UNIT 6 DETERMINATION AND FORECASTING OF EXCHANGE RATES

Structure

6.0 OBJECTIVES

After studying this unit you should be able to :

● describe how exchange rates are determined under freely floating exchange rate regime

● examine consequences of central bank intervention in foreign exchange markets.

● explain how exchange rates are forecast.

6.1 INTRODUCTION

In unit 5 you learnt about foreign exchange market and its various operational aspects. In this unit you will first learn about how exchange rates are determined in the free market environment and then you will learn about forms and consequences of central bank intervention in the foreign exchange market. You will also study methods of exchange rate forecasting.

6.2 EQUILIBRIUM APPROACH TO EXCHANGE RATES

We learnt in unit 5 that exchange rate is relative price of currencies in the foreign exchange market. How is this price determined? There are various theories offered for the same. Purchasing Power Parity Theory, Interest Parity Theory are quite popular. But before we go into these theories, lets examine equilibrium approach or free market approach to exchange rates.

Equilibrium approach to exchange rate determination essentially states that exchange rate between any two currencies will be determined by demand and supply of the relevant currencies. Thus the exchange rates are influenced by various factors influencing demand and supply for various currencies. Cross border transactions viz trade, services and capital account, as explained in Block 1, Unit 4 on Balance of Payment , create demand- supply forces in the market and in a free market, exchange rates are the demand supply clearing prices.

The exchange rates in this environment are determined as part of the general real and monetary equilibrium of the world economic system; there is no sense in which one may assert that the exchange rate is an exclusively monetary phenomenon. Indeed an equilibrium exchange rate can change without any accompanying change in money supply or the real money demand. Such would for example, be the case if there were

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a change in the composition of production between home goods and traded goods or improvements in domestic supply condition of a critical raw material or discovery of a new source of energy. Besides, 'expectations' about future demand supply of a currency play a critical role in determining exchange rates. Needless to say, the exchange rate will be highly volatile in free market

Changes in exchange rates, as you can well imagine, would have radical impact on patterns of international trade and capital flows, and can profoundly influence the economy of countries. The domestic economy of a country will be directly and indirectly affected by foreign exchange developments. The immediate impact of fluctuations in rates is felt at first by those who are directly involved in international trade or international finance. What complicates the problems of those affected is the unpredictability of the markets. While trends can be forecast, timing is a sensitive issue. The events of recent years have thrown up painful lessons for institutions which deal in and with foreign currencies. The advent of floating rates has given rise to movements which has made things extremely difficult. The importers who have to pay for their purchases in foreign currency, investors who have purchased a foreign asset, or the corporation which floats a foreign debt, are all facing foreign exchange risk. The exporters are similarly placed. Every one would like to minimise his risks by trying to quantify it to determine maximum exposure. It is some what easier to identify the foreign exchange risk in a fixed rate environment - although the danger of parity changes still exists - than in a floating rate environment. In the latter case, one can only hope that profit taking or central bank intervention would stop complete panic when markets are highly illiquid.

Devaluation and revaluation cover large fluctuations but have generally been in the range of 20 per cent. The measures can give indication of short term foreign exchange risk. Longer term risk is greater and much more difficult to evaluate. Currencies can undergo sharp fluctuations over a few years or even a few months. The South East Asian crisis towards the end of the last century is a case in point, where currencies lost 70-80 per cent in short span of time. It may thus seem logical to establish parities under equilibrium, but unfortunately nobody has ever been able to establish them and nobody even knows all the factors that weigh at a given point of time on the behaviour of currencies. We are reminded of a quote from a reputed foreign exchange consultant when at the end of his lecture during a seminar one of the delegates asked him : Sir, can you tell us what will be the exchange rate of Rupee tomorrow? He replied: Well, my dear, it will depend on which side of my bed I get up tomorrow morning! Well, so much for the exchange forecasts. But the world can not run its mill unless we find some anchor in this highly unpredictable foreign exchange market. Purchasing power parity and interest parity have been the two main anchors in this context. Let us discuss them one by one in the following.

6.3 PURCHASING POWER PARITY

Purchasing Power Parity was first started in a rigorous manner by Swedish Economist Gustar Cassel in 1918. It was suggested by him that this could be used for new set of official exchange rates at the end of World War I that would allow the resumption of normal trade relations. Since then this has been widely used by central banks as a means to establish new par values for their currencies when they find the older rates were in disequilibrium.

Purchasing power parity in simple words means that the exchange rate between the two currencies will be determined by the relative purchasing power of the two currencies. To take an example, if a ' standard' pizza costs one dollar in US and Rs 40 in India, the dollar/ rupee exchange rate should be 1$= Rs. 40. Thus, in absolute terms, purchasing power parity means that exchange adjusted price levels should be the same all over the world. The assumption is that free trade between the countries should equalise the prices of goods in all the countries expressed in local currencies. Suppose, for a moment that the exchange rate 1$ = Rs 45. It will provide opportunity for international arbitrage. How? As you can readily imagine, in this situation, an Indian exporter would buy pizza in India for Rs. 40 and export it to US to sell for 1$ and

convert the sale price of 1$ into Indian rupees at the rate of Rs. 45 for each dollar. Assuming the transportation costs to be zero, the Indian exporter can make neat profit of Rs. 5 for every pizza he sells in US. Because of this profit potential, forces are set in motion to change the exchange rate and/or the prices of pizza. In our example, pizzas will start moving from India to US. The reduced supply of pizzas in India will raise the prices of pizzas in India and the increased supply of pizzas in US will lower the prices of pizzas in US. In addition to moving pizzas around, the pizza exporters would be busily converting dollars into Indian ruppes to buy more pizzas. This activity increases the supply of dollar and simultaneously increases the demand for Indian rupee. This means INR is getting more valuable, so it will take more dollars to buy INR. Since the rate is quoted in INR, it will take lesser INR to buy dollar. The exchange rate of INR will go up from Rs 45 towards Rs. 40. Thus, international arbitrage works to keep exchange rates in line with purchasing power parity . This is the absolute purchasing power parity theory. The absolute purchasing power parity does not take into account the differences in prices that will arise due to transportation costs, tariffs, quotas and other restrictions and product differentiation.

The relative version of purchasing power parity which is more commonly used states that the exchange rates between home currency and any foreign currency will adjust to reflect changes in the price levels of the two countries. For example, if inflation is 5% in the United States and 7 % in India, then in order to equalise dollar price of goods in the two countries, the dollar value of Indian rupee must fall by about 2%.

If ih and if are the periodic price level increases (rate of inflation) for the home currency and foreign currency respectively, eo is the home currency value of one unit of foreign currency at the beginning of the period and et is the spot exchange rate in period t then :

$$\frac{et}{eo} = \frac{(1+ih)^t}{(1+if)^t}$$

Take an example, if the United States and India are running annual inflation rates of 5% and 7%, respectively, and the initial exchange rate was 1$ = Rs 40; then according to relative purchasing power parity, the value of the dollar in three years should be :

$$42.33 = 40 \ (\ 1.07 \ /1.05)^3$$

Purchasing power parity bears an important message. Just as the price of goods in one year cannot be meaningfully compared to the price of goods in another year without adjusting to interim inflation, so exchange rate change may indicate nothing more than the reality that countries have different inflation rates. In fact, according to purchasing power parity, exchange rate movements should cancel out changes in foreign price level relative to the domestic price level. The offsetting movements should have no effects on the relative competitive positions of domestic firm and foreign competitors. Thus changes in the nominal exchange rate may be of little significance in determining the true effects of currency changes on a firm and nation. In terms of currency changes affecting relative competitiveness, therefore, the focus must be not on nominal exchange rate changes but instead on changes in real purchasing power of one currency related to another. That is the exchange rate change during a period should equal the inflation differential for the same time period. In one word, purchasing power parity says that currencies with high rates of inflation should devalue relating to currencies with lower rates of inflation.

6.4 INTEREST RATE PARITY

Besides purchasing power parity theory, another theory which is quite popular is the interest rate parity theory. According to interest rate parity theory, the currency of one country with a lower interest rate should be at forward premium in terms of the currency of a country with a higher rate. More specifically in an efficient market with no transaction costs, the interest differential should be equal to the forward differential. When this condition is met, the forward rate is said to be at interest parity and equilibrium prevails in the money market. This theory is based on interest rate

behaviour, commonly known as Fisher Effect and International Fisher Effect. Lets us discuss these in the following.

6.4.1 The Fisher Effect

The financial news papers generally give interest rates for currencies which are mostly nominal. That is, they are expressed as the rate of exchange between current and future rupees. For example, a nominal interest rate of 8% p.a. on one year loan means that Rs.1.08 must be repaid in one year for Rs.1.00 loaned today. But what really matters to both parties to a loan agreement is the real interest rate, the rate at which current goods are being converted into future goods.

In a sense, the real rate of interest is the net increase in wealth that people expect to achieve when they save and invest current income. Alternatively, it can be viewed as the added future consumption promised by a corporate borrower to a lender in return for the latter's deferring current consumption. From the company's standpoint, this exchange is worth while as long as it can find suitably productive investments. However, because virtually all financial rates are stated in nominal terms, the nominal interest rate must be adjusted to reflect expected inflation. The Fisher Effect states that the nominal interest rate is made of two components (1) a real required rate of return, a, and (2) an inflation premium equal to the expected amount of inflation, i. Formally the Fisher Effect is :

1 + nominal rate = (1 + real rate) (1+expected inflation rate)

$$1 + r = (1+a)(1+i) \quad \text{or} \quad r = a + i + ai$$

The Fisher equation says that if the required real return is 4% and expected inflation is 10%, then the nominal interest rate will be 14.4% = 1+r = (1+.04) (1+.10).

6.4.2 The International Fisher Effect

The key to understanding the impact of relative changes in nominal interest rates among countries on the foreign exchange value of a nation's currency is to recall the implications of purchasing power parity (PPP) and the generalised Fisher effect. Purchasing power parity implies that exchange rates will move to offset changes in inflation rate differentials. Thus a rise in Indian inflation rates relative to those of other countries will be associated with a fall in the rupees' value. It will also be associated with a rise in Indian interest rate relative to foreign interest rates. Combine these two conditions and the result is the International Fisher Effect.

$$\frac{(1 + r_h)^t}{(1 + r_f)^t} = \frac{e_t}{e_0} \qquad\qquad 1.1$$

Where e_t is the expected exchange rate in period t. The single period analogue to equation 1.1 is

$$\frac{1 + r_h}{1 + r_f} = \frac{e_1}{e_0} \qquad\qquad 1.2$$

Note the relation here to interest rate parity. If the forward rate is an unbiased predictor of the future spot rate - that is $f_1 = e_1$ then equation 1.2 becomes interest parity condition

$$\frac{1 + r_h}{1 + r_f} = \frac{f_1}{e_0} \qquad\qquad 1.3$$

According to both equations 1.2 and 1.3 the expected return from investing at home, $1 + r_h$ should equal the expected return in home currency from investing abroad, $(1 + r_f) e_1/e_0$ or $(1 + r_f) f_1/e_0$. However despite the intuitive appeal of equal expected return, domestic and foreign expected returns might not equilibrate if the element of currency risk restrained the process of international arbitrage.

Using the International Fisher Effect as discussed above, let us forecast US dollar and Swiss Franc rates. In January, the one year interest rate is 4% on Swiss francs and 7 % on US dollars.

a) If the current exchange rate is SF1 = $ .63, what is the expected future exchange rate in one year?

According to International Fisher Effect, the spot exchange rate expected in one year equals $0.63 \times 1.07/1.04 = \$0.6482$.

In this case, international arbitrage works to keep exchange rates in line with interest differentials. Suppose, for a moment, that one year forward rate equals $ 0. 65 instead of $ 0.6482. Does this offer an arbitrage opportunity? The answer is yes! Do you see how? In this situation, an American resident has two options. He can either invest his 1 dollar for one year at the rate of 7% per annum and obtain 1.07 dollar at the end of one year . Or, alternatively he may convert 1 dollar into SF at the spot rate of $0.63, invest that money in the Swiss market at the rate of 4% per annum and simultaneously execute a forward contract to convert SF back into dollar at the end of one year. The necessary steps will be as follows:

1) Convert 1 dollar into 1.5873 SF at the spot rate of 1SF = $0.63

2) Invest 1.5873 SF at 4% to obtain   SF 1.6508 = SF 1.5873 x   1+ .04

3) Convert SF 1.6508 into dollar 1SF = $0.65, as per forward contract executed, to get $ 1.0730

Do you notice, under the second alternative, the US resident will get $ 1.0730 instead of $ 1.07 under the first option. Clearly, it is an opportunity to make neat profit of .003%. This opportunity will move market forces to convert US $ into SF and make neat profit which will soon get corrected as we had seen under the case of international arbitrage under absolute PPP above. Only difference is that instead of Indian pizzas, now more dollars will like to flow to Swiss, increasing demand for dollars and thereby strengthening dollar; with exchange rate moving from 1SF = $0.65 towards $0. 6482.

b) If a change in expectations regarding future inflation rate causes the expected future spot rate rise to $0.68 what would happen to U.S. Interest rate?

   If r US is the unknown US interest rate and Swiss interest rate stayed at 4% then according to the International Fisher Effect
   0.68/0.63 = (1 + r US) / 1.04
   ={(0.68 / 0.63) (1.04) } – 1 = r US
   = 12.25%.

The International Fisher Effect is also known as Interest parity as foreign exchange rates tend to adjust for interest differential between two countries. You must have noticed the role of inflation both under purchasing power parity and interest parity theories. Lets elaborate on the role of inflation in financial markets in the following.

6.5 INFLATION AND ITS IMPACT ON FINANCIAL MARKETS

Exchange rate movements have become the single most important factor affecting the value of investments particularly on an international level. They are crucial to business sales and profits forecasts and to investment plans and their outcome. They can turn what was in one year a thriving industry into a loss making industry in two years time - whether the products were intended for the export or the home market. The much favoured "discounted cash flow" approach to investment analysis is useless without taking into account exchange rate assumptions. With the growth of investments across international boundaries and a shrinking world in terms of communications, the domestic cost of food, fuel, clothes or travel are now substantially influenced by international markets and subject to the exchange rate movements.

In the present day floating exchange rate system, the currency of any individual country is only worth what you can buy with it, or what you can exchange it for at any particular time.

A country whose rate of inflation is consistently higher than that of its competitors will experience faster increase in its production costs and its exports will become more expensive than those of its lower inflation competitors. This invariably leads to a reduction in level of exports, a rising level of imports and a growing trade and current account deficit. This will ultimately result in weakening of the value of its currency against its competitors.

Over a long term an historic record of high inflation is often thought of as an indicator of weak currency. A country's inflation rate is determined mainly by a combination of government economic policies and the political climate in the country. Like in India, with state 'populism', rate of inflation has invariably been on the rise. Consequence! rupee consistently depreciating against all major currencies. The financial markets are seriously affected by the inflationary pressures. The U.S. economy has protected itself from violent exchange rate fluctuations of dollar because of a regime of low inflation and interest rates over a number of years.

Thus, from the long term perspective, factors which determine the competitiveness of a particular economy and, in turn, strength and weakness of its currency are relative inflation rates which further, in turn, are impacted by money supply growth , budget deficits, economic growth rates, employment rate, etc.

6.6 CENTRAL BANK INTERVENTION

Central banks do participate in foreign exchange markets in their role as agents to their governments or banker of the banks. Thus they always maintain some form of presence in the markets. Their most publicised form of involvement however is when they enter the markets on their own or under orders from their governments to stabilise exchange rates. Such operations are often termed as central bank intervention.

The primary purpose of intervention is to alter the liquidity of the markets by providing either supply or demand for home currency in the foreign exchange market. The reasons could be deep seated or temporary; in any case they will seldom be stated publicly. If we want to know the success of intervention compared to goals, such goals would not normally be defined precisely.

When central bank authorities state publicly that a certain level is "unrealistic" and that they are trying to modify it, they have in fact committed to a support level, and the user of the market can act accordingly. If they fail to maintain that level, they lose face. It is then that we witness the cat and mouse game between central bank and the markets, which former seldom wins. However, over the years central banks have developed their understanding of markets and developed better intervention methods and therefore they intervene in the market by using minimum funds with maximum impact.

The most obvious form of intervention takes place in spot markets. A central bank can intervene openly or under cover. Public intervention consists in calling one or several banks in the market and either asking for prices and dealing, or making prices. Under cover intervention consists in giving an order to one bank or a limited number of banks, like RBI using State Bank of India as agent. The choice and size of such intervention is determined by the goal that the central bank wishes to achieve.

The intervention of the central bank is not limited to its own market and it can request other central banks to act as its intervening agent in their markets. Such interventions are however, resorted to under exceptional circumstances and run in large figures.

Spot interventions result in the acquisition of foreign currency, if the central bank is selling its own currency in the markets, or in acquisition of domestic currency, if the central bank is a buyer. In the first case the central bank is increasing its reserves of foreign currency and in the process creates extra domestic money to accommodate markets. In the second case it is depleting its foreign currency reserves and is tightening the money supply by taking its own currency.

If a central bank no longer has foreign currency reserves, it may borrow them from other central banks or get accommodation from world financing agencies like IMF, World Bank. Excessive foreign currency reserves may be lent in the markets. What this means is that spot interventions always lead to other money market operations with clear interest rate implications. Therefore, central banks, in order to intervene effectively in spot markets undertake forward swap transactions in sizeable amounts in their domestic market. However, there are very clear cut lessons which the central banks have learnt :

1)   It is difficult to fight a market trend unless the trend is about to shift;

2)   Acting in a manner that the market is anticipating is futile and self defeating;

3)   It is only by keeping the markets guessing that some degree of success can be achieved;

4)   You can put on others the blame for loss of confidence in your currency.

The intervention by a central bank is important because the government considers that their currency in the international market is vital to their economic and financial well being. High economic growth with low inflation is the common agenda of all governments and their central banks. Central bank intervention in foreign exchange markets is therefore common. In the process, said or unsaid, free floating exchange rate regime turns into managed exchange rate regime. Intervention by central banks , particularly because of the lesson number (3) above, have further added to array of factors which determine exchange rates. Forecasting is nothing but projecting explanatory factors into the future. By now you must have realised why that foreign exchange consultant, quoted above, said that the tomorrow's exchange rate will depend on which side of the bed he gets up next morning. Foreign exchange rate forecasting is thus quite challenging.

6.7 ꞌ EXCHANGE RATE FORECASTING

Forecasting of exchange rate can be classified as being short term (e.g., upto one year) medium term (between one to three years) or long term (three to five years). The assessment of currency or interest rate in the future cannot be an exact science. Fundamental analysis can, however, provide a reliable guide to likely changes in major trends for individual currencies, although the timings and extent of such changes are difficult to anticipate precisely. For timing, technical analysis may help. All technical analysts use historical data as a basis for their conclusions. The patterns of market behaviour that emerge through the study of this data are the basis for projecting future trends. Although technical analysis has become prevalent and accepted, many banks have also developed their own systems. But technical analysis has considerable limitations , chief among which is that it does not concern itself with factors such as upcoming news which can change the market.

The methodology used in forecasting is sometimes guessing, but with a more systematic and methodical approach. Further , forecasts are again to be seen from the point of view of the user. Spot dealer could not care less what the currency will be doing in a year's time. However, corporates who have to develop long-term strategies are interested in long-term currency/interest rate forecasts.

Short-term Factors

News expected, or unexpected may have an impact on the markets. The unpredictability of political developments in the modern world and the speed with which they are reported always adds elements of instability. What further aggravates the problem is that the full impact of a particular development is not always clear. The developments that affect the markets cuts across all geographical boundaries. There is a great difference between the theoretical, "should be", response of the markets to certain developments, to what "actually" takes place.

The other factor which affect the market on a day-to-day basis is reaction to liquidity. Liquidity is the relationship between supply and demand from all market participants. Liquidity of the markets is initially the result of existing positions in the interbank market combined with arising supply and demand.

Let us take an hypothetical situation where the interbank market is highly short in dollars. If during the day further demand for non-dollar currencies arises, the banks can easily accommodate this demand by reducing their short positions. This does not necessarily mean that dollar will stabilise because the banks may wish to re-establish their original positions. However, if a sudden need for dollars arises, we may have a situation where banks already over-extended may have to buy large quantities of dollars that nobody has for sale. This would create a sharp if temporary - dis-equilibrium.

Under the same situation where the market is short in dollars let us assume two news items appear within a space of one hour. The first is very bearish to dollar. Market participants who wish to sell more dollars, will find buyers - perhaps not easily if nobody wants to hold them; but at a price somebody will be willing to take them. The second news item is very bullish. This can suddenly create a demand for dollars that nobody has. The result can easily be guessed. This rather simple example illustrates what can happen in a one-sided market when demand shifts abruptly.

The gross liquidity of the market — the total supply and demand — is commonly referred to as the depth of the market. The greater the depth, the more efficient the markets are, especially when supply and demand come close to being matched.

The main characteristic of the market depth is the smooth large deals. When a sizeable deal does not move the market by more than 0.2 or 0.3 per cent or when any move is only temporary the markets can be said to have depth. On the other hand, if a relatively small deal, such as a $20 million transaction moves the market by 0.5 per cent or more, creates a temporary trend, the markets lack depth.

Another important aspect of depth is stability. In the first example above, a purchase of $200 million instead of $ 20 million in a market heavily selling dollars may not have a great influence on the trend but $25 million sale may create a further drop. In this case the market shows reserves only on one side. A truly efficient market will be one where transactions, no matter how large, are more or less matched – an infrequent occurrence in foreign exchange markets. Thus, in one word, in the short term, market liquidity and demand-supply pressure are to be foreseen for exchange rate forecasting.

Long-term Strategies

Long-term strategies focus more on what are perceived as underlying trends. This type of strategy tends to be more of a manger's prerogative. Such basic positions are usually taken with a certain goal in mind; perhaps the view that certain parities will change drastically within a time span, or devaluation or revaluation will occur. Usually the parameters of such positions are established in advance and dealers are given specific instructions on how to handle the positions. The one added element on long-term strategies as opposed to short-term strategies is the financing of basic positions. Short-term positions are in or out and are settled within a day or two. The financing is minimal. In the management of long-term positions the financing is extremely important.

The basic questions to consider when mapping out long-term strategy are : what is the goal? what is the time span for achieving that goal? is the financing costly, or does it create added profit potential? is it better to stay in spot, or should it be changed into a forward ?

The exchange rate forecasting may be undertaken in-house or bought out. Banks and large players normally have in- house forecasting team. Forecasting service is to provide an added tool of analysis for the purpose of predicting market trends. No serious service can ever claim to be always right. Even if it did, nobody would believe it. Dealers have therefore, mixed feelings about this as they feel those who forecast have no stake as they do not operate in the market.

6.8   LET US SUM UP

In the absence of government intervention, exchange rate respond to the forces of supply and demand that in turn are dependent on inflation rate, interest rates and GNP growth rates. In a healthier economy, the currency is likely to be strong. Exchange rates are affected to a large extent by expectations of future exchange rates changes, which depend on forecasts of future economic and political conditions.

In order to achieve certain economic and political objectives, governments often intervene in the currency markets to affect exchange rate. Although the mechanics of such intervention vary, the general purpose of each variant is basically the same, to affect market liquidity.

Where people are unsure of what to expect, any new piece of information can alter their beliefs. Thus if the underlying domestic policies are unstable, exchange rates will be volatile as traders react to new information.

6.9   KEY WORDS

Equilibrium Exchange Rate : The rate at which demand and supply of a currency become equal.

Monetary Equilibrium : Equilibrium between demand and supply of a currency achieved through monetary forces.

Real Equilibrium : It refers to equilibrium in the commodity market.

Purchasing power parity : It states prices of a similar products of two different countries should be equal when measured in common currency.

Interest Rate Parity : The forward discount or premium is approximately equal to the interest differential between currencies.

Arbitrage : Purchase of securities or commodities on one market for immediate resale on another to earn profit from price discrepency.

6.10   TERMINAL QUESTIONS/EXERCISES

1.   Suppose prices start rising in the United States relative to prices in India. What would you expect happen to the dollar - rupee rate? Explain.

2.   If a foreigner purchases Indian short term security, what happens to the supply and demand for rupees?

3.   Under each of the following scenario , whether the value of rupees relative to Japanese yen will appreciate, depreciate or remain the same? Assume that exchange rates are free to vary and that other factors remain constant.

   a)   Growth rate of external income is higher in India than in Japan.

   b)   Inflation is higher in India than in Japan.

   c)   Prices in Japan and India are rising at the same rate.

   d)   Real interest rates are higher in India than in Japan.

   e)   India imposes new restrictions on the ability to buy Indian companies and real estate.

   f)   Indians wages rise relative Japanese wages, which means Indian productivity falls behind Japanese productivity.