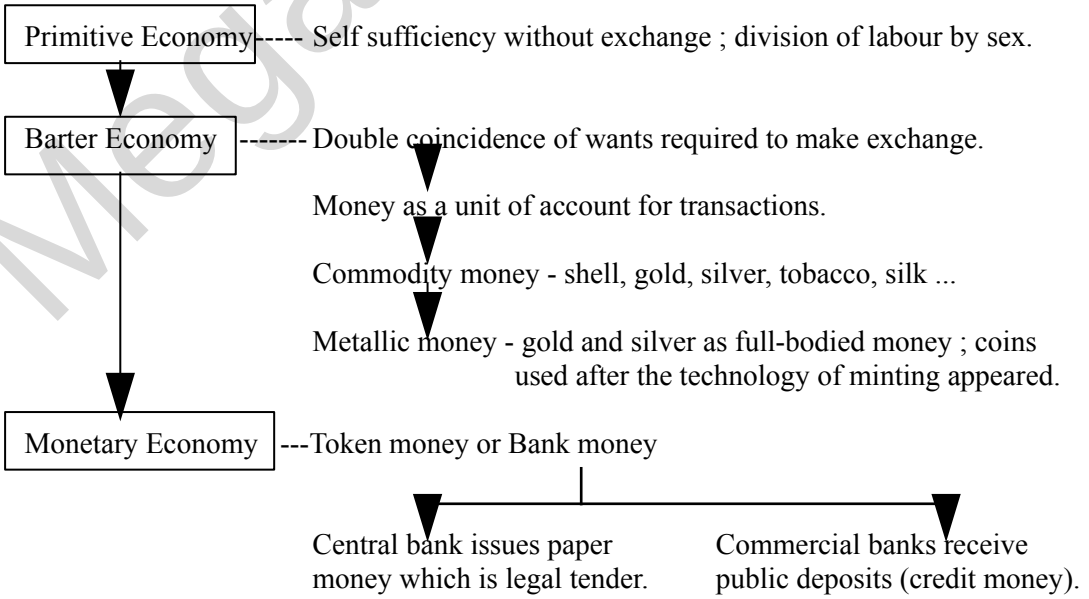
Money has a general purchasing power.
Money buy goods and services but goods and services do not (cannot) buy money.
Bad money drives away good money.

There are four important functions of money, namely : a medium of exchange, a unit of account, a store of value, and a standard of deferred payment.

Money Substitute : It serves as a **temporary** medium of exchange but does not have a store of value. A credit card is an example. Money substitutes are not money by themselves and the transactions involved had to be settled by cash or cheque at a later date.

Near Money : It refers to any asset fulfilling the store of value and is readily to be converted into a medium of exchange and itself is still not a medium. Shares and bonds are examples. They are interest-earning and highly liquid and readily convertible into cash.

Historical Development of Money



At ancient time, money came from commodities or metals, i.e. they are ***used as*** money.
Now, money is not a kind of goods capable of direct consumption but for exchange most of the time.
The special character of money - ***its moneyness*** - fully appears in its ***functional*** stage.

II Money Demand

The Quantity Theory of Money

The nature of the theory includes the following features :
- It is a theory about money and price level ; money demand and nominal income.
- It aims at to find out how the stock of money affects the price level and income.
- It denotes the economic philosophy of laissez-faire, i.e. the classical view of the market mechanism.

1 The Classical or Transaction Version of Quantity Theory

Irving Fischer (1867 - 1947) of the Yale University took this version in his book - The Purchasing Power of Money (1911).

He stressed money as a medium of exchange and focus on the transaction demand for money only. His theory began by introducing the so-called "equation of exchange". It simply says that the amount of expenditure spent on transaction must be equal to the total value of goods and services exchanged at a certain time period.

The Equation (Identity) of Exchange

Value of money spent on transactions ≡ Value of goods and services in exchange
(Expenditures in nominal terms)

* In a monetary economy where transactions rely on money to facilitate exchanges, this equation is also an identity. Fischer went on to find some variables to express the above equation.

* On the left hand side, the value of money spent is expressed by M times V_T where M denotes the nominal money stock in circulation at a time period ; and V_T is the so-called transaction velocity of money. It is the average number of times money changes hand in a time period during exchanges.

* On the right hand side, the value of goods and services in exchange is expressed by P times T. P denotes the average price of transactions and T denotes the total number of transactions in a time period.

* The equation becomes : $M . V_T = P . T$

Based on this equation, Fischer added in new elements to formulate the ***quantity theory***. His ideas are :

* No rational person holds idle money balances.
* The value of M is determined by the central bank and it becomes an exogenous variable.
* T is fixed in the short run because there is full-employment income based on the classical view.
* The velocity is independent of M, P and T. It is also a constant in the short run.
It is determined by some exogenous factors like the institutional and technological factors which are fixed in the short run, e.g. credit card, computerized check-clearing, money transfer. The period of wage payments (e.g. monthly) will affect the velocity of money.

* By **assuming** V_T and T to be constant, the equation becomes :

$M . V_T = P . T$ **OR :** $P = (V_T / T) . M$

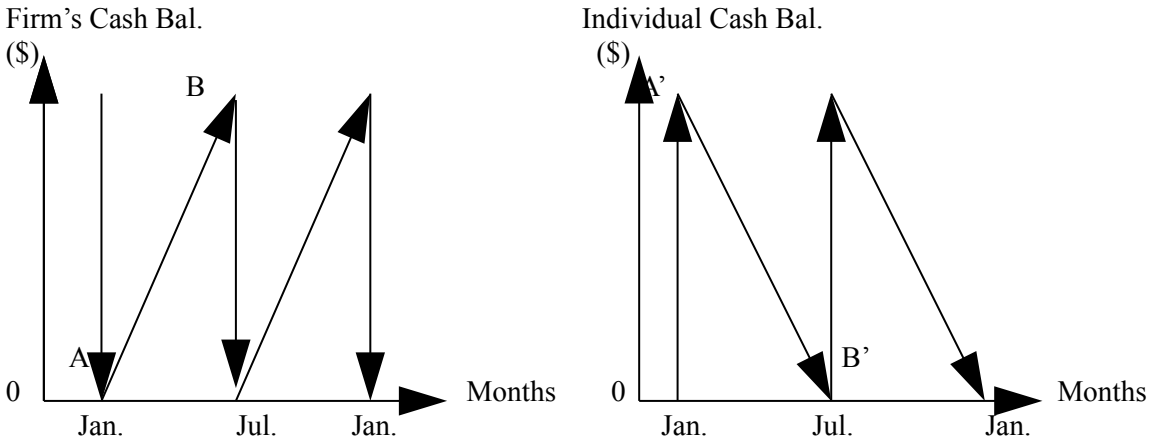
That is, the price level is ***directly proportional to*** the quantity of money. In equilibrium of a money market, the level of money demand is equal to the level of money supply, i.e. money stock = money demand, M_D.

$P = (V_T / T) . M_D$ **OR :** $M_D / P = (1 / V_T) . T$ with V_T & T are constants.

An Example

Assume : an economy with only 1 firm and 1 individual, for the sake of simplicity.

Payment : 1st January ($100) and 1st July ($100).
Spending : A steady stream covering 6 whole months after each payment.



January 1 : Firm's cash : $100 → $0 (A)
Individual : $0 → $100 (A')

June 30 Midnight : At points B ; B'

Within a period of 6 months, the average cash balance = $50 for both the firm and the individual . The transaction velocity of money = $100 ÷ $50 = 2 which implies that the money stock is exchanged two times within the period (year).

For the same logic, if the payment is made 4 times per year, then $V_T = 4$.

Fischer said that such institutional changes occur slowly so that V_T can be treated as a constant.

Implications of The Transaction Version :

* When the amount of real money supply is greater than the amount of real money demand, the price level will rise until the level of real demand = the level of real supply in the money market, vice versa.
* The price level will change accordingly to adjust to any disequilibrium in the money market.

Research Problems of This Version :

* Transactions often involve those of capital assets so that the value of T may not be constant even with full employment.
* There is a difficulty in defining a general price level of all goods and services as well as assets of various types.

2 The Income Version of The Quantity Theory

This version stressed on the ***income transactions*** rather than all transactions taken place.

* As a result, the value of ***real*** national income (y) can be used to replace the value of T.
* The average price of transactions (P) is replaced by the price index of the national income.
* Again, the transaction velocity is replaced by the ***income*** velocity of money or circulation, i.e. the number of times per year that the money stock is used to purchase the final output currently produced - GNP.
* Compared with the transaction version, the value of y in this version is smaller than the value of T, and the value of V is smaller than the value of V_T .
* The equation carried in this version is :

$M . V = P . y$ OR : $M_D = (1 / V) . P . y$ OR : $M_D / P = (1 / V) . y$

* In conclusion, the quantity of money determines the price level. Any change in money stock will be reflected in the change in price level. The income version emphasizes the role of money in the production of national output (y) instead of the role of money in transactions in the case of the transaction version.
* For example with V being a constant, suppose the real growth rate at the time period is 4 %, then

$$\Delta M = \Delta P + \Delta y = \Delta P + 4\%$$

The above implications that if a zero inflation rate is desired, a monetary growth at a rate of 4 % (Δ M) is necessary. In case of Δ M = 10 % ; with Δ y = 4 % ; Δ P will be 6 % , i.e. inflation of 6 %.

3 Cambridge Cash-Balances Approach

A.C. Pigou wrote "The Value of Money" in 1917 suggesting this approach. Alfred Marshall also supported this idea.

* This version treats money ***as a store of wealth (asset)***. The asset value of money is determined by variables like interest rate, the expectation of price and interest rate in the future.
* It emphasizes the theory as ***a theory of money demand*** , i.e. a theory to determine the factors affecting the amount of demand for cash balances (= the amount of money held in the form of cash and deposits). It determines the optimal amount of money held by people to maintain a balance in liquidity, security and convenience.
* This approach argues that in the short run, all those factors affecting the level of money demand are proportional to a change in national income.

People choose to hold a portion (= k) of their nominal income in the form of money (M_D).

$M_D = k.\ Y$ where k is stable in the short run.
OR : $M_D = k\ .\ P.\ y$ where $Y = P.\ y$

The demand for nominal money balances is proportional to the nominal national income (and wealth).

* Compared with Fischer's transaction version, this approach can show the effect of money stock on the price level more clearly.

* Adjustment :

Suppose the money market is in equilibrium initially. There is an rise in money stock. now. At the original price level and interest rate, there is an excess supply of money in the market. Based on the stable portion of national income held by the people, they will spend more on both consumer and capital goods. The level of aggregate demand and total expenditures will increase.

In the short run with full-employment, the level of aggregate demand is larger than that of aggregate supply in the product market. The prices of products will begin to rise. Rising prices, as a result, will increase the level of money demand because more money is now needed to support the purchases of higher-priced goods and services. Finally, the level of money demand will catch up with the increased level of money supply. The money market will be in equilibrium again.

Suppose the level of money supply falls, there is a deficiency in money holding. Money becomes tight. It makes people to reduce the purchase or sell other forms of assets for cash. If the money stock falls once-and-for-all, it would lead to arise in interest rate. Investment incentive is discouraged.
The level of aggregate demand and the price level would fall.

Implication :

* The change in money stock determines the change in price level. Prices are flexible enough to adjust to any changes (the argument of the invisible hand).
* The change in money affects only the nominal variables (like national income) for an economy.

4 Modern Quantity Theory & Monetarism (* ***An Optional Part***)

Modern Quantity Theory (Milton Friedman 1912 - _)

It is a theory of the ***demand*** for money. Money is a kind of ***asset*** or one way of holding wealth. The demand for money is the demand for real purchasing power in the form of money.

Money Demand = f (income, wealth, interest returns on bonds & shares, the price level, expectation on future prices...)

Freidman's Conclusion

* Money demand is a ***stable*** and predictable function. Money supply is crucial in the analysis of money market and monetary variables. (The interest elasticity of money demand is **small**.)
* When there is any monetary change, it may lead to a change in prices as well as a change in real output. The change in real output is faster than the change in prices, i.e. the change in output adjusts itself faster. A change in money supply would also lead to a change in aggregate demand and national income.
* The change in money supply is the ***principal factor*** to cause inflation.
  Inflation is basically a monetary phenomenon.
  In the short and intermediate run, a change in money supply may be partly reflected in the change of the price level and nominal income because $M. V = P . y$ where $Y = P. y$
  In the long run, a change in money supply will be reflected by the change in the price level, **not** in a change in the real output or real income. Hence, the classical view holds in the long run.
* If the money supply dominates over the change in nominal income, the quantity theory is also a theory of **nominal income**.

Major Monetarist Proposition

* Money supply has the **dominant** influence on nominal national income.
* In the short run, money supply **affects** some real variables, causing cyclical movements in the level of output and thus employment. In the long run, money affects primarily the price level and nominal variables. Those real variables like real income and employment level, are determined by other real factors like productivity, technology etc.
  Money supply and the price level are proportional in the long run but **not** in the short run. This view is different from the classical view.
* The private sector is **inherently stable.** Economic instability is primarily the result of government policies. The market mechanism is still the best for all, i.e. the principle of laissez-faire.

Implication Or Policy Recommendation

* A **constant** rate of growth of the money stock can bring about economic stability. The long term growth rate of GNP of an economy should be best equal to the long term growth rate of the money stock. (However this **rule** is very difficult to be adopt by the central bank in practice.)
* Fiscal policy is **not** an effective stabilization tool for the economy. The means of financing government expenditures would affect the degree of stabilization of the fiscal policy.

Comparison : Friedman's Version & The Old Version of The Quantity theory

* The factor ***k*** is no longer constant according to Friedman's view.
* Money is an important asset or an asset demand for money. (It is also a modern theory of **portfolio** choice.)
* The transmission mechanism works very quickly in the classical view. The change in money stock will be quickly reflected in the change in price level with a belief of price flexibility, i.e. the force of the invisible hand.
  While Friedman suggests that this mechanism takes time. The time of adjustment lies between that suggested by the classical economists and the Keynesians.

***** End of the Optional Part *****

III Money Supply

Money supply (stock) refers to the total amount of money (currency) supplied by the central monetary authority - Central Bank to the banking sector and the non-bank public (the citizens and the government).

1 Classification of Money Stock

Money is a liquid asset. The liquidity of an asset refers to the cost of exchanging it for other assets. The most liquid form of asset - cash in your wallet - carries the full characteristic of " moneyness ".
Based on the degree of **liquidity** and the **function**, money supply is generally classified into 3 **broad** types.

Money Aggregates (In H.K.) :

M_1 = Currency in circulation + Demand Deposits

M_2 = **M_1** + SD + TD of licensed banks +
CDs issued by licensed banks (and held outside the banking sector)

M_3 = **M_2** + TD with DTCs and RLBs + CDs issued by DTCs and RLBs

Money Supply = Currency in circulation + **All** Forms of Deposits In The Financial Institutions

Note : * DTC denotes deposit-taking company and RLB denotes restricted licence bank.
* Inter-bank deposits are not counted in the money supply.
* Total money supply includes foreign currencies also.

2 The Note-Issuing Mechanism In Hong Kong

The Exchange Fund is set up in 1935 with HK$ being 100 % backing by foreign currencies. The HK Dollar became internationally recognized based on this foreign exchange standard.

The three note-issuing banks (The Bank of China since 1994) can deposit any amount (without interest) to the Exchange Fund in exchange for a *Certificate of Indebtedness* in order to issue banknote in H.K.

The Hong Kong Association of Banks is responsible to determine the prime rate in H.K. In the USA, the Federal Reserve sets the discount rate - the interest rate charged by the FED on commercial banks when the banks borrow money from the FED.

Prime Rate : The minimum interest rate charged by the Exchange Fund to the 3 note-issuing banks and also the minimum interest rate charged by these 3 banks to any public borrowers.

Inter-bank Rate : The interest rate charged among the commercial banks themselves. It shows the degree of money required within the banking sector.

In 1995, the Hong Kong Monetary Authority was set up to supervise the monetary sector in H.K.

3 The High-powered Money Or Monetary Base

The following tables show the assets and liabilities of a central bank and the commercial banks as a whole :

Central Bank

ASSETS	LIABILITIES
Gold Foreign Currencies Government Bonds Loans and Securities	Local Currency Deposits of Commercial Banks *

Commercial Banks (Consolidated)

ASSETS	LIABILITIES
Cash Assets : Currency (Vault cash) Reserves in the Central Bank * Loans and Advances Government Bonds Other Forms of Investments	Deposits of The Public Borrowings

Local currency is issued by a central bank and becomes a liability to it. The reserves of the commercial banks are partly held on deposit with the central bank and they are the central bank's liability because it must redeem them on demand by the commercial banks.

The central bank's liabilities form the base on which the commercial banks can expand and create credits through the so-called credit creation. These liabilities are termed the **monetary base or high-powered money**.

It is high-powered because the change of its value can lead to a larger change in deposits (eventually the money supply) by the process of credit creation.

H = Cash of non-bank public + Vault cash of the commercial banks +

Reserves of the commercial banks deposited in the central bank

The Decision of Banks To Hold Reserves

Commercial banks always face the choice between **liquidity** and **profitability**. They depend on the following factors to hold reserves :

* the uncertainty of its net deposit flow.
* the cost of borrowing when running short of cash :
  - if borrowed from the central bank, the cost is the discount rate ;
  - if borrowed from other commercial banks, the cost is the inter-bank rate.
* cost of holding reserves being the interest forgone.
* interest rate (return) of other forms of assets.

IV Commercial Banks & Credit Creation

1 The Process of Credit Creation

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The Assumptions of Credit Creation :

* The public holds all the currency desired, i.e. any deposit created will be re-deposited. There is no **cash leakage or cash drain** from the commercial banks. It makes the calculation easier.
* Banks holds only the legal (minimum) required reserve, i.e. there is no **excess reserve**. The legal required reserve ratio is smaller than 1. (It is 25 % in the case of H.K.)
* For simplicity, bank assets consist of reserves and loans only. The only liability is the demand deposit.

The Calculation

Initially a bank obtains a deposit of $100 from the public. It starts to lend it out for profit.

	Net Additional Money (Demand Deposits) ($)	Net Additional Loans ($)	Net Addition To Reserves ($)
Start	100	80	20
2nd Round	80	64	16
3rd Round	64	51.2	12.8
4th Round	51.2	40.96	10.24
5th Round	40.96	32.77	8.19
nth Round	…	…	…
Total =	500	400	100

The maximum deposit created = Initial change of deposits × (1 / RR)

where (1 / RR) is called the **banking multiplier** in its most simplest form.

2 The Open Market Operation : Case 1

Stage 1 : The bank received a deposit of $200 and had it fully loaned up, based on a minimum reserve ratio of 20 %.

Reserve	200	Deposit	1 000
Loan	800		

The initial money stock was $200 when the deposit just reached the bank, ceteris paribus.
With the process of credit creation, the total money stock (deposit) became $1000 with the high-powered money equal to $200 (the reserve).

Stage 2 : The central bank bought back or redeemed $100 government bond from the public. The public received the money from the central bank and deposited all of it into the banking sector. At the very first beginning, the balance sheet looked like below.

Reserve	300	Deposit	1 100
Loan	800		

The actual reserve ratio became (300 ÷ 1100 =) 27.3 % with an excess reserve (=). The excess reserve could be loaned out for more interest earned and will also become deposits after a period of time. ***Reserve Ratio = Reserve / Deposit = Δ R / Δ D***

Stage 3 : The bank will start the process of credit creation until it is fully loaned up.

Reserve	300	Deposit	1 500
Loan	1 200		

The Money or Banking Multiplier = 1 ÷ RR = 500 / 100 = 5
The money supply changed from $1000 to $1100 with the redemption of government bond by the central bank in Stage 2. After Stage 3, i.e. credit creation, the total money stock or deposit became $1500. ***Δ D = 1500 - 1000 = 500 ; Δ M_s = 1500 - 1100 = 400***

3 The Open Market Operation : Case 2

Stage 1 : The bank received a deposit of $200 and had it fully loaned up.

Reserve	200	Deposit	1 000
Loan	800		

Stage 2 : The central bank sells $100 bond to the public. The public buys the bond **by their deposits** in the bank. The immediate effect is shown below.

Reserve	100	Deposit	900
Loan	800		

The demand deposit held by the public falls after buying the bond. The reserve of the bank (in the central bank account) also falls by 100. The actual reserve ratio became %.

Commercial Banks' Reaction :

* Borrow back from the central bank but bears the discount rate.
* Reduce the demand deposit by calling back the outstanding loan as soon as possible.

Stage 3 : The bank has to liquidate its loan to meet the legal reserve requirement.

Reserve	100	Deposit	500
Loan	400		

The actual reserve ratio = the required reserve ratio = 100 / 500 = 20 %.
The level of demand deposit falls as a result from 1000 to 500.
The level of money stock falls also.

> The central bank can make use of this so-called open market operation either by **multiple** expansion or contraction of credit to affect the level of money supply in the money market.

Conclusion of Credit Creation In A Banking Sector

* The banking sector, under a fractional reserve system, can create loans and hence money supply by the existence of excess reserve. ***Demand deposits are also money (M_1) !***
* The central bank can affect the money supply by an open market operation with multiple contraction (by selling bond) or multiple expansion (by redeeming back the bond) of credits or loans.
* The discount rate affects the decision of the commercial banks to borrow and its level of interest earned.
* The central bank can affect the money supply by varying the required reserve ratio in theory.

4 The Banking Multiplier With Cash Drain

The public, in reality, often holds a certain amount of the currency out of their demand deposits for many reasons.

The currency-deposit ratio (c) describes the behaviour of the public on cash holding as well as the degree of liquidity due to their traditional payment habit and any seasonal fluctuation on the use of cash.
The degree of liquidity also reflects their saving habit.

Mathematical Formula :

$H \equiv C + R$ and $\Delta H = \Delta C + \Delta R$

$\Delta H = c.\Delta D + r.\Delta D$ because $\Delta C / \Delta D = c$; $\Delta R / \Delta D = r$

$\Delta H = (c + r).\Delta D$

$$\Delta D = \frac{1}{(c + r)} . \Delta H \qquad \text{OR :} \qquad D = H / (c + r)$$

As a change in deposit leads to a change in the money supply, in this case, the money multiplier = $1 / (c + r)$ and it is greater than 0 provided that c and r are both smaller than 1.

$M_S = C + D = c.D + D = (1 + c).D$ and $$M_S = \frac{(1 + c)}{(r + c)} . H$$

The economic interpretation for the formula is that for every increase in H, the public holding of currency as well as the total amount of deposits will be raised by a certain percent.

The Determinants of The Money Supply
Based on the formula above, the level of money supply is affected by the followings :

* H which is the so-called monetary base - the base of all money stock in a monetary economy.
* r which governs the bank's power to make loans.
* c which indirectly affects the amount of deposits flow into the banking sector again through the process of credit creation.

Therefore, the central bank through the control of H and r , executes the monetary policy (together with the determination of the amount of currency issue and the open market operation).

The Role of Government In The Process of Money Supply In H.K.

* It is responsible for the note-issuing mechanism in H.K.
* It **avoids** budget deficits and if happens, to be financed by fiscal reserves as far as possible.
  The fiscal policy is **neutral** to the money supply. The government avoids to borrow money from banks.
* The government plays **no** role in allocating bank loans to various sectors of the industries - a firm role in the laissez-faire principle.

V Central Bank & Monetary Policy

The central bank is a government bank to supervise the whole banking system. It is responsible for the following :

* the issue of banknote or paper money and the control of foreign reserves & gold ;
* the role of a government bank, i.e. a financial adviser & consultant to handle all government expenditures & revenues ;
* the supervision and control of **all** commercial banks - the bank of all other banks ;
* the clearing house of the commercial banks ;
* the lender of last resort in bank crisis or any harsh situations.

Monetary policy refers to the methods taken by the central bank to control the money supply. They include :

Open Market Operation
Central bank may buy bonds in the open market by **writing a cheque of itself**. When the public deposits the cheque into a commercial bank, the central bank simply credits the amount of deposits of that commercial

bank in the account of the central bank. High-powered money is increased with a **stroke of the pen.** Money supply is correspondingly increased.

Discount Rate

It affects the action of the commercial banks in borrowing money from the central bank, thus affecting the level of money supply. In H.K. it is the prime rate and the inter-bank rate that matter.

Forex Market Intervention

If the central bank buys foreign currencies to affect the exchange rate, the high-powered money is increased.

Legally Required Reserve Ratio

It affects the money multiplier in the process of credit creation.

Issue of Currency

The Limitation of Monetary Policy

In theory, the relative effectiveness and limitation of the monetary and fiscal policies will be mentioned in the IS-LM model. In practice, there are several types of lags (time lag, legislative lag, execution lag etc.) in launching the policies.

Besides, the central bank needs to take into account many non-economic factors so that it is very difficult for the central bank to have a rule on its monetary policy in practice.

The central bank cannot determine **both** the market interest rate and the level of money stock to maintain an equilibrium in the money market. As the interest rate is determined by demand and supply, it varies with the level of demand when the money supply is fixed.

If interest rate is fixed, money supply cannot be fixed when demand changes. Otherwise, the equilibrium could not be kept. Once the interest rate is fixed, the central bank loses control over the level of money supply.

Todays, most governments practise a policy mix - the use of fiscal and monetary policy together with various degrees of emphasize on their own economic and political targets.

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