within narrow limits and for practical purposes this rate can be regarded as fixed or stable.

12.9.2. Rate of Exchange under Paper Standard

If both the trading countries are on paper standard the rate of exchange cannot be determined through gold. There are two theories regarding how the rate of exchange is determined in the case of paper standard. One is known as the purchasing power parity theory and the other is known as the demand-supply theory. Let us discuss these theories one by one.

12.9.2.A. Purchasing Power Parity Theory

The purchasing power parity theory was propounded by Cassel, a Swedish economist. This theory has two versions : absolute version and relative version. The absolute version is concerned with the determination of the rate of exchange while the relative version is concerned with the determination of the change in the rate of exchange. According to the absolute version, the rate of exchange between two currencies is determined by comparing the internal purchasing powers of the two currencies in the respective countries. The internal purchasing power again depends on the internal price level. As an example, suppose that the purchasing power of five rupees in India is equal to the purchasing power of one dollar in the USA. This means that the same amount of commodities can be purchased either by spending five rupees in India or by spending one dollar in the USA. Then according to the purchasing power parity theory, one dollar = five rupees. The absolute form of the purchasing power parity theory can be expressed as follows :

$$\frac{1 \text{ dollar}}{1 \text{ rupee}} = \frac{\text{purchasing power of dollar}}{\text{purchasing power of rupee}}$$

$$= \frac{\text{price level in India}}{\text{price level in the USA}}$$

How the rate of exchange is determined on the basis of purchasing power parity can be explained with the help of one example. Suppose trade is taking place between India and the USA and suppose also that the rate of exchange of 1 dollar = 5 rupees has been established on the basis of purchasing power parity theory. Now suppose that the price levels remain the same in both the countries but the rate of exchange in the foreign exchange market becomes 1 dollar = 10

rupees. As a result the US traders will try to convert more dollars into rupees. This is so because they can now get 10 rupees per dollar in place of 5 rupees per dollar and with the same price level they can purchase more commodities from the Indian market. Hence the demand for Indian rupee will increase in the foreign exchange market and the value of Indian rupee in terms of US dollars will increase. This will continue until the rate of exchange of 1 dollar = 5 rupees is re-established. Thus in the long run the rate of exchange between rupee and dollar is determined by the purchasing power parity.

In the relative version it is stated that the change in the rate of exchange is obtained by comparing the changes in the price levels of the two countries. The corresponding formula can be stated as follows :

New rate of exchange = rate of exchange in the base year $\times \frac{\text{domestic price index}}{\text{foreign price index}}$. This formula can be explained with the help of an example. Suppose that with 1971 as the base year the price index in India in 1991 is 400 while the corresponding price index in the USA is 200. Suppose also that in 1971 the rate of exchange on the basis of purchasing power parity is 1 dollar = 5 rupees. Then the new rate of exchange in 1991 will be 1 dollar $= 5 \text{ rupees} \times \frac{400}{200} = 10$ rupees. When the price index in India is 400 and the price index in the USA is 200 it means that the purchasing power of the Indian rupee has halved compared to the purchasing power of the US dollar. As a result of fall in the purchasing power of Indian rupee, the value of Indian rupee in terms of foreign currency will also fall. This happens when the rate of exchange is established at 1 dollar = 10 rupees in place of 1 dollar = 5 rupees.

The main merit of the purchasing power parity theory is that in this theory the determination of the rate of exchange has been linked with the purchasing powers of the two currencies. Just as the internal value of a currency depends on the price level, in the same way the external value should also be determined by the price level. But this theory has also some limitations as a result of which this theory has now been discarded. Some of the limitations are as follows.

First, some economists argue that comparison of purchasing powers is not possible because the same commodities are not consumed in the two countries.

Second, this theory requires free movement of goods, no trade controls and no transport costs. This theory fails when trade controls exist and there are costs such as freight and taxes that are added to the cost of goods.

Third, this theory does not take into account the role of capital movements, changes in international demand conditions, etc. in determining the rate of exchange.

Fourth, the purchasing power parity theory does not specify the commodities which should be included in calculating the purchasing power of any currency. If the purchasing power is determined on the basis of commodities which are traded between the two countries then this theory becomes a truism devoid of any operational significance.

Fifth. Keynes argues that it is not true to say that the rate of exchange changes due to change in the price level. Rather, the converse is true, that is, the price level itself changes due to change in the rate of exchange.

For all these limitations, the purchasing power parity theory is not completely acceptable. According to modern theory, the price of any currency, like the price of any commodity, is determined by the demand and supply of that currency. The demand and supply of any currency is again determined by the demand and supply of exports and imports. Thus the rate of exchange is determined by the forces of demand and supply.

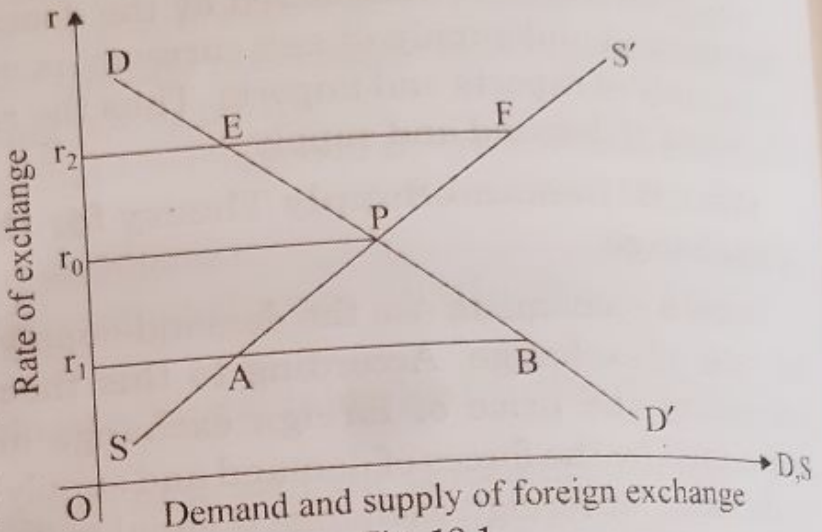
12.9.2.B. Demand-Supply Theory for the Determination of the Rate of Exchange

Modern economists use the demand-supply theory for the determination of the rate of exchange. According to this theory, like the price of any other commodity the price of foreign exchange or the rate of exchange is also determined by the forces of demand and supply. That rate of exchange at which the demand for foreign exchange is equal to its supply is called the equilibrium rate of exchange.

Let us suppose that trade takes place between India and the USA. Then let us see how the rate of exchange between the dollar and the rupee is determined by the forces of demand and supply. In the foreign exchange market the price of dollar in terms of rupees will be determined by the supply of and demand for dollars to be traded against rupees. The demand for dollars will arise in order to pay to the USA for the imports made by Indians from the USA. Hence the demand for dollars will arise from the debit items in the balance of payments of India. Similarly, the supply of dollars will arise as a result of exports of Indian goods to the USA. Thus the supply of dollar comes from the credit items in the balance of payments of India. Now if imports of India from the USA exceed the exports of India to the USA in value terms, the supply of dollar will be less than the demand for dollar in the foreign exchange market where dollars will be exchanged for rupees. As a result there will be an excess demand for dollars in the foreign exchange market. The price of dollar will increase in terms of rupees or the price of rupee will fall in terms of dollars. In other words, if there is a deficit in the balance of payments of India the price of rupee in terms of dollars will fall. In the same way, if there is a surplus in the balance of payments of India, the supply of dollars to be exchanged against rupees will be greater than the demand for dollars and the price of dollar in terms of rupees will fall. On the other hand, if there is an equilibrium in the balance of payments of India vis-a-vis the USA, the demand for dollars will be equal to supply and the equilibrium rate of exchange will be determined. Thus, according to the demand-supply theory, that rate of exchange which brings about equilibrium in the balance of payments will be called the equilibrium rate of exchange.

As in the commodity market, in the foreign exchange market also we can get a demand curve for foreign exchange and a supply curve of foreign exchange. The equilibrium rate of exchange will be determined at the intersection point of these demand and supply curves. This is explained with the help of the following diagram (fig.12.1) where we plot demand and supply of dollars on the horizontal

axis and the price of dollar in terms of rupees on the vertical axis. The price of dollar in terms of rupees is nothing but the rate of exchange between rupee and dollar. In the figure DD' is the demand curve for dollars and SS' is the supply curve of dollars. It is assumed that the demand curve is downward sloping and the supply curve is upward rising. They intersect at point P where the rate of exchange is Or_0. Hence Or_0 is the equilibrium rate of exchange. Let us see what happens if the rate of exchange is greater than or less than Or_0. Suppose that the rate of exchange is Or_1 which is less than Or_0. At this rate of exchange the demand for dollars will be r_1B while the supply of dollars will be r_1A. Hence demand will exceed supply and AB will be the amount of excess demand. As a result of excess demand the price of dollars in terms of rupees will increase. This will continue until the rate of exchange reaches Or_0. Similarly, if the rate of exchange is Or_2 there will be an excess supply of dollars equal to EF. Due to the pressure of excess supply the price of dollar in terms of rupees will fall. This will also continue until the rate of exchange reaches Or_0. In this way if the rate of exchange is flexible it will settle at that level where the demand for foreign exchange is equal to its supply. Thus in the demand-supply theory the equilibrium rate of exchange is determined by the forces of demand and supply.



Demand and supply of foreign exchange
Fig. 12.1

We have seen that the demand for foreign exchange arises from the debit items in the balance of payments while the supply of foreign exchange arises from the credit items in the balance of payments. The demand-supply theory states that the rate of exchange depends on the condition of balance of payments position of the country. If there is a deficit or a surplus in the balance of payments the rate of exchange will change. If there is a deficit in the balance of payments the demand for foreign exchange will exceed its supply and the price of foreign currency in terms of domestic currency will increase. This means devaluation of the domestic currency. In the same way when there is a surplus in the balance of payments the domestic currency will appreciate in value in terms of foreign currency. If there is equilibrium in the balance of payments the demand for foreign exchange will be equal to its supply and the rate of exchange is in equilibrium.

Or_0. Hence Or_0 is the equilibrium rate of exchange. Let us see what happens if the rate of exchange is greater than or less than Or_0. Suppose that the rate of exchange is Or_1 which is less than Or_0. At this rate of exchange the demand for dollars will be r_1B while the supply of dollars will be r_1A. Hence demand will exceed supply and AB will be the amount of excess demand. As a result of excess demand the price of dollars in terms of rupees will increase. This will continue until the rate of exchange reaches Or_0. Similarly, if the rate of exchange is Or_2 there will be an excess supply of dollars equal to EF. Due to the pressure of excess supply the price of dollar in terms of rupees will fall. This will also continue until the rate of exchange reaches Or_0. In this way if the rate of exchange is flexible it will settle at that level where the demand for foreign exchange is equal to its supply. Thus in the demand-supply theory the equilibrium rate of exchange is determined by the forces of demand and supply.

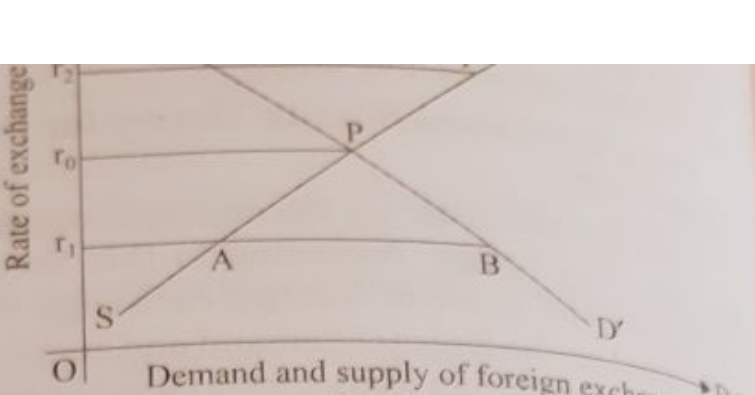


Fig. 12.1

We have seen that the demand for foreign exchange arises from the debit items in the balance of payments while the supply of foreign exchange arises from the credit items in the balance of payments. The demand-supply theory states that the rate of exchange depends on the condition of balance of payments position of the country. If there is a deficit or a surplus in the balance of payments the rate of exchange will change. If there is a deficit in the balance of payments the demand for foreign exchange will exceed its supply and the price of foreign currency in terms of domestic currency will increase. This means devaluation of the domestic currency. In the same way when there is a surplus in the balance of payments the domestic currency will appreciate in value in terms of foreign currency. If there is equilibrium in the balance of payments the demand for foreign exchange will be equal to its supply and the rate of exchange is in equilibrium.

12.10. Spot Market and Forward Market

Depending on the nature of the transaction we can distinguish between two types of transactions — spot transaction and forward transaction. In a spot transaction the seller of foreign exchange has to deliver the foreign exchange he has sold 'on the spot' (within two days). Likewise the buyer of foreign exchange will immediately receive the foreign exchange he has bought. The market in

which spot transactions take place is called the spot market and the rate of exchange quoted in the spot market is called the spot rate. In the spot market, foreign exchange is bought or sold at the current price of foreign exchange for immediate delivery. The current price at which foreign exchange is bought or sold is called the spot rate for such transactions. There is also another important market for foreign exchange, namely, forward market. In the forward market when the contract is signed the seller agrees to sell a certain amount of foreign exchange to be delivered at a future date at a price agreed upon in advance. Similarly, the buyer agrees to buy a certain amount of foreign exchange at a future date and at a predetermined price. The rate of exchange determined in the forward market is called the forward rate. Usually the forward contracts are on a three month basis, though both shorter and longer contract periods exist.

In the absence of a forward market, exporters, importers and international investors may be exposed to risks arising from unfavourable changes in the price of foreign exchange — the spot rate in the future. Forward markets protect current transactions against such changes in the spot rate.

Spot and forward markets are intimately linked together in at least three ways : the first way is by hedging or covering ; the second way is *via* interest arbitrage and the third way is by speculation. We consider them one by one.

12.10.1. Hedging or Covering in the Foreign Exchange Market

Hedging means covering risk arising from changes in the exchange rate. How risk can be avoided through forward market can be explained as follows. Suppose an Indian exporter has received an order of exporting any product to the USA. When the contract is signed the spot rate is $1 = Rs.40. Suppose also that as per terms of the contract the exporter will receive the value of export after 90 days. If the value of commodities exported is Rs. 4000 and if the transaction is a spot transaction the exporter will earn $100. But it is not a spot transaction and the exporter will receive value after 90 days and the spot rate on that date is uncertain. Hence even if the value of the commodities remains fixed at Rs.4000 the exporter can get more than $100 or less than $100 depending on the rate of exchange prevailing on the date of settlement. If the rate of exchange on the date of settlement is $ 1 = Rs.45, the exporter will get Rs. (4000 ÷ 45) or $88.89 and if the rate of exchange on the date of settlement is $1 = Rs. 35, the exporter will get Rs. (4000 ÷ 35) or $114.29. If rupee depreciates in value the exporter will receive less value in dollar terms and if rupee appreciates in value the exporter will receive more value in terms of dollar. Thus in the case of forward contract there is an uncertainty about the future rate of exchange and the exporter has to bear this uncertainty arising from changes in the rate of exchange. This uncertainty can be avoided through forward market. If the forward rate is $ 1 = Rs.41, then the exporter can get Rs. (4000 ÷ 41) or $ 97.56 with certainty after 90 days whatever may be the spot rate on that date.

The forward rate may be greater than the spot rate or may be less than the spot rate. If the forward rate of dollar is greater than the spot rate, then it is said that there is a premium on dollar. On the other hand, if the spot rate is

greater than the forward rate then it is said that dollar is at a discount. If the interest rates in the two countries differ, this gives rise to an interest arbitrage and a difference in spot and forward rates. The relation between the spot rate and the forward rate can be expressed in terms of the following formula :

$R_f = \frac{1+i_d}{1+i_f} \cdot R_s$ where R_f = forward rate, R_s = spot rate, i_d = rate of interest in the domestic country, i_f = rate of interest in the foreign country. To illustrate, let us suppose that R_s = Rs. 40 per dollar, i_d = rate of interest in India = 12% p.a. and i_f = rate of interest in the USA = 6% p.a. If the period of forward transaction is 3 months, then $i_d = 3\%$ and $i_f = 1.5\%$ and $R_f = \frac{1+0.03}{1+0.015} \times 40 = 40.59$ rupees. Here it is assumed that the forward rate is determined by the interest arbitrage effect only.

The interest arbitrage effect is as follows : If the rate of interest is higher in India than in the USA, money will flow from the USA into India in order to earn the higher interest rate. Demand for Indian rupee to be exchanged against US dollar will increase. Indian rupee will appreciate in value in terms of US dollar. The rate of exchange will be such that an investor can earn the same amount by investing a sum of money in the two countries. Suppose a US investor likes to invest 100 dollars in India. At the spot rate of Rs.40 per dollar he will get Rs.4000. By investing Rs.4000 at the rate of interest of 12% p.a. for 3 months he will get an amount equal to Rs. $\left(4000 + 4000 \times \frac{12}{100} \times \frac{3}{12}\right) = 4120$ rupees. On the other hand, had the investor invested 100 dollars in the USA at 6% p.a. for 3 months, he would have got an amount equal to $100 + 100 \times \frac{6}{100} \times \frac{3}{12} = 101.5$ dollars. Now the interest arbitrage effect states that the forward rate will be that rate of exchange for which 101.5 dollars will be equal to 4120 rupees or, one dollar will be equal to $\frac{4120}{101.5} = 40.59$ rupees. This is the same rate which is obtained with the help of the above mentioned formula.

A formal derivation of the formula can be stated as follows : Suppose a US investor likes to invest x dollars in the USA at the rate i_f per period. This will amount to $x(1 + i_f)$ dollars at the end of the period. On the other hand, if x dollars are converted into rupees at the spot rate R_s and then invested in India at the rate i_d per period, then this will amount to $xR_s(1 + i_d)$ rupees at the end of the period. Now the forward rate, R_f will be such that $x(1 + i_f)\, R_f = xR_s(1 + i_d)$

or, $R_f = \frac{1+i_d}{1+i_f} R_s$. This gives the relation between the spot rate and the forward rate by taking into account the interest arbitrage effect only. From the above relation we get $\frac{R_f}{R_s} = \frac{1+i_d}{1+i_f}$. From this it is clear that when $i_d > i_f$, then $R_f > R_s$. Similarly, when $i_d < i_f$, then $R_f < R_s$, and when $i_d = i_f$ then $R_f = R_s$.