

UNIT- 4: EXCHANGE RATE MECHANISM

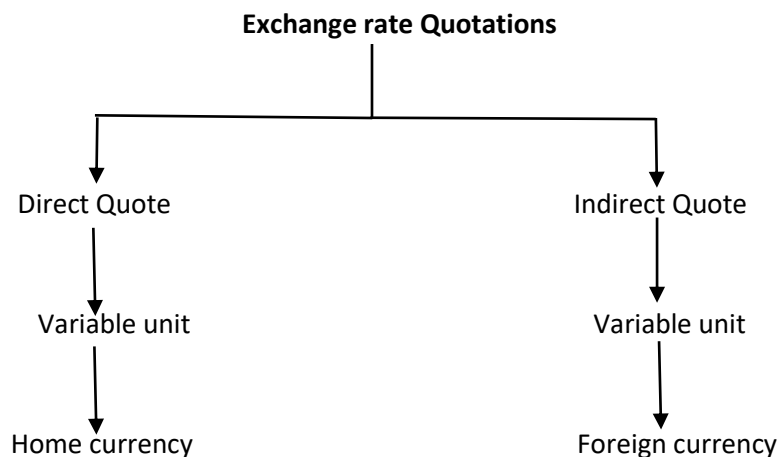
The exchange of foreign currencies into the home currency is carried out by exchanging some units of the home currency for some units of the foreign currency. The ratio of exchange between the two currencies is known as the **foreign exchange rate**, and the expression of this ratio or the rate of exchange is known as the **foreign exchange quotation**.

Exchange Rate Quotations

There are two methods for quoting the exchange rate between currencies, namely, the direct method and the indirect method. Normally, two rates are quoted for foreign exchange transactions, namely, the buying rate and the selling rate. Again, foreign exchange transactions may take place in the spot market or in the forward market; separate rates may be applicable in the spot market and the forward market, known as spot rate and forward rate, respectively.

Direct method and indirect methods of quotations

There are two ways of quoting the exchange rates between the home currency and any foreign currency - the direct method and the indirect method.



Direct method or Quote: The direct method expresses the number of units of the home currency required to buy one unit of a foreign currency. The exchange quotation which gives the price for the foreign currency in terms of the domestic currency is known as direct quotation. In direct quotation, the unit of the foreign currency is kept constant and change in price number of units of the domestic currency equivalent to one foreign currency. Direct quotations are also known as American quotes or home currency quotation.

Direct quotation: 1 foreign Currency unit = x home Currency units

Example: 1 US \$ = Rs.43.5125

This means that Rs.43.5125 are needed to buy one US dollar. In other words, it is the home currency price of a foreign currency. When the exchange rate is expressed up to four decimal places, the last decimal place is known as a **point**. If the dollar-rupee exchange rate moves from Rs.43.5125 to Rs.43.5128, the rate is said to have moved up by three points.

Indirect method or Quote: The Indirect Method of quoting exchange rates expresses the number of units of a foreign currency that can be bought with one unit of the home currency or, alternatively, with one hundred units of the home currency. In this method, the rate is quoted in terms of the number of units of the foreign Currency for one unit of the domestic Currency. In indirect quotation, the unit of domestic currency is kept constant and the change in the price of the currency is indicated by varying units of the foreign currency for fixed sum of domestic currency. Indirect quotation is also known as foreign currency quotation or European Terms.

Indirect quotation: 1 home Currency unit = x foreign Currency units

Example:

Re.1 = US \$ 0.022982

Rs.100 = US \$ 2.2982

This means that Rs. 100 are needed to buy US \$ 2.2982. The indirect quote is the reciprocal of the direct quote and vice versa. In India, all the banks are now required to quote foreign exchange rates in the direct method.

For converting the direct quote into indirect quote or indirect quote into direct quote, the following formulas will be used:

$$\text{Indirect quote} = \frac{1}{\text{direct quote}}$$

$$\text{Direct quote} = \frac{1}{\text{indirect quote}}$$

Bid and Ask/offer rate (or) Buying and selling rates:

Foreign exchange dealers usually quote two prices, one for buying and the other for selling the foreign currency. The buying rate is termed the **bid rate** While the selling rate is termed the **offer or ask rate**. The offer rate would be higher than the bid rate. The difference between the offer rate and bid rate is termed the **bid-offer spread** and it is one of the sources of profit for the forex dealers.

In the direct method of quotation, the first rate quoted would be the buying rate (or bid rate) and the second rate quoted would be the selling rate (or offer rate). The two rates for dollar-rupee exchange may be 1 US \$ = Rs. 43.35 - 43.66. This means that the dealer quoting the rates is prepared to buy one US dollar for Rs. 43.35 but he is prepared to sell one US dollar only for Rs. 43.66. By buying US dollars at Rs. 43.35 and selling them at Rs. 43.66. the dealer makes a profit of Re. 0.31 or 31 paise (Rs. 43.66 - Rs. 43.35) per dollar traded.

The Spread percentage is calculated using the following formula:

$$\text{Bid-ask spread(\%)} = \frac{\text{Ask price} - \text{bid price}}{\text{ask price}} \times 100$$

The size of spread in respect of a currency depends upon many factors, like its strength, the type of transaction, and its supply and demand position with the transacting bank. The spread is smaller in a widely traded currency because it is easy for the banks to transact in such a currency. In a scarcely traded currency, the banks have to face some difficulty, and hence the spread is large.

Spot market and forward market

The foreign exchange market consists of a spot market and a forward market. In the spot market, deals are arranged immediate delivery. Here, settlement takes place on the second working day after the date of transaction. In the forward market, the purchase or sale of a foreign currency is arranged today at an agreed exchange rate, but with delivery scheduled to take place some time in the future. usually one, three, six or twelve months from the date of transaction. Forward markets are available for most of the major currencies of the World. About 40 to 50% of foreign currency transactions involve forward Deal maturing within one to three months.

In the forward market, parties enter into forward foreign exchange contracts. A forward foreign exchange contract is an agreement between two parties to exchange one currency for another at some fixture date, with the exchange rate, the delivery date and the quantity involved being fixed at the time of the agreement. Such forward exchange contracts are drawn up between banks and their clients or between two banks. "It would be difficult to overstate the importance of the forward market for foreign exchange. The forward market is valuable for reducing risks arising from changes in exchange rates when importing, exporting, borrowing, and investing. Forwards are also used by speculators."

Spot rate and forward rate

The exchange rate between two currencies is the number of units of one currency per unit of the other currency. The exchange rate determined in the spot market is known as the **spot exchange rate**. These rates are determined by the demands for and supplies of the currencies being exchanged in the global foreign exchange market. The exchange rate agreed upon by the parties to a forward foreign exchange contract Where the foreign currency is to be delivered in the future is known as the **forward exchange rate** which would be different from the spot exchange rate.

Forward premium and forward discount

The forward rate is the rate that is contracted today for the exchange of currencies at a specified date in the future. The forward rate is likely to be either higher or lower than the spot rate. The difference between the forward rate and the spot rate is known as the **forward rate differential or forward margin or swap points**.

The forward margin may be either at 'premium' or at 'discount'.

- ❖ If the forward rate is higher than the existing Spot rate in the Forward market, the currency trading at a forward premium.
- ❖ If the forward rate is lower than the existing Spot rate in the Forward market, the currency trading at a forward discount.

The forward premium or forward discount can be expressed as an annualized percentage deviation from the spot rate by using the following formula:

$$\text{Forward premium (discount)} = \left(\frac{\text{forward rate} - \text{spot rate}}{\text{spot rate}} \right) \left(\frac{360 \text{ or } 12}{n} \right) \times 100$$

Where n is the maturity period of the forward contract expressed in number of days or months.

Cross rates

An exchange rate between two currencies that is derived from the exchange rate of those currencies with a third currency is known as a cross rate. The exchange rate between two currencies is based on the demand and supply of the respective currencies. Exchange rates are readily available for currencies which are frequently transacted. However, exchange rates may not be available for currencies which have only limited transactions. In such a situation, the home currency can be converted into a common currency such as the US \$ or the Euro, and the common currency can then be converted into the desired currency. This is referred to as cross rate trading Which is a three-way transaction involving three currencies, namely, the home currency, the common currency and the desired currency.

Determination of cross rate with single quote by using chain rule

Example

$$\text{USD 1} = \text{Rs.39.50}$$

$$\text{USD 1} = \text{SFr 1.8000}$$

The rate for swiss francs in terms of rupees can be calculated by “chain rule” as follows

$$? \text{ Rs.} = \text{SFr 1} \dots\dots\dots (1)$$

$$\text{SFr 1.8000} = \text{USD 1} \dots\dots\dots (2)$$

$$\text{USD 1} = \text{Rs.39.50} \dots\dots\dots (3)$$

It should be noted that the currency which appears as the second item (right hand side) in the first equation appears as first item (left-hand side) in the next equation. Thus swiss franc appears on the right-hand side in the first equation and left-hand side in the second equation. US dollar appears on the right-hand side equation appears on the left-hand Side in the third equation.

$$\text{Cross rate} = \frac{\text{product of the right hand side}}{\text{product of the left hand side}}$$

Determination of cross rate with two-way quote

$$\text{Cross rate for bid rate of desired currency} = \frac{\frac{\text{bid rate of the common currency}}{\text{(expressed in units of the home currency)}}}{\frac{\text{offer rate of the common currency}}{\text{(expressed in units of the desired currency)}}}$$

$$\text{Cross rate for offer rate of desired currency} = \frac{\frac{\text{offer rate of the common currency}}{\text{(expressed in units of the home currency)}}}{\frac{\text{bid rate of the common currency}}{\text{(expressed in units of the desired currency)}}}$$

Forward rate quotations

Quotations for forward rates can be made in two ways. they can be made in terms of the exact amount of local currency at which the trader quoting the rates will buy and sell a unit of foreign currency. This is called '**outright rate**' and it is used by traders in quoting to customers. The forward rates can also be quoted in terms of points of premium or discount on the spot rate, which is used in interbank quotations. To find the outright forward rates when premium or discount on quotes of forward rates are given in terms of points, forward premium points have to be added to the spot rate, while forward discount points are deducted from the spot rate.

Forward margin in ascending order = premium; add to spot rate
Forward margin in descending order = discount; deduct from spot rate

Example

	Spot	1-month	3-months	6-months
FFr/US\$	5.2321/2340	25/20	40/32	20/26

NOMINAL, REAL AND EFFECTIVE EXCHANGE RATES

Nominal and Real Exchange Rates

Nominal exchange rate represents the ratio between the value of the two currencies at a particular point of time. The real exchange rate is the inflation-adjusted nominal exchange rate. The relationship between nominal exchange rate (e) and the real exchange rate(e_r) can be written in the form:

$$e_r = e \frac{p}{p^*}$$

Where p and p^* are domestic and foreign price indices.

Effective Exchange Rates

Effective exchange rate is the measure of the average value of a currency relative to two or more other currencies. The relationship between an effective exchange rate and the nominal exchange rate is similar to that between the general price index and the price of an individual commodity.

Steps involved in the Construction of an effective exchange rate index:

1. The first step is to select the currency for the basket, for it is not feasible to include all the currencies of the world only those currencies are included that matter significantly in the country's trade.
2. The second step is to find out the weight of different currencies in the basket. This is because different currencies do not carry the same importance.

i.e. $\frac{\text{total trade value of individual country}}{\text{total trade value of all countries}}$

3. The third step in this process is to find out the exchange rate index.

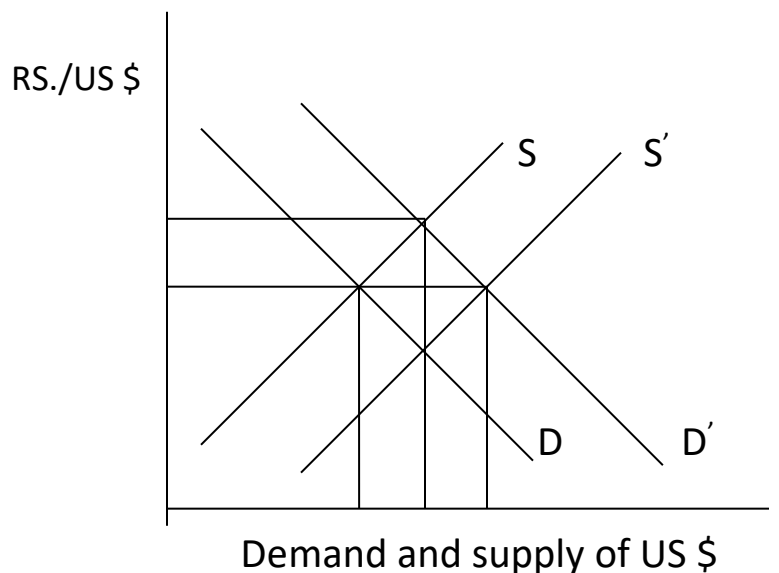
i.e. Exchange rate index = $\frac{\text{new exchange rate}}{\text{old exchange rate}} \times 100$

4. Finally to calculate effective exchange rate by multiplying weights of Respective country with respective exchange rate index.

i.e. weight X exchange rate index

Determination of Exchange Rate in the spot market

The exchange rate between two currencies in a floating-rate regime is determined by the interaction of demand and supply forces. The exchange rate between the rupee and the US dollar depends upon the demand for the US dollar and its availability or supply in the Indian foreign exchange market.



Exchange Rate Determination

In the above Figure, the exchange rate designated by the price of the US dollar (foreign currency) in terms of the rupee, is shown on the vertical axis, and the supply of, and demands for, the US dollar is shown on the horizontal axis. The demand curve slopes downward to the right because the higher the value of the US dollar, the costlier are the Indian imports and the importers curtail the demand for imports and consequently the demand for foreign currency falls. Similarly, a higher value of the US dollar makes Indian export cheaper and thereby stimulates the demand for export. The supply of the US dollar increases in the form of export earnings and the supply curve of the US dollar moves upward to the right with a rise in its value. The equilibrium exchange rate is reached where the supply curve intersects the demand curve at Q_1 . This rate as shown in the figure is Rs.40/US \$.

If demand for import rises owing to some factors at home, the demand for the US dollar will rise to D' and intersect the supply at Q_2 , the exchange rate will then be Rs. 42/US \$. But if export rises as a result of decline in the value of the rupee and the supply of the dollar increases to S' , the exchange rate will again be 40/US \$. Quite evidently, the frequent shifts in the demand and supply conditions cause the exchange rate to also adjust frequently to a new equilibrium.

Factors influencing Exchange rate

1. Flow of funds on the current and capital accounts:

A country with current account deficit experiences a depreciation of its currency. It is because there is demand for foreign currency to make payment for imports. On the contrary, a current account surplus country possesses a large supply of foreign exchange with the result that the country experiences an appreciation of its currency. However, the current account alone is not responsible for this state of affairs. Capital account flows help change the situation. Larger inflow on the capital account leads to an appreciation of the currency.

2. Impact of Inflation

Inflation in the country would increase the domestic price of the commodities. With increase in prices exports may decline because the price may not be competitive. With the decrease in exports the demand for the currency would also decline; this in turn would result in the decline of external value of the currency. It may be noted that it is the relative rate of inflation in the two countries that cause changes in exchange rates.

3. Interest rate

The interest rate has a great influence on the short-term movement of capital. When the interest rate at a centre rises, it attracts short-term funds from other centres. This would increase the demand for the currency at the centre and hence its value. Rising of interest rate may be adopted by a country due to tight money conditions or as a deliberate attempt to attract foreign investment. Whatever be the intention, the effect of an increase in interest rate is to strengthen the currency of the country through larger inflow of investment and reduction in the outflow of investments by the residents of the country.

4. combined effect of interest and inflation

The PPP theory (relative version) states that the exchange rate between two currencies changes to reflect the inflation rate differential between the two countries, whereas the Fisher effect states that the inflation rate differential between the countries leads to differential interest rates

across countries. According to the Fisher effect theory, the interest rate differential between two countries equals the inflation rate differential between these two countries. On considering these two theories together, it may be concluded that the exchange rate movement equals the interest rate differential between the countries concerned.

5. Intervention by Monetary Authorities

When the market forces do not influence the exchange rate in the country's favour, then its monetary authorities intervene in the foreign exchange market through buying and selling of foreign currency and influence the exchange rate

6. Participants' Psyche and Bandwagon Effect

Yet the other factor influencing the exchange rate is the psychology of the participants in the foreign exchange market. When a speculator being dominant in the foreign exchange market expects a drop in the value of a particular currency, he begins selling it forward. The other speculators follow the lead. Ultimately, the currency depreciates even if the inflation and interest rates are in a position to push up the value of the currency.

EXCHANGE RATE DETERMINATION IN FORWARD MARKET

The determination of exchange rate in a forward market finds an important place in the theory of Interest Rate Parity (IRP). It is, therefore, relevant to explain this theory and how it helps in exchange rate determination in a forward market and how the arbitrageurs behave when the forward rate differential is not equal to the interest rate differential.

Interest Rate Parity Theory

The IRP theory states that equilibrium is achieved when the forward rate differential is approximately equal to the interest rate differential. In other words, Forward rate differs from the spot rate by an amount that represents the interest rate differential.

Determination of forward exchange rate

On the basis of the IRP theory, the forward exchange rate can easily be determined. Mathematically, the relationship can be expressed as

$$F = S \left(\frac{1+r_h}{1+r_f} \right)$$

Where

F = forward exchange rate for a specified future period.

S = spot exchange rate

r_f = nominal interest rate on a security with a maturity equal to that of the forward exchange rate and denominated in a foreign currency

r_h = nominal interest rate on a security with a maturity equal to that of the forward exchange rate and denominated in a domestic currency

covered interest arbitrage

where there is no parity between the forward rate differential and interest rate differential, opportunities for arbitrage will arise. Arbitrageurs will move funds from one country to another for taking advantage of the disparity. In an efficient market, with free flow of capital and negligible transaction cost, continuous arbitrage will soon restore parity between the forward rate differential and interest rate differential. This type of arbitrage is known as **covered interest arbitrage**.

$$\text{Interest rate differential} = \left(\frac{1+r_h}{1+r_f} \right) - 1$$

$$\text{Forward rate differential} = \frac{F - S}{S}$$

uncovered interest arbitrage

When there is disparity between the future spot rate differential and the interest rate differential, opportunities for arbitrage will rise. such arbitrage is referred to as **uncovered interest arbitrage**.

$$\text{Interest rate differential} = \left(\frac{1+r_h}{1+r_f} \right) - 1$$

$$\text{Future spot rate differential} = \frac{S_{e+1} - S}{S}$$

Where s_{e+1} is the expected future spot rate

Theories of determining exchange rate

The following four theories explain different aspects of exchange rate behaviour:

1. The Purchasing Power Parity (PPP) theory
2. The Fisher Effect (FE) theory
3. The International Fisher Effect (IFE) theory
4. The Interest Rate Parity (IRP) theory

These theories are useful in explaining the exchange rate behaviour under the floating exchange rate system. They make the following three assumptions:

- a. Law of one price:** It assumes that the prices of identical tradeable goods and financial assets would be Within transaction cost of equality all over the world.
- b. Free role of arbitrageurs:** Arbitrageurs are free to take advantage of any disparity in prices anywhere in the world.
- c. Unrestricted movement of goods or financial assets:** There are no restrictions for movement of goods and financial assets across countries.

1.The Purchasing Power Parity (PPP) theory

The Purchasing Power Parity theory was put forward by Gustav Cassel, a Swedish economist. The theory states that the rate of exchange between any two currencies is determined by their purchasing power. The purchasing power of a currency is equivalent to the amount of goods and services that can be purchased with one unit of that currency.

The Purchasing Power Parity theory has two versions-an absolute Version and a relative version. The **absolute version** of the theory states that the exchange rate between the currencies of two countries would equal the ratio of the price levels of the two countries, measured by the respective consumer price indices. Thus,

$$e_0 = \frac{p_h}{p_f}$$

where e_0 = current exchange rate

P_h = price level in the home country

P_f = price level in the foreign country

According to the **relative version** of the PPP theory, one of the factors leading to change in exchange rates between currencies is inflation in the respective countries. The change in exchange rates would equal the inflation rate differential between the two countries.

$$e_t = e_0 \left[\frac{1+i_{h,t}}{1+i_{f,t}} \right]^t$$

where

e_t = expected exchange rate at time period t

e_0 = current exchange rate

$i_{h,t}$ = expected domestic inflation rate at time period t

$i_{f,t}$ = expected foreign country inflation rate at time period t

2.The Fisher Effect (FE) theory

The Fisher effect deals With the Phenomenon of varying interest rates in different countries. interest is essentially the reward for waiting. Irwin Fisher, an American economist, tried to explain this phenomenon. His theory is known as the Fisher effect (sometimes also referred to as fisher's closed proposition or hypothesis).

Fisher makes a distinction between the two rates of interest, namely the interest rate and the nominal interest rate. The **real interest rate** is the rate of interest required by the investor as reward for waiting. The **nominal interest rate** is the required real rate of return on investment plus the expected rate of inflation. countries experiencing higher inflation rates would have higher nominal Interest rates and Vice versa. Thus, the varying interest rates in different countries are due to the inflation rate differential between the countries. mathematically, the fisher effect can be expressed as

$$r = a + i + ai$$

where

r = nominal interest, rate

a = required real interest rate

i = expected rate of inflation

The Fisher effect explains the interest rate variations across countries as the effect of inflation rate differentials between countries. The interest rate differential between any two countries equals the inflation rate differential

between these two countries. Mathematically, it can be expressed as

$$\frac{1 + r_{h,t}}{1 + r_{f,t}} = \frac{1 + i_{h,t}}{1 + i_{f,t}}$$

3.The International Fisher Effect (IFE) theory

The PPP theory (relative version) states that the exchange rate between two currencies changes to reflect the inflation rate differential between the two countries. According to the Fisher effect theory, the interest rate differential between two countries equals the inflation rate differential between these two countries. On considering these two theories together, the International Fisher effect theory states that the anticipated change in the exchange rate between two currencies would equal the inflation rate differential between the two countries Which, in turn, would equal the nominal interest rate differential between these two countries. This proposition is known as fisher's open proposition. Mathematically, this relationship can be express

$$e_t = e_0 \left(\frac{1 + r_{h,t}}{1 + r_{f,t}} \right)$$

4.Interest Rate Parity Theory

The IRP theory states that the forward rate differential in exchange rate of two currencies would equal the interest rate differential between the two countries. In other words, Forward rate differs from the spot rate by an amount that represents the interest rate differential. On the basis of the IRP theory, the forward exchange rate can easily be determined. Mathematically, the relationship can be expressed as

$$F = S \left(\frac{1 + r_h}{1 + r_f} \right)$$

Where

F = forward exchange rate for a specified future period.

S = spot exchange rate

r_f = nominal interest rate on a security with a maturity equal to that of the forward exchange rate and denominated in a foreign currency

r_h = nominal interest rate on a security with a maturity equal to that of the forward exchange rate and denominated in a domestic currency