UNIT 7 FINANCIAL MARKETS*

Structure

7.0 OBJECTIVES

After going through this unit you will be in a position to

- explain the role and nature of financial markets;
- distinguish between various types of financial markets;
- appreciate the recent trends in financial markets in India;
- explain how equilibrium is attained in foreign exchange market; and
- identify derivative products such as currency swaps, futures, and options.

7.1 INTRODUCTION

A stable financial system requires sound financial institutions, well functioning financial markets and robust financial infrastructure. Financial markets bring together buyers and sellers to trade in financial assets such as stocks, bonds, derivatives and currencies. They play an important role in allocating resources in

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an efficient manner. They also facilitate the price discovery process in financial instruments and are the conduit of transmitting policy signals to real economy. While stable markets play an important role in the pursuit of economic growth, volatile movements in financial markets have serious implications for macro-economic performance. We can classify markets according to their special features as debt or equity markets; primary and secondary markets; money and capital markets; domestic and foreign exchange markets. In this Unit, we will be discussing the foreign exchange market in detail along with an instrument of financial markets, i.e., derivatives.

The term foreign exchange refers to the process of converting home currencies into foreign currencies and vice-versa. The market where foreign exchange transactions take place is called foreign exchange market.

Over the last 30 years, financial derivatives market has seen considerable growth and dynamism. A financial derivative is defined as a financial instrument whose value depends on the values of other, more basic, underlying variables. Many different types of forward contracts, swaps, options and other derivatives are regularly traded by financial institutions. We will discuss the nature of these derivative instruments and provide an overview of how they are used.

7.2 FINANCIAL MARKETS: ROLE AND TYPES

Financial markets are the centres or arrangements that provide facilities for buying and selling of financial claims and services. Corporations, financial institutions, individuals and government trade in financial products on these markets either directly or through brokers and dealers on organised exchanges or off-exchanges. In financial markets funds are transferred from people who have an excess of available funds to people who have a shortage.

7.2.1 Role of Financial Markets

Financial markets play an important role in the economy.

a) Channelization of Funds

Financial markets play a crucial role in promoting greater economic efficiency by channelling funds from people who do not have a productive use for them to those who do. Financial markets channel funds from lenders/ savers who have saved surplus funds by spending less than their income to those who have a shortage of funds because they wish to spend more than their income (see Fig. 7.1). The main lenders-savers are households, but business, governments and foreigners also lend occasionally if they have surplus funds.

The most important borrowers-spenders are business and governments. Households and foreigners also borrow sometimes to finance their consumption.

Fig. 7.1: Channelization of Funds in Financial Markets

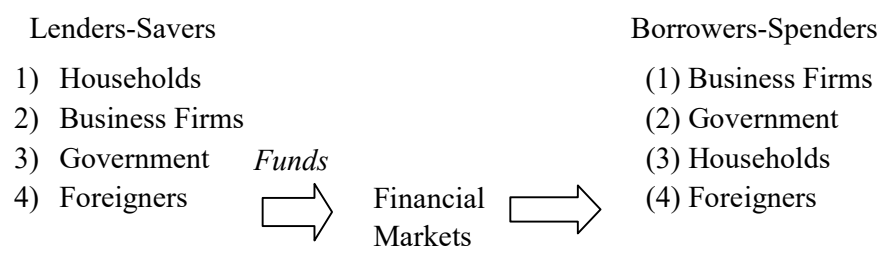

Fig. 7.1 shows the channelization of funds from the lenders-savers to the borrowers-spenders through financial markets.

b) Promotion of Economic Efficiency

Well functioning financial market is an essential determinant of high economic growth and plays an essential role in leading a country out of low income trap. A well functioning financial market facilitates the movement of funds from people who lack productive investment opportunities to people who have such opportunities. This efficient allocation of capital when employed to produce more capital, contributes to higher production and efficiency for the overall economy and thus facilitates higher economic growth.

c) Improvement in Economic Welfare

Activities performed in financial markets have direct bearing on personal wealth, behaviour of business and consumers, and business cycles. A well functioning market improves the well-being of consumers by allowing them to schedule their purchases. It provides funds to consumers to buy what they need without forcing them to wait until they have saved the entire purchase amount.

7.2.2 Types of Financial Markets

The term 'financial market' is broader term which can be sub-divided into several categories. Based on the essential features of these markets we classify financial markets as follows:

a) Debt and Equity Markets

A firm or an individual can obtain funds in a financial market in two ways. The most common method is to issue a debt instrument such as bond or a mortgage, which is a contractual agreement by the borrower to pay the holder of the instrument fixed amount at regular intervals (interest and principal payments) until a specified date (the maturity date), when a final payment is made. The maturity of a debt instrument is the number of years (term) till its expiry. A debt instrument is short term if its maturity is less than a year and long term if its maturity ten is years or longer.

The second method of raising funds is by issuing equities, such as common stocks, which are claims to share in the net income and asset of the firm. Owning stock means that you own a portion of the firm and thus have the right to vote on important decisions of the firm.

b) Primary and Secondary Markets

A primary market is a financial market in which new issue of a security (security is a generic term for financial instruments such as bond, stock or option) is sold to initial buyers by the corporation or the government agency. At different times and in different countries, different methods have been used to sell new issues of securities to investors. The issuer may sell directly to investors; it may pay a broker certain commission to distribute the new issue; or it may sell the whole issue to an underwriter who re-sells it to the public. Primary markets mobilize savings and supply fresh or additional capital to business units.

Secondary markets, on the other hand, deal in securities already issued, or existing, or outstanding and thus are known as indirect markets. Secondary market is a place where stocks that have been previously issued (in primary markets) can be resold. The Bombay Stock Exchange is an example of secondary market. Other examples are foreign exchange markets, futures markets and option markets. Secondary market serves two important functions. First, it provides liquidity to the financial instruments by making it easier and quicker to sell these instruments to raise cash. The increased liquidity of these instruments then makes them more desirable. Second, it determines the on-going price of the securities issued earlier by firms in the primary market.

c) Money and Capital Markets

The difference in the two markets is the period of maturity of financial assets issued in these markets. Money market is a financial market in which only short term debt instruments with original maturity of less than one year are traded. Treasury bills market, call money market and commercial bills market are the examples of the money market. Capital market is a financial market in which longer term debt generally with original maturity of one year or greater and equity instruments are traded. Stock markets and government bonds market are examples of the capital market. Equity market, debt market, and derivatives market also form part of capital market.

d) Foreign Exchange Market

Trade between countries involve the mutual exchange of different currencies and bank deposits denominated in different currencies. Foreign exchange market facilitates the trading of currencies and bank deposits denominated in foreign currency. Transactions conducted in the foreign exchange market determine the rate at which currencies are exchanged, which in turn determine the cost of purchasing foreign goods and financial assets.

Check Your Progress 1

1) What is meant by foreign exchange market?

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2) What are the different types of financial markets?

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3) Enumerate the role of financial markets.

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7.3 RECENT TRENDS IN FINANCIAL MARKETS IN INDIA

Financial markets in India have witnessed a fundamental transformation in the years since economic liberalization. The going has not been smooth all along but the overall effects have been largely positive. Over the decades, India's banking sector has grown steadily in size (in terms of total deposits) at an average annual growth rate of 18 percent. As of 2021, there are 135 commercial banks in operation with 12 of them state owned, 22 private sector banks, and 46 foreign banks. Although state owned banks dominate the financial sector (they account for over 80 percent of deposits and assets), the years since liberalization have seen the emergence of new private sector banks as well as the entry of several new foreign banks. Private banks are today increasingly displacing the nationalized banks from their position of pre-eminence. Though the State Bank of India remains the largest bank in the country by far, new private banks such as ICICI banks, Axis bank and HDFC bank have emerged as important players in the retail banking sector. The proportion of non-performing assets (NPAs) in the portfolios of the banks is one of the important indicators of the health of the banking sector. The foreign banks have the healthiest portfolios and the nationalized banks the worst, but the downward trend across board in NPAs is indeed a positive feature. Equity markets have also experienced difficult times as well. Since economic liberalisation of 1991, firms have relied more on equity capital to mobilise funds. Market capitalization as percentage of GDP has

increased significantly. While it was 45.13 per cent in 2003, it increased to 88 per cent in 2017. Although GDP has risen faster than before, the long term growth in equity markets has been much higher. The transition has not been smooth all along however. At least two major bubbles, in 1998 and again in 2001, rocked the Indian stock markets since economic liberalization. Several institutions have played an important role in these recurring crises including inappropriate monitoring of the bourses. Nevertheless, institutions have doubtlessly improved and have become more transparent over time. The time honoured *badla system* of rolling settlements is now gone and derivatives have firmly established themselves on the Indian scene.

The introduction and rapid growth of financial derivatives have been one of the important changes in the Indian financial sector since liberalization. The fixed income derivatives have witnessed considerable growth. The interest rate swap and forward rate agreement are being frequently used in inter-bank transactions as well as for hedging of corporate risk.

During the last decade three significant trends of (1) financial convergence, (2) financial engineering, and 3) financial inclusion have emerged. Financial convergence or universal banking is a practice whereby all financial services are made available to customers under one roof. For example, a bank, apart from its ordinary business of accepting deposits and lending money, may also offer investment banking, credit card services, and sell insurance policies.

Financial engineering is about the development and creative application of financial technology for solving financial problems, exploiting financial opportunities, and adding value. Financial inclusion has repeatedly been mentioned in policy announcement of many countries. Financial inclusion means provision of useful and affordable financial products and services to all businesses and people. Thus it implies opening of savings bank account, subscription to insurance policies, and access to credit.

7.4 FOREIGN EXCHANGE MARKET

Foreign exchange market is an important financial market as it has strong influences on macroeconomic variables, particularly exports and imports. In foreign exchange market currencies of different countries are traded for one another. The foreign exchange market is not a single location in which currencies are traded. It rather refers to the array of institutions through which people buy and sell currencies. It includes a hotel desk clerk who provides currency exchange as a service to hotel guests, brokers who arrange currency exchanges worth billions of dollars, and governments and central banks that exchange currencies. Major currency dealers are linked by computers so that they can track exchange rates for various currencies all over the world.

7.4.1 Spot Exchange Rate and Forward Exchange Rate

Central to the foreign exchange market is the rate at which currencies are traded for one another. This is called the exchange rate. There are two kinds of

exchange rate transaction. The predominant one is the spot transaction which involves immediate exchange of bank deposits. Two parties agree to an exchange of bank deposits and execute the deal immediately. Exchange rates governing such "on the spot" trading are called spot exchange rates and the deal is called a spot transaction. Forward transactions involve the exchange of bank deposit at some specified future date – one that may be 30 days, 90 days or even several years away. The exchange rates quoted in such transactions are called forward exchange rates. In a 30-day forward transaction, for example, two parties may commit themselves on April 1, 2019 to a spot exchange of €88,000 for $100,000 on May 1, 2019. The 30 day forward exchange rate is therefore € 0.88 per dollar and it is generally different from the spot rate, and from the forward rates applied to different future dates.

7.4.2 Equilibrium in the Foreign Exchange Market

The rates at which most currencies exchange for one another are determined by demand for and supply of the currencies concerned. We define exchange rate as the amount of domestic currency required for purchase of one unit of foreign currency. Let us discuss how a model of demand and supply operate in the foreign exchange market.

The demand curve for a currency, say dollars, relates the number of dollars buyers want to buy in any period to the exchange rate. An increase in the exchange rate means it takes more domestic currency to buy one unit of foreign currency. Thus increase in exchange rate is similar to depreciation of a currency in the foreign exchange market. A higher exchange rate, in turn, makes foreign goods and services more expensive and reduces the demand for foreign goods (that is, imports). Increase in exchange rate is thus likely to reduce the demand for foreign currency. Consequently, the demand curve for foreign exchange is downward sloping, as in Fig. 7.2.

The supply curve of foreign exchange (say dollars) emerges from a similar process. When people and firms in the United States purchase goods, services, or assets in foreign countries, they must purchase the currency of those countries first. They supply dollars in exchange for foreign currency. The supply of dollars on the foreign exchange market thus reflects the degree to which people in the United States are buying foreign money at various exchange rates. A higher exchange rate means that a dollar trades for less foreign currency (say, euro). In effect, the higher exchange rate makes foreign goods and services dearer to the U.S. buyers, so the U.S. consumers will purchase less foreign goods and services.

People will thus supply more dollars at a higher exchange rate; we expect the supply curve for dollars to be upward sloping, as suggested in Fig. 7.2. In addition to private individuals and firms that participate in the foreign exchange market, most governments participate as well. A government might seek to lower its exchange rate by selling its currency; it might seek to raise the rate by buying

its currency. Although governments often participate in foreign exchange markets, they generally represent a very small share of these markets. The most important traders are private buyers and sellers of currencies.

In Fig. 7.2, the equilibrium exchange rate is the rate at which the quantity of dollars demanded equals the quantity supplied. Here, equilibrium occurs at exchange rate E, at which Q dollars are exchanged per period.

Fig. 7.2: Demand for and Supply of Foreign Exchange

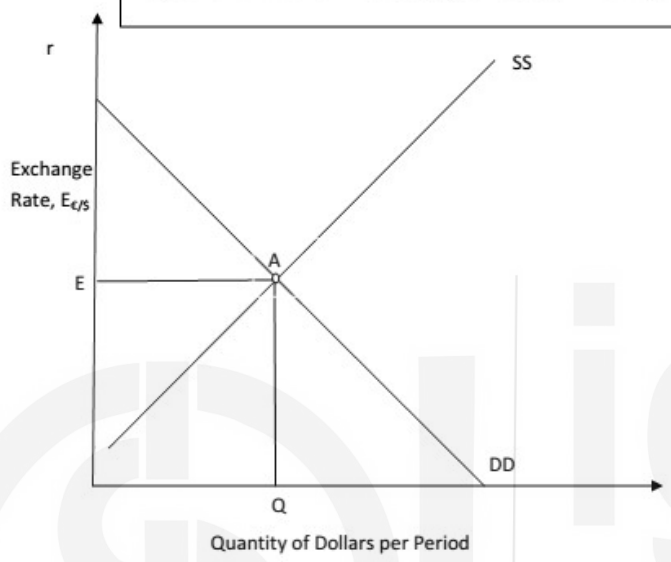


Fig. 7.2: DD is the demand curve for dollars which relate the number of dollars buyers want to buy in any period to the exchange rate. SS is the supply curve for dollars. Equilibrium occurs at exchange rate, E at which Q dollars are exchanged per period.

Shifts in the Demand for and Supply of Foreign Currency

People purchase a country's currency for two quite different reasons: to purchase goods or services in that country or to purchase the assets of that country – its money, its capital, its stocks, its bonds, or its real estate. Both of these motives must be considered to understand why demand and supply in the foreign exchange market may change. One thing that can cause the price of the dollar to rise, for example, is a reduction in bond prices (implies increase in interest rate) in the U.S. markets. Fig. 7.3 Panel A, illustrates the effect of this change. Suppose the supply of bonds in the U.S. bond market increases from S1 to S2 in Panel (A). Bond prices will drop. Lower bond prices mean higher interest rates. Foreign financial investors, attracted by the opportunity to earn higher returns in the United States, will increase their demand for dollars on the foreign exchange market in order to purchase the U.S. bonds.

Fig. 7.3 Panel A: Bond Market

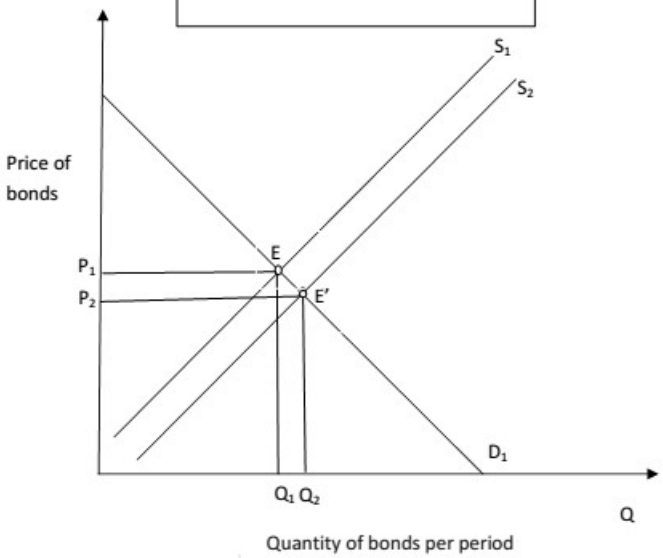
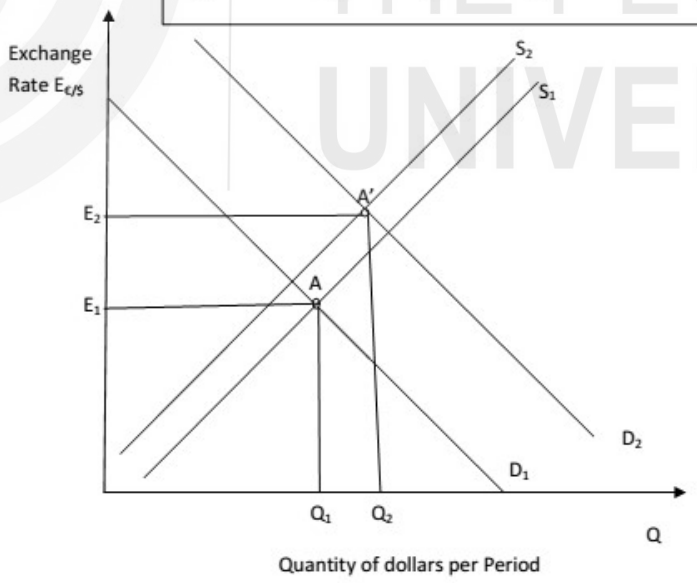


Fig. 7.3 (A) illustrates the effect of an increase in the supply of bonds from S_1 to S_2, on bond prices, which fall from P_1 to P_2.

Panel (B) of Fig. 7.3 shows that the demand curve for dollars shifts from D_1 to D_2. Simultaneously, the US financial investors, attracted by the higher interest rates at home, become less likely to make financial investments abroad and thus supply fewer dollars to exchange markets. The fall in the price of U.S. bonds shifts the supply curve for dollars on the foreign exchange market from S1 to S2, and the exchange rate rises from E to E′.

Fig. 7.3 Panel (B): Foreign Exchange Market



In Panel (B), a fall in bond prices will cause rate of interest in home to rise. The demand for dollars will rise from D_1 to D_2 and the supply of dollars will fall from S_1 to S_2. The exchange rate rises from E_1 to E_2.

Check Your Progress 2

1) Explain how equilibrium is attained in foreign exchange markets.

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2) Explain the effect of a rise in bond price on equilibrium exchange rate.

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7.5 FINANCIAL DERIVATIVES

Risk is a characteristic feature of all commodity and financial markets. Producers or possesses of these commodities cannot be sure of the prices that their produce or possession may fetch when they have to sell them, in the same way as the buyers are not sure what they would have to pay for their purchase. Both parties in such situations can benefit from a contract whereby forward prices may be fixed and the price risk facing them is eliminated. Forward contracts, currency swaps, future and options came into being primarily for the reason the need to eliminate price risk.

7.5.1 Forward Contract

A deal for the purchase or sale of a commodity, security, or any other asset can be in the spot market or in the forward market. A spot or cash market is most commonly used for trading. A majority of our day to day transactions are in the spot market, where we pay on the spot and get the delivery of the goods. In addition to spot purchase, another way to acquire or sell assets is by entering into a forward contract. In a forward contract, the buyer agrees to pay at a later date when the seller delivers the goods. Typically, the price at which the concerned commodity or asset will be traded (in future) is decided at the time of entering into the contract. Thus the price is pegged before hand to avoid the price risk and thus assures the price at which one can buy or sell goods at some future date.

Let us consider an example. Suppose a manufacturer uses certain raw material whose price is subject to variation. Thus there is a risk that the price could move adversely in future. In order to avoid the risk, the manufacturer may enter into a forward contract with the supplier of the raw material. Of course, at the maturity of a contract, if the market price of the commodity is higher than the price agreed, then the manufacturer (buyer of the raw material) stands to gain while the seller is in a losing position. The manufacturer (buyer of the raw material)

happens to lose, if the market price on the stipulated future date is lower than the agreed price.

A forward contract is evidently a reasonable means of avoiding price risk, but it entails an element of risk that a party to the contract may not honour its part of the obligation. Thus, each party faces the risk of default. There is another problem. Once a position of buy or sell is taken in a forward contract, an investor cannot retreat except through mutual consent with other party or buy entering into an identical contract and taking a position that is the reverse of the earlier position. The alternatives are by no means easy. With forward contract entered on a one to one basis and with no standardization, the forward contracts have virtually no liquidity. These problems of default and no liquidity associated with forward contracts led to the emergence of future contract. The future contracts are thus refined forward contracts.

7.5.2 Future Contract

A future contract is a standardized contract between two parties where one of the parties commits to sell and the other to buy, a stipulated quantity (and quality, where applicable) of a commodity, currency, security, index or some other specified item at an agreed price on a given date in the future.

Future contracts, called futures, can be traded as financial instruments on commodity exchanges or other future exchanges. People can buy or sell futures like other commodities. When an investor buys a 'futures' (so that she takes a long position) on an organised future exchanges, she is in fact assuming the right and obligation of taking the delivery of the specified item on a specified date. Similarly, when an investor sells a futures (so that she takes a short position), she assumes the right and obligation to make the delivery of the underlying asset. A clearing house or a clearing corporation provides the services for settlement of the futures traded on the exchanges. A clearing house thus plays a pivotal role in the trading of futures.

It is not necessary to hold on to a futures contract until maturity and one can easily close out a position. Either of the parties may reverse their position by initiating a reverse trade, so that the original buyer of a contract can sell an identical contract at later date, cancelling, in effect, the original contract. The fact that the buyer as well as the seller of a futures contract are free to transfer their interest in the contract to another party, makes such contract marketable instruments and thus also highly liquid. The future contracts are thus an improvement over the forward contract in terms of standardization, performance, guarantee and liquidity.

7.5.3 Options

The options are similar to the futures in the sense that they are also standardized but are different from them in many ways. Options, in fact, represent the right but not the obligation, to buy or sell a specified amount (and quality) of a

commodity, currency, index or financial instrument, or to buy or sell a specified number of underlying futures contracts at a specified price on or before a given date in future. Like other contracts, there are two parties to an options contract: the buyer (or the holder, owner) who takes a long position, and the seller (or writer) who takes a short position. The options contract gives the owner a right to buy/ sell a particular commodity or other asset at a pre-determined price by a specified date. The price involved is called strike price and the date involved is known as expiration. It is important to understand that such a contract gives its holder the right and not the obligation to buy/sell. The option writer, on the other hand, undertakes upon himself the obligation to sell/buy the underlying asset if that suits the option holder.

There are two types of options: call options and put options. A call option gives an owner the right to buy while a put option gives its owner the right to sell. Like future contracts, options are also tradable on exchanges. The exchange-traded options are standardized contracts and therefore, trading is regulated by the exchanges that ensure the honouring of such contracts.

When an option contract is bought, it is up to the holder, to exercise it or not, and the writer has no say. To illustrate, suppose it is March now and an investor is considering to buy May option contract on TCS involving 600 shares with an exercise price of Rs. 210. If it is a call option, the investor obtains, on purchase of the option, the right to buy 600 shares of TCS at the rate of Rs. 210 per share on the expiration day in May stipulated in the month of March. Obviously, if on that day, the price of the share in the market is quoted at higher than Rs. 210; the investor would like to exercise the call. By buying shares at Rs. 210 and selling them at the prevailing higher price, the investor can make a profit. If, on the other hand, the price of the share is quoted at Rs. 210 or lower, the investor would not exercise the call as it would amount to buying shares costlier than the market price. It may be noted that it is not necessary to hold an option until maturity. The option holder can keep the option till expiry or sell it in the market anytime before it expires. Option markets are highly liquid generally.

7.5.4 Currency Swaps

In addition to forwards, futures and options, financial institutions use another important financial derivative to manage risk. Swaps are financial contract that obligate each party to the contract to exchange (swap) a set of payments it owns for another set of payments owned by another party. There are two basic kinds of swap: currency swap involves the exchange of a set of payments in one currency for a set of payments in another currency. Interest rate swaps involve the exchange of one set of interest payments for another set interest payments, all denominated in the same currency.

A typical situation that necessitates currency swap is when a firm has a liability denominated in one currency and an income stream denominated in another currency. For example, an Indian firm may have borrowed Japanese Yen to

finance the acquisition of equipment from Japan. This firm may be engaged in exporting goods to the US and would therefore be receiving its income in US dollars. Thus the firm has to make payments in Japanese Yen to meet its loan commitment while it receives its income in the US dollar. If US dollar weakens against Yen, firm will incur a loss. This situation can be avoided by converting the Japanese Yen liability into a US dollar liability through a currency swap. It involves the exchange of the principal amount in one currency for the principal amount in another currency between the two parties at the beginning of the deal. The principal amount in the two currencies would be re-exchanged at the termination of loan period.

7.6 COVERED INTEREST ARBITRAGE

The interest parity theory maintains that in equilibrium, the premium (or discount) on a forward contract for foreign exchange is related to the interest rate differential as per equation (7.1).

$$\frac{F-S}{S} = \frac{r-r^*}{1+r^*} \quad \ldots \quad (7.1)$$

where F and S are the forward and spot exchange rates respectively, r is the domestic rate of interest on a particular class of security, and r* is the foreign rate of interest. This holds true for the pair of securities which are identical in all respects (maturity, risk class, etc.) except for the currency of denomination. When equation (7.1) is satisfied there is no profit opportunity. Empirically however, the parity condition is not always satisfied. Deviations from interest parity condition can occur because of transaction cost, political risk and capital market imperfections; thus giving rise to unexploited profit opportunity.

The most common type of interest rate arbitrage is the covered interest rate arbitrage. Interest rates vary between countries based on their current economic cycles, which creates an opportunity for international investors. By purchasing a foreign currency with a domestic currency, investors can profit from the difference in interest rate between two countries. The exchange rate risk is hedged with a forward contract. Covered interest rate arbitrage is thus, the practice of using favourable interest rate differentials to invest in a higher yielding currency and hedging the exchange risk through a forward currency contract.

Let us take an example. Suppose the dollar deposit interest rate is 1 percent while euro's deposit interest rate is 3.5 percent. Further, suppose that dollar and euro are trading at exchange rate of 1.5$/€. Investing $100,000 dollar in the domestic market at 1 percent interest rate for a year would result in a future value of $101,000. However, exchanging dollar for euro and investing in the Euro zone would result in a future value of $103,500 if exchange rate remains unchanged at the current level. However, a future appreciation of the dollar against the euro if expected, will wipe out these gains. To protect the investors from unfavourable movements of exchange rate, the investor will enter into a forward contract.

Using forward contracts, investors can hedge the exchange rate risk by locking in a future exchange rate. Suppose that the one year forward contract for $/€ would be 1.48 $/€, a slight premium in the market. The exchange back to dollars would therefore result in $1334 loss on the exchange rate, which still yields and overall $2169 gain on the position and offers downside protection.

Despite the strong logic, interest rate arbitrage is not without risk, the foreign exchange markets are fraught with risk, due to lack of cohesive regulation and tax agreements. In fact, some economists argue that covered interest rate arbitrage is not a profitable business unless transaction costs can be reduced to below markets rates. Some potential risk includes differing tax treatment, foreign exchange control, supply or demand inelasticity, transaction cost, and slippage during execution. Besides, such arbitrage opportunity is not common. Market participants will rush in to exploit any arbitrage opportunity, and market forces will prevent occurrence of arbitrage gains, if any.

Check Your Progress 3

1) What is the difference between a future contract and an option contract?

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2) What is the difference between a forward contract and a future contract?

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7.7 LET US SUM UP

Financial markets play a crucial role in channelizing funds, promoting economic efficiency, and improving welfare of society. Foreign exchange market is a place where currencies of different countries are traded for one another. The foreign currency is demanded to buy goods, services and assets in foreign currency. The equilibrium in the foreign exchange market is attained by equating the supply of foreign exchange with the demand. The rate at which this occurs is the equilibrium exchange rate. This unit also discussed special financial instruments known as derivatives and used for eliminating price risk.

7.8 ANSWERS/ HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) It is an arrangement which provide facilities for buying and selling of foreign exchange.

2) Debt and Equity; Primary and Secondary; Money and Capital; Foreign Exchange Market.

3) Go through Sub-Section 7.2.1 and answer.

Check Your Progress 2

1) Equilibrium is attained by equating demand for foreign exchange with supply of foreign exchange. The rate at which equilibrium is attained is the equilibrium exchange rate.

2) A rise in bond price means lower interest rate. Foreign investors will reduce their demand for domestic currency (dollars). Demand for dollars will fall. However, U.S. investors will be more likely to make investments abroad. Hence, they will supply more dollars to foreign exchange markets. The exchange rate will fall.

Check Your Progress 3

1) The options represent the right but not the obligation, to buy or sell a specified amount of a commodity, currency, index or financial instrument.

2) A forward contract is negotiated between a seller and a buyer. There is no such concept as the forward market – in this case assets or commodities are traded over the counter between two parties. Futures contracts are traded in an exchange (similar to stock exchange) meant for the purpose.

UNIT 8 BALANCE OF PAYMENTS*

Structure

8.0 OBJECTIVES

After going through this unit you will be in a position to

- explain the Balance of Payments accounting principles in an open economy;
- identify the implications of trade deficit and surplus;
- explain how capital flows facilitate BoP equilibrium; and
- explain how equilibrium in the goods market takes place when net exports are added to domestic demand.

8.1 INTRODUCTION

A closed economy is one which does not import or export goods and services. In this sense, in the present day world, all countries are open economies; only the degree of openness varies. Openness has three distinct dimensions, viz., 1)

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Openness in goods market which provides an option to consumers and firms to choose between domestic goods and foreign goods, 2) Openness in financial markets which provides an option to financial investors to choose between domestic assets and foreign assets, and 3) Openness in factor markets which provides an option to firms to choose where to locate production and to workers to choose where to work.

We will concentrate on openness in the goods markets in this Unit. In an open economy, the residents have to choose between domestic goods and foreign goods. This brings in the role of the relative price of domestic goods in terms of foreign goods – the real exchange rate. In this Unit, we will include exports and imports in national income identity. In a closed economy there was no need to distinguish between the domestic demand for goods and the demand for domestic goods. However, in an open economy, exports are to be added and imports are to be subtracted to arrive at the demand for domestic goods. The factors which influence exports and imports; will also influence the demand for domestic goods and also the IS curve. The open economy IS curve includes net exports as a component of aggregate demand.

The present Unit also includes the balance of payments accounting principles. Openness in financial markets allows financial investors to hold both domestic assets and foreign assets. Openness in financial markets allows a country to have either trade surplus or trade deficit. A country running a trade deficit is buying more from the rest of the world than it is selling to the rest of the world. In order to pay for the difference between what it buys and what it sells, the country must borrow from the rest of the world. It borrows by making it attractive for foreign investors to increase their holdings of domestic assets. Let us begin with the relation between trade flows and financial flows.

8.2 BALANCE OF PAYMENTS ACCOUNTING PRINCIPLES

The demand for foreign exchange arises because its citizens want to buy things whose prices are quoted in foreign currencies. Whenever you (Indian citizen) purchase foreign goods, you first buy foreign currency (Dollar, Euro or Yen) and then make the purchases. The next question is where the supply of foreign exchange comes from. The domestic country, say India, earns foreign exchange when it exports goods, services or assets to another country.

Balance of payments (BoP) is the record of the transactions of the residents of the country with the rest of the world. The simple rule for BoP accounting is that any transaction that gives rise to a payment by a country's residents is a deficit item in that country's BoP.

Table 8.1: Account of a Country's Balance of Payments (BoP)

Credits	Debits
(1) Exports of goods	(5) Imports of goods
(2) Exports of Services	(6) Imports of Services
(3) Unrequited receipts (gifts, indemnities etc. from foreigners)	(7) Unrequited payments (gifts, indemnities etc. to foreigners)
(4) capital receipts (borrowings from, capital repayments by, or sale of assets to foreigners)	(8) capital payments (lending to, capital repayments to, or purchase of assets to foreigners)
Total Receipts	Total Payments

The left side of Table 8.1 shows the sources of acquiring foreign currency and the right hand side shows how the foreign currency is spent. The most straight forward way in which a country can acquire foreign currency is by exporting goods (row 1). In an analogous way row (5) shows the value of imported goods. These two rows describe the country's visible trade. Row (2) lists the receipts of the country from the sale of services to foreigners during the period in question. These services include shipping, banking and insurance services, income through tourism, interest and dividends earned on investments abroad. Analogously row (6) covers payments which residents of the country make to foreigners for similar services. Items in row (1), (2), (5) and (6) together form the trade items. The items in row (3) and (7) are referred to as transfer items. The items in row (3) are the receipts which the residents of a country receive "for free" without having to make any present or future payments in return. In a purely analogous way, row (7) describes payments which the country in question makes as gifts, assistance, indemnities etc. Items in rows (1), (2), (3), (5), (6) and (7) enumerate all the payments and receipts made for the current period of time; they all have a flow dimension and refer to a certain value of exports and imports per time period.

Items (4) and (8) are different. They express changes in stock magnitudes and refer to capital receipts and payments. They play a critical role. When a government, a corporation or an individual borrows money from abroad, the country acquires foreign currency. This is recorded as capital inflow. On the other hand, foreign nationals might acquire assets in the domestic country in the form of land, houses, productive plants, shares. All these items are recorded by row (4) along with changes in the country's stock of gold or reserves of foreign currency. Analogously, if residents of the country were to acquire foreign assets or if the government were to lend money to a foreign government, this would give rise to an outflow of foreign currency and are accounted as capital transfers under row (8).

8.3 CURRENT AND CAPITAL ACCOUNTS

There are several ways in which the BoP can be broken down vertically. We can first be concerned only with the export and import of goods. This gives us the 'balance of trade'. The balance of trade need not always be balanced. If the country exports more goods than it imports, it is said to have a favourable (or surplus) balance of trade. If it imports more goods than it exports, it has a unfavourable (or deficit) balance of trade.

Table 8.2: Disaggregation of Balance of Payments

Credits	Debits
(1) Exports of goods	(5) Imports of goods
(2) Exports of Services	(6) Imports of Services
(3) Unrequited receipts (gifts, indemnities etc. from foreigners)	(7) Unrequited payments (gifts, indemnities etc. to foreigners)
(4) Capital receipts (borrowings from, capital repayments by, or sale of assets to foreigners)	(8) Capital payments (lending to, capital repayments to, or purchase of assets to foreigners)
Total Receipts	Total Payments

Balance of current account is a broader concept than the balance of trade, as it includes i) the balance of trade, ii) the balance of services, and iii) the balance of unrequited transfers. The balance of current account can show a surplus or a deficit. The current account is in surplus if exports exceed imports plus net transfers to foreigners that is if receipts from trade in goods and services and transfer exceed payments on this account. Balance of current account is a very important concept, as it shows the flow aspect of a country's international transactions. We could say that all the goods and services produced within the country during the time period in question and exported, are entered on the credit side of the balance of current account. Similarly, all the goods and services imported and consumed within the country during the same period are entered on the debit side of the balance of current account.

The deficit/ surplus on the current account must be settled. If a country has a deficit on the balance of current account, the country has spent more abroad during the period than it has earned. A way to settle this is by a transaction on the capital account. The capital account records purchases and sales of assets such as stocks, bonds and land, and borrowings and lending from/ to foreigners by government, corporations and individuals, any change in country's gold stock or reserves of foreign currency. The deficit in current account can thus be financed by borrowing abroad, by selling assets or by depleting the reserves of foreign currency.

8.4 TYPES OF CAPITAL FLOWS: AUTONOMOUS AND ACCOMODATING

In case a country has a deficit in its balance of current account, there will always be offsetting transactions on the capital account to bring the balance of payments into equilibrium. This can be done either through autonomous or accommodating capital flow. The implications of these two flows for BoP are quite different. Hence we must distinguish between these two flows. Autonomous capital flows are ordinary capital flows which take place regardless of other items in the balance of payments. These flows can be caused by a foreigner paying back a loan, or a person/company taking up a loan abroad by issuing bonds. These transactions have an effect on the country's balance of payments but they are in no way caused by balance of payments consideration. These flows are planned capital movements. The individuals, firms or government for different reasons plan to engage in capital transactions with the rest of the world giving rise to autonomous capital flows.

Accommodating capital movements are capital flows that take place specifically to equalise the balance of payments in the book keeping sense. These flows can take various forms. Foreign firms might accept short term claims on firms in the country or perhaps a foreign government extends a loan to the country. In all these cases the accommodating capital movements are direct consequences of the balance of payments situations. Accommodating capital flows are unforeseen capital flows, which are needed to bring the balance of payments into equilibrium. These flows are ex post in nature. Only at the end of the period can one discover whether accommodating movements have taken place. In the sense they are unplanned and appear as a result of the economic activity which has taken place during that period. If a deficit is settled by an accommodating capital flow, it can be viewed as warning signal for the country. The deficit could have been settled by a short term loan or a depletion of reserves. Usually this condition cannot continue forever. Lenders are seldom willing to extend short term loans forever, and reserves have a tendency to become depleted. The government must in such a situation change its economic policy to abolish the deficit in the balance of payments that has caused the accommodating inflow.

8.5 EQULIBRIUM/ DISEQUILIBRIUM IN BALANCE OF PAYMENTS

In a trivial sense the balance of payments will always be in equilibrium. A deficit on the current account will have to be financed by either borrowing abroad or by depleting the reserves of foreign currency. On the contrary, if the country has a surplus on the current account, it will have to export capital by lending money abroad for instance. In this book keeping sense the balance of payments will always balance.

Current Account + Capital Account = 0

In what sense can we then have disequilibrium in balance of payments? If the government has to take recourse of accommodating capital inflow to finance a current account deficit, then it is usually a warning signal. The government must change its economic policy to reduce the deficit in the balance of payments that has caused accommodating inflow. Surpluses do not usually create great problems. The increase in official reserves of the country is referred to as an overall balance of payments surplus. Analogously depletion of reserves through accommodating capital flows is referred to as balance of payments deficit. When the central bank is losing reserves, the balance of payments is in deficit.

Check Your Progress 1

1) Explain how surplus on the current account is settled.

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2) Enumerate the difference between Balance of Trade, Balance of Current Account, and Balance of Capital Account.

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3) Do you agree with the statement, "Balance of Payments always balances". List your reasons.

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8.6 NATIONAL INCOME ACCOUNTS FOR AN OPEN ECONOMY

Consider the expenditure on an economy's output of goods and services. In a closed economy, all output is sold domestically, and expenditure is divided into three components: consumption (C), investment (I) and government purchases (G). In an open economy some output is sold domestically and some is exported to be sold abroad. We can divide expenditure on an open economy's output, Y, into four components: 1) Cd, consumption of domestic goods and services; 2) Id, investment in domestic goods and services; 3) Gd, Government purchases of

domestic and goods and services; 4) X, Exports of domestic goods and services. We assign subscripts 'd' for domestic and 'f' for foreign, respectively.

The division of expenditure into these components is expressed in the identity

$$Y = Cd + Id + Gd + X \quad \text{... (8.1)}$$

The sum of first three terms, (Cd+Id+Gd), is domestic spending on domestic goods and services. The fourth term, X, is foreign spending on domestic goods and services.

Note that domestic spending on all goods and services equals domestic spending on domestic goods and services plus domestic spending on foreign goods and services. Hence, total consumption equals consumption of domestic goods and service, Cd, plus Consumption of foreign goods and services, Cf ; total investment, I equals investment in domestic goods and services, Id, plus investment in foreign goods and services, If ; and total government expenditure equals government purchases of domestic goods and services, Gd, plus government purchases of foreign goods and services, Gf. Thus,

$$C=Cd+Cf \quad \text{... (8.2)}$$

$$I = Id+If \quad \text{... (8.3)}$$

$$G=Gd+Gf \quad \text{... (8.4)}$$

We substitute these three equations into the equation 8.1:

$$Y= (C– Cf) + (I – If) +(G – Gf)+ X \quad \text{... (8.5)}$$

We can rearrange to obtain

$$Y= C + I + G + X – (Cf + If + Gf) \quad \text{... (8.6)}$$

The sum of domestic spending on foreign goods and services (Cf+If+Gf) is expenditure on imports (M). WE can write the national income accounts identity as

$$Y = C + I + G + X – M \quad \text{... (8.7)}$$

Because spending on imports is included in domestic spending (C+I+G) and because goods and services imported from abroad are not a part of a country's output, this equation subtracts spending on imports. Defining net exports to be exports minus imports (NX = X – M), the identity becomes

$$Y = C + I + G + NX \quad \text{... (8.8)}$$

This equation states that expenditure on domestic output is the sum of consumption, investment, government purchases and net exports. The above equation can be rearranged as

$$NX = Y – (C + I + G) \quad \text{... (8.9)}$$

Net Exports = (Output – Domestic Spending)

Equation (8.9) shows that in an open economy, domestic spending need not equal domestic product, or goods produced in the country. If output exceeds domestic spending, we export the difference: net exports are positive. If output falls short of domestic spending, we import the difference: net exports are negative. The key macroeconomic difference between open and closed economies is that, in an open economy a country's spending in any given year need not equal its output of goods and services, a country can spend more than it produces by borrowing from abroad, or it can spend less than it produces and lend the difference to foreigners.

8.7 TRADE IN GOODS, MARKET EQUILIBRIUM, BALANCE OF TRADE

When we assumed that the economy is closed to trade, there is no need to distinguish between the domestic demand for goods and the demand for domestic goods: they meant the same thing. Now, we must distinguish between the two. Some domestic demand falls on foreign goods, and some of the demand for domestic goods comes from foreigners.

In an open economy, the demand for domestic goods is given by

$$Z = C + I + G + X - M/R \quad \text{... (8.10)}$$

The first three terms – consumption (C), investment (I), and government spending (G) – constitute the domestic demand for goods. If the economy were closed, C + I+ G would also be the demand for domestic goods. First, we must subtract imports – that part of the domestic demand that falls on foreign goods rather than on domestic goods. We must be careful here: foreign goods are different from domestic goods, so we cannot just subtract the quantity of imports, M. If we were to do so, we would be subtracting apples (foreign goods) from oranges (domestic goods). We must first express the value of imports in terms of domestic goods. The real exchange rate, R, is defined as the price of domestic goods in terms of foreign goods. 1/R is the price of foreign goods in terms of domestic goods. So, M/R is thus the value of imports in terms of domestic goods. Second, we must add exports (X), that part of the demand for domestic goods that comes from abroad. This is captured by the term X in equation (8.10).

8.7.1 Determinants of C, I and G

Consumption, investment and government spending decisions are not affected by the openness of the economy. Real exchange rate affects the composition of consumption spending between domestic goods and foreign goods; however it does not affect the overall level of consumption. Similarly, real exchange rate may affect the composition of investment demand – whether firms buy domestic machines or foreign machines, but it should not affect total investment. Therefore,

$$\text{Domestic Demand: } C + I + G = C(Y-T) + I(Y, r) + G \quad \text{... (8.11)}$$

$$(+) \qquad (+, -)$$

The (+) and (–) signs below a variable indicates the nature of relationship between variables in a function. In equation (8.11) the (+) sign below the variable (Y–T) indicates that there is a positive relationship between the variables C and (Y–T). Similarly, investment, I, depends positively on production, Y, and negatively on the interest rate, r. We assume government spending, G, as given (i.e., exogenous).

8.7.2 Determinants of Imports

Imports are domestic demand for foreign goods. It depends positively on both domestic income and exchange rate. Higher domestic income leads to a higher domestic demand for all goods, both domestic and foreign. So a higher domestic income leads to higher imports. Imports also depend on real exchange rate. Depreciation in domestic currency makes foreign goods more expensive. This leads to a decline in demand for foreign goods compared to domestic goods. Thus an increase in the real exchange rate, R, leads to an increase in imports, M. Thus, we write imports as

$$M = \underset{(+,\,+)}{M(Y, R)} \quad \text{... (8.12)}$$

8.7.3 Determinants of Exports

Exports are foreign demand for domestic goods. It depends on foreign income and exchange rate. Higher foreign income means higher foreign demand for all goods, both foreign and domestic. So, higher foreign income leads to higher exports. Higher the price of domestic goods in terms of foreign goods the lower the exports. In other words, the higher the real exchange rate (appreciation in domestic currency), the lower are exports. We therefore write exports as

$$X = \underset{(+,\,-)}{X(Y_f, R)} \quad \text{... (8.13)}$$

An increase in foreign income, Y_f, leads to an increase in exports. An increase (appreciation) in the real exchange rate, R, leads to a decrease in exports.

8.7.4 Putting the Components Together

We assume that the price level is given and that output demanded will be supplied. We do not include capital account at this stage, so for the time being current account and balance of payments are the same. Fig. 8.1 plots the various components of demand against output, keeping constant all other variables (interest rate, taxes, government spending, foreign output and real exchange rate) that affect demand. In Fig. 8.1(a), the line DD plots domestic demand, C + I + G, as a function of output, Y. Under our standard assumptions, the slope of the relation between demand and output is positive but less than 1. An increase in output (equivalently, an increase in income) increases demand but less than one-for-one. To arrive at the 'demand for domestic goods', we subtract imports and add exports.

Fig. 8.1: Panel a: Domestic Demand

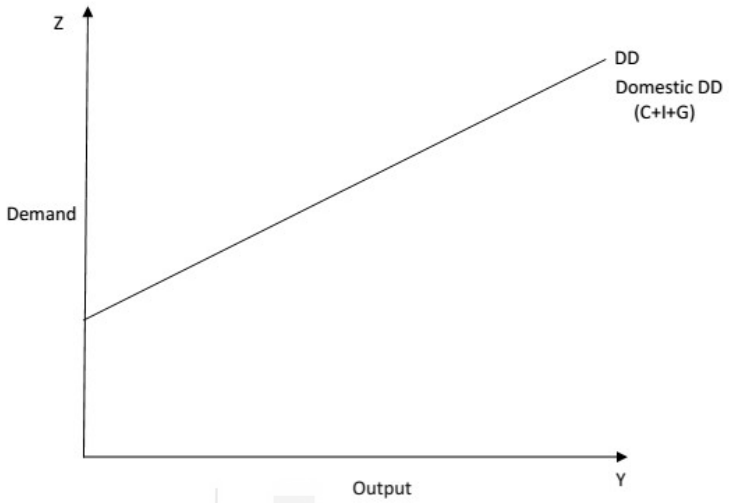

Fig. 8.1 (a) shows the line DD which plots the domestic demand, C + I + G as a function of output, Y.

In Fig. 8.1(b) we subtract imports from domestic demand, and it gives us the line AA. The line AA represents the domestic demand for domestic go

ods. The distance between DD and AA equals the value of imports, (M/R). Because the quantity of imports increases with income, the distance between the two lines increases with income.

Fig. 8.1: Panel b: Domestic Demand and Imports

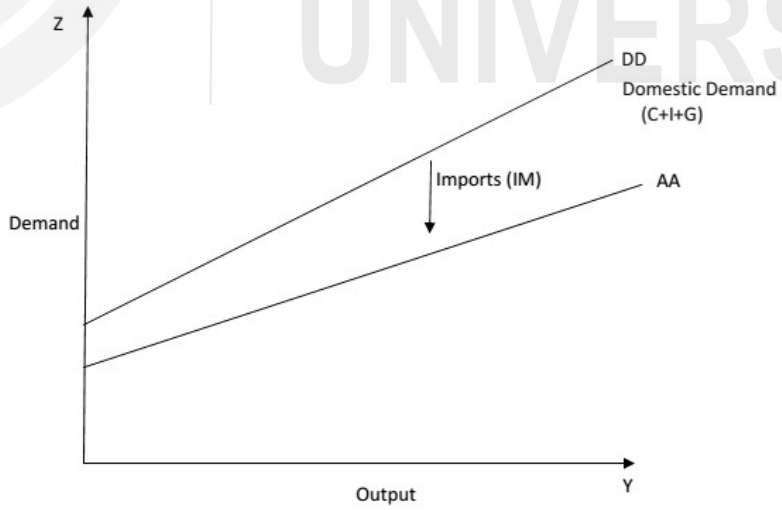

Fig. 8.1 (b) plots AA line which represents the domestic demand for domestic goods. The distance between DD and AA equals the value of imports.

We observe that AA is flatter than DD; as income increases, part of the additional domestic demand is for foreign goods rather than for domestic goods. In other words, as income increases, the domestic demand for domestic goods increases less than total domestic demand. Further, AA has a positive slope – an increase in income leads to some increase in the demand for domestic goods.

Fig. 8.1: Panel c: Demand for Domestic Goods and Net Exports

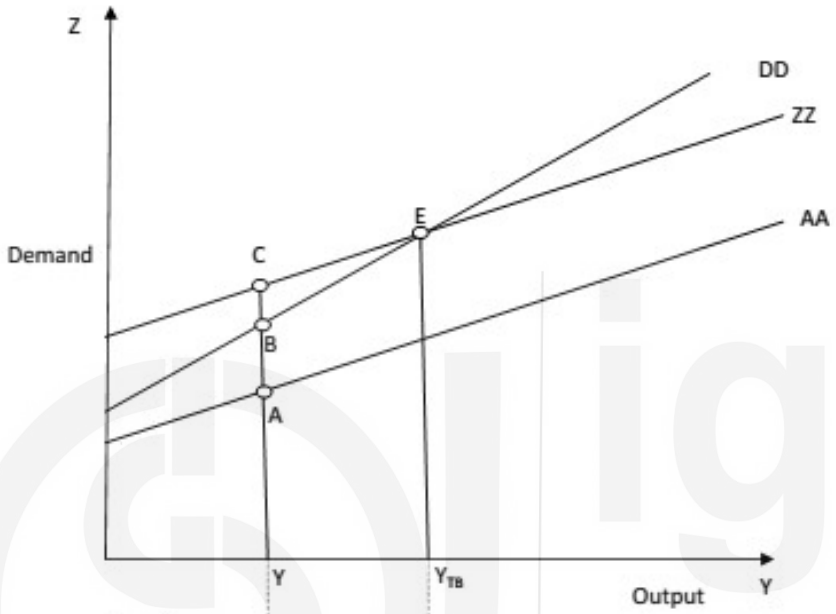

Fig. 8.1: Panel d: Trade Balance

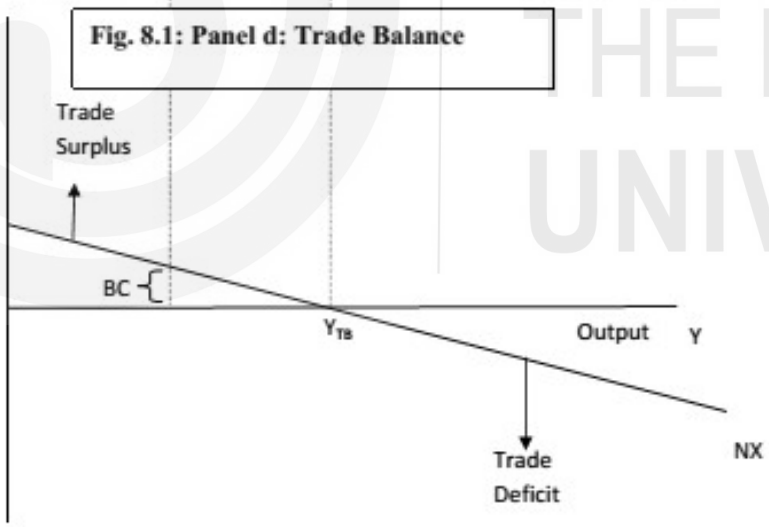

Fig. 8.1 (c) plots ZZ line which represents demand for domestic goods and is arrived by adding exports to the ZZ line. At output level, Y, exports are given by the distance AC and imports by the distance AB so net exports are given by the distance BC.

Fig. 8.1 (d) shows net exports as a decreasing function of output. Y_{TB} is the level of output at which the value of imports equals the value of exports.

In Fig. 8.1 (c) we add exports, and it gives us the line ZZ, which is above AA. The line ZZ represents the demand for domestic goods. The distance between ZZ and AA equals exports. As exports do not depend on domestic income (they depend on foreign income), the distance between ZZ and AA is constant, i.e., both lines are parallel. Since AA is flatter than DD, ZZ is also flatter than DD.

From Fig. 8.1 (c), we can characterise net exports as a function of output. At output level Y, for example, exports are given by the distance AC and imports by the distance AB, so net exports are given by the distance BC.

This relation between net exports and output is represented as the line NX (for Net Exports) in Fig. 8.1(d). Net exports are a decreasing function of output: as output increases, imports increase, and exports are unaffected, so net exports decrease. Call YTB (TB for trade balance) the level of output at which the value of imports equals the value of exports, so that net exports are equal to 0. Levels of output above YTB lead to higher imports and to a trade deficit. Levels of output below YTB lead to lower imports and to a trade surplus.

8.7.5 Goods Market Equilibrium

For the goods markets to be in equilibrium, output (the left side of the equation 8.14) must be equal to the demand for domestic goods (the right side of the equation 8.14).

$$Y = C(Y-T) + I(Y, r) + G + X(Yf, R) - M(Y, R)/R \quad \ldots(8.14)$$
$$(+) \quad (+,-) \quad (+,-) \quad (+, +)$$

The demand for domestic goods is equal to consumption, C plus Investment, I plus Government spending, G plus the value of exports, X minus the value of imports, M.

Consumption, C, depends positively on disposable income, (Y–T).

Investment, I, depends positively on output, Y and negatively on the real interest rate, r.

Government spending, G, is taken as given.

The quantity of exports, X, depend positively on foreign output, Yf and negatively on the real exchange rate, R (a rise in real exchange rate implies and increase in the value of domestic goods in terms of foreign goods that is, a real exchange rate appreciation. This real exchange rate appreciation will make domestic goods costlier in terms of foreign goods and will make foreign goods cheaper for domestic residents. It will thus reduce the volume of exports and raise the volume of imports).

The volume of imports, M, depends positively on output, Y. When domestic income goes up, the spending by domestic residence increase on all goods

including imports. Imports depend positively on real exchange rate. An increase in the real exchange rate that is real exchange rate appreciation will raise the volume of imports by making them cheaper for domestic residents. The value of imports in terms of domestic goods is equal to the quantity of imports divided by the real exchange rate.

Fig. 8.2: Equilibrium in the Goods Market

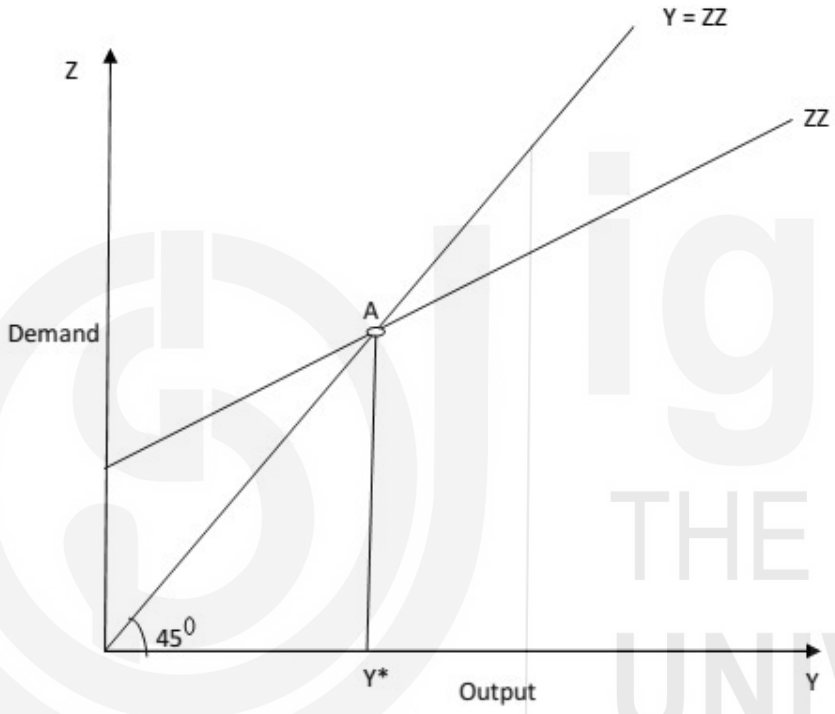

Fig. 8.2 shows the equilibrium in the goods market is attained at the intersection of the ZZ line (represent the demand for domestic goods) and the Y = ZZ line. Y* is the equilibrium level of output.

This equilibrium condition determines output as a function of all the variables we take as given, from taxes to the real exchange rate to foreign output. In Fig. 8.2, demand is measured on the vertical axis, and output (equivalently production or income) is measured on the horizontal axis. The line ZZ plots demand as a function of output; this line simply replicates the line ZZ in Fig. 8.1; ZZ is upward-sloping but with slope less than 1. Equilibrium output is at the point

where demand equals output, at the intersection of the line ZZ and the 45° line, Y=ZZ, point A in the figure, with associated output level Y*.

8.7.6 Net Exports

The difference between exports and imports (X – M) is called net exports (NX) or the trade balance. If exports exceed imports, the country is said to run a trade surplus. If exports are less than imports, the country is said to run a trade deficit.

Net exports or the excess of exports over imports; depend on our income, Y, which determines import spending; on foreign income, Yf, which affects foreign demand for domestic goods (exports) and on real exchange rate, R.

$$NX = X(Yf, R) - M(Y, R)/R \quad \ldots(8.15)$$

$$= NX(Y, Yf, R) \quad \ldots(8.15a)$$

$$(-, \ +, \ -)$$

Three important results follow from equation (8.15a).

A rise in foreign income other things being equal raises the demand for exports. It improves the home country's trade balance and therefore raises the home country's aggregate demand.

An increase in the real exchange rate leads to a decrease in net exports. A real appreciation of dollar against euro will make imports cheaper for the US residents and US exports costlier for Europeans by raising the price of domestic currency in terms of foreign currency.

A rise in domestic income raises consumption of all goods including imports. Higher import spending worsens net exports and trade balance.

Using equation (8.15a), we can rewrite the equilibrium condition in equation (8.14) as

$$Y = C(Y-T) + I(Y, r) + G + NX(Y, Y_f, R) \quad \ldots(8.16)$$

$$(+) \qquad (+, -) \qquad (-, \ +, \ -)$$

The implications of equation (8.16) are as follows:

An increase in interest rate leads to a decrease in investment spending, and as a result, to a decrease in the demand for domestic goods. It leads, through the multiplier, to a decrease in output.

An increase in the exchange rate leads to a shift in demand toward foreign goods and, as a result, to a decrease in net exports. A decrease in net exports decreases the demand for domestic goods. It leads, through the multiplier, to a decrease in output.

Check Your Progress 2

1) What are the factors that affect the exports, imports and net exports?

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2) Distinguish between domestic demand for goods and demand for domestic goods.

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8.8 THE IS CURVE IN OPEN ECONOMY

The IS curve shows the equilibrium level of GDP associated with each interest rate. The GDP is in equilibrium when desired expenditure/ aggregate demand equal actual output, Y or when injections equal withdrawals. The open economy IS curve includes net exports as a component of aggregate demand. Therefore, the equation of the IS curve is derived by equating output to aggregate demand which includes consumption, investment, government expenditure and net exports. In equation form we can say

$Y= C(Y–T) + I(Y, r) + G + NX(Y, Y_f, R)$

Fig. 8.3: Equilibrium in the Goods and Financial Market: IS-LM

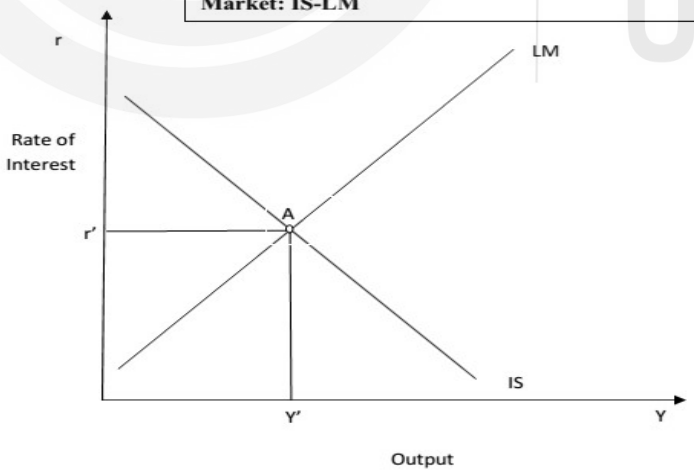

Figure 8.3 illustrates the IS curve which shows the combinations of interest rate and output for which goods market is in equilibrium and the LM curve which shows the combinations of interest rate and output for which money market is in equilibrium. Equilibrium occurs at point A with equilibrium level of output equal to Y'.

The IS curve depicted in Fig. 8.3, is negatively sloped because higher interest rates cause investment to fall, which shifts ZZ down and lowers equilibrium GDP. In contrast, lower interest rates cause investment to rise, which shifts ZZ up and raises equilibrium GDP. The curve looks very much the same as in the closed economy, but it hides a more complex relation than before. In all cases, the IS curve shows the relationship between interest rates and level of income at which desired expenditure flows are equal to actual output or desired withdrawals are equal to desired injections. However, the flows of withdrawals and injections are different in a closed economy from an open economy. In a closed economy with no government sector, the IS curve shows the combinations of interest rate and GDP for which saving and investment are equal. In an open economy with government sector, the IS curve shows the combinations of interest rate and GDP for which withdrawals in the form of savings, S; taxes, T; and imports, M; (S + T + M) are equal to injection in the form of investment, I; government purchases, G; and exports, X; (I + G + X). In this case the IS curve is drawn for given values of government spending, exports, autonomous consumption as well as the tax rate.

The LM relation in an open economy is exactly the same as in a closed economy. The LM curve is upward sloping. For a given value of real money stock, M/P, an increase in output leads to an increase in the demand for money, and to an increase in the equilibrium interest rate.

Equilibrium in the goods and financial market, is attained at point A in Fig. 8.3 with output level, Y' and interest rate, , r' .

Shifts in the IS Curve

An increase in the exogenous spending, shifts the ZZ curve up in Fig. 8.4, so it shifts the IS curve to the right. In an open economy, changes in real exchange rate, R and foreign income, Y_f shift the IS curve, in addition to changes in autonomous consumption, government expenditure and tax rate. A depreciation (increase in real exchange rate) increases the demand for domestic goods, shifting the IS curve out and to the right. Likewise, an increase in foreign income and with it, an increase in foreign spending on our goods will increase net exports or demand of our goods.

Fig. 8.4: Shifts in the IS Curve

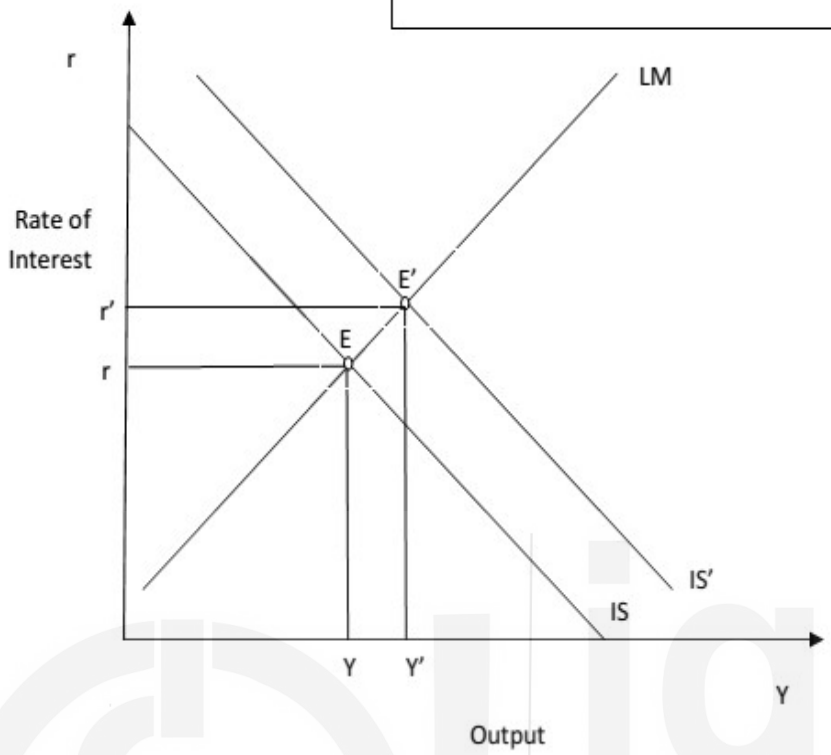

Fig. 8.4 shows rightward shifts in IS curve on account of rise in foreign demand leading to an increase in interest rate and domestic output.

Fig. 8.4 shows the effect of a rise in foreign income. Higher foreign spending on domestic goods raises domestic country's exports and hence, at unchanged interest rate, requires an increase in output. This is shown by the rightward shift of the IS curve. The full effect of an increase in foreign demand, thus, is an increase in interest rate and an increase in domestic output and employment. On other hand, a weakening of foreign economies reduces their imports and hence pulls down domestic demand. It leads to decrease in equilibrium output and interest rate.

Fig. 8.4 can also help explain the effect of depreciation in exchange rate. A depreciation raises the net exports at each level of income and hence shifts the IS curve upward to the right. Thus depreciation leads to a rise in our equilibrium output.

Table 8.3 below summarises the effect of different disturbances on the level income and net export.

Table 8.3: Effects of Disturbance on Income and Net Exports

	Increase in Domestic Income, Y	Increase in Foreign Income, Y_f	Increase in Real Exchange Rate (real appreciation), R
Income	+	+	–
Net Exports	–	+	–

Table 8.3 summarises the effect of disturbances (changes in domestic income, foreign income and real exchange rate) on the level income and net export.

8.9 CAPITAL MOBILITY

In the simplest world, in which exchange rates are fixed forever, taxes are the same everywhere, and foreign asset holders never face political risks, we would expect all asset holders to pick the asset that has the highest return. That would force asset returns into strict equality everywhere in the world capital markets because no country could borrow for less. For now we will assume perfect capital mobility. Capital is perfectly mobile internationally when investors can purchase assets in any country they choose, quickly, with low transaction costs and in unlimited amounts. When capital is perfectly mobile, asset holders are able to move funds across borders in search of highest returns or lowest borrowing costs.

8.9.1 International Capital Flows and the Trade Balance

To see the relationship between international capital flows and the trade balance, let us look at the national income accounts identity in terms of saving and investment.

$Y = C + I + G + NX$

Subtract (C + G) from both sides to obtain

$Y - C - G = I + NX$ … (8.17)

Since (Y– C– G) is national saving, S,

$S = I + NX$, or $(S - I) = NX$ …(8.18)

This form of national income accounts identity shows that an economy's net exports always equal the difference between its saving and investment. The right hand side of the identity, NX, the net export of goods and services, is also called

the trade balance. It tells us how our trade in goods and services departs from the benchmark of equal imports or exports.

The left hand side of the identity is the difference between domestic saving and domestic investment, (S – I), the net capital outflow. Net capital outflow equals the amount that domestic residents are lending minus the amount that foreigners are lending to us. The national income accounts identity shows that net capital outflows always equals the trade balance.

If (S – I) and NX are positive, we have a trade surplus. In this case, we are net lenders in the world financial markets and we are exporting more goods than we are importing. If (S – I) and NX are negative, we have a trade deficit. In this case we are net borrowers in the world, and we are importing more goods than we are exporting. If (S – I) and NX are exactly zero, we are said to have a balanced trade because the value of imports equal the value of exports.

8.9.2 Balance of Payments and Capital Flows

We now introduce the role of capital flows within a framework in which we assume that the home country faces a given price of imports and a given export demand. In addition we assume that the world rate of interest, rf, is given. With perfect capital mobility, capital flows into the country at an unlimited rate if the country's interest rate is above the foreign rate of interest, capital outflows will be unlimited.

The Balance of Payments surplus, BP, is equal to the trade surplus, NX, plus the capital account surplus, CF:

$$BP = NX(Y, Y_f, R) + CF(r - r_f) \quad \ldots(8.19)$$

Equation (8.19) shows the trade balance as a function of domestic and foreign income and the real exchange rate, and the capital account as a function of the interest rate differential. An increase in income worsens the trade balance and an increase in interest rate above the world level pulls in capital from abroad and thus improves the capital account. It follows that when income increases, even the tiniest increase in the interest rates is enough to maintain overall balance of payments equilibrium. The trade deficit would be financed by capital inflow.

8.9.3 Policy Dilemmas

Countries frequently face policy dilemma, in which a policy designed to deal with one problem worsens another problem. Very often there is a conflict between the goals of external and internal balance.

Fig. 8.5: External vs. Internal Balance

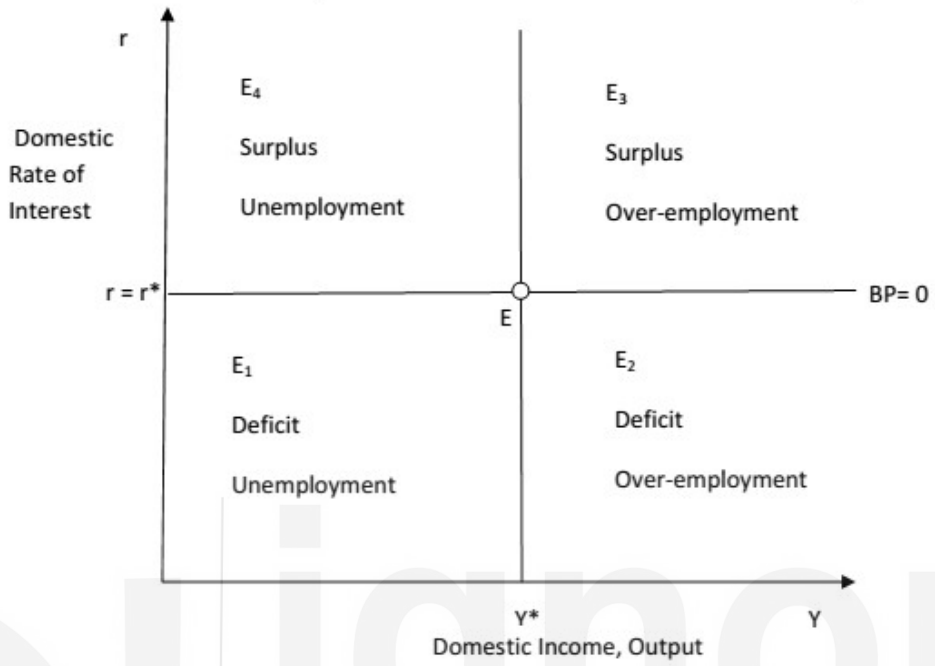

Fig. 8.5 shows BP = 0 line along which we have Balance of Payments equilibrium. Points above the BP = 0 line correspond to a surplus and points below it to a deficit . The full employment output level is Y*.

External balance exists when the balance of payments is close to zero. Otherwise, the central bank will run down its reserves in case of net outflow and accumulate reserves in case of net inflow. Internal balance exists when output is at the full employment level. In Fig. 8.5, we show the line BP = 0, derived from equation (8.19), along which we have balance of payments equilibrium. Our key assumption, i.e., perfect capital mobility, forces the BP = 0 line to be horizontal. Only at a level of interest rate equal to that of the rates abroad, can we have external balance: If domestic interest rates are higher, there is a huge capital inflow resulting in surplus in capital account and overall surplus. On the other hand, if domestic interest rate is below foreign interest rates, there is unlimited capital account deficit.

Thus BP=0 must be flat at the level of world interest rates. Points above the BP=0 schedule correspond to a surplus, and points below to a deficit. The full employment output level is Y*. Point E is the only point at which both internal balance and external balance are achieved. Point E1, for example, corresponds to a case of unemployment and a balance of payments deficit. Point E2, by contrast, is a case of deficit and over employment.

We can talk about policy dilemmas in terms of points in the four quadrants of Fig. 8.5 below. For instance, at point E1, there is a deficit in the balance of payments, as well as unemployment. An expansionary monetary policy would deal with the unemployment problem but worsen the balance of payments (Rightward shift of LM curve would increase the equilibrium output/employment but would lower the domestic rate of interest. The lower domestic rate of interest will make the domestic economy less lucrative for foreign investors). If the country can find a way of raising the interest rate, it would obtain financing for the trade deficit. That means that both monetary and fiscal policies would have to be used to achieve external and internal balance simultaneously.

Check Your Progress 4

1) Explain how the IS curve is derived.

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2) Explain why there could be a conflict between external and internal balance.

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8.10 LET US SUM UP

In an open economy, the residents can consume more than what they produce by borrowing from the rest of the world. All such transactions of the residents with the rest of the world are recorded in the Balance of Payments. Balance of Payments has two main components: the current account and the capital account. A deficit in the current account has to be settled by a transaction in the capital account. A deficit in the current account can be settled by three methods, viz., (i) borrowing abroad, (ii) selling assets, and (iii) depleting foreign exchange reserves.

National Income accounting for an open economy is different from that of a closed economy in the sense that exports are to be added and imports are to be subtracted to arrive at the demand for domestic goods, the ZZ curve. Equilibrium in the goods market is attained by equating national income with the sum of consumption, investment, government expenditure, and net exports. Imports are positively affected by domestic income and real exchange rate. Exports are affected positively by foreign income and negatively by exchange rate. Net

exports, which are the excess of exports over imports, are positively affected by foreign income, and negatively by domestic income and exchange rate. An increase in net exports will raise the domestic demand and equilibrium level of income. It will cause the IS curve to shift rightward.

The unit concluded by presenting a note on capital mobility. Net capital outflows are the amount that domestic residents are lending minus the amount that foreigners are lending to us. The net capital outflow always equals the trade balance. A positive (negative) capital outflow and trade balance implies that we are net lenders (net borrowers).

8.11 ANSWERS/ HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) A surplus in current account is settled by a reverse transaction in the capital account. It must be settled by either lending abroad or buying assets abroad or by accumulating reserves of foreign currency.

2) Balance of trade includes exports and imports of goods. Balance of current account includes balance of trade, balance of services, and balance of unrequited transfers. Balance of capital account records purchases and sales of assets such as stocks and bonds; borrowings and lending from/ to foreigners by government, corporations and individuals; any change in country's gold stock or reserves of foreign currency.

3) It is true only as an accounting principle. However, if deficit is financed by an accommodating capital inflow then it is a warning signal for the government to change its economic policy.

Check Your Progress 2

1) Imports are positively affected by domestic income and real exchange rate, while, exports are positively affected by foreign income and negatively by real exchange rate. Net Exports, which is the excess of exports over imports, are positively affected by foreign income and negatively by domestic income and real exchange rate.

2) Go through Section 8.7 and answer.

Check Your Progress 3

1) The IS curve is derived by equating national income to the aggregate demand. It is negatively sloped and is drawn for given values of C, G, R, T, r, Y_f .

2) Go through Section 8.9 and answer.

UNIT 9 EXCHANGE RATE ETERMINATION*

Structure

9.0 OBJECTIVES

After going through this unit you will be in a position to

- explain the concepts of nominal and real exchange rates;
- distinguish between various types of exchange rate regimes;
- compare returns to assets denominated in different currencies;
- apply the interest parity condition to find the equilibrium exchange rate;
- explain the Purchasing Power Parity (PPP) theory of exchange rate; and
- explain the monetary approach to exchange rate determination.

9.1 INTRODUCTION

One of the key economic decisions a country takes is how it will value its currency in comparison to other currencies. An exchange rate regime is how a

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country manages its currency in the foreign exchange market. An exchange rate regime is closely related to the country's monetary policy.

A country can manage its currency in a foreign exchange market under three types of exchange rate regimes, viz., (i) floating exchange rate, (ii) fixed exchange rate, and (iii) managed floating exchange rate. A floating exchange rate regime is where the central bank determines the money supply and let the exchange rate adjust freely according to market forces. In many countries, however, the central bank acts under implicit or explicit exchange rate target and uses monetary policy to achieve those targets. This type of exchange rate arrangement is called fixed exchange rate regime. There is another type, i.e., managed floating, where the central bank influences the exchange rate without having a specific exchange rate path or target. Central to the decision of whether to buy domestic goods or foreign goods is the price of domestic goods relative to foreign goods, that is, the exchange rate.

In this Unit we will discuss how the exchange rate is determined, and the role of exchange rate in international trade. First we learn how exchange rate allows us to compare the prices of goods produced by different countries. Subsequently we describe the international asset market in which currencies are traded. This is followed by a section on asset approach by showing how today's exchange rate responds to changes in the expected future values of exchange rates. The asset approach explains the exchange rate determination in the short run. To understand long term exchange rate movements, we discuss the monetary approach to exchange rate determination. In the long run, the price level plays a key role in determining both interest rate and exchange rate

9.2 EXCHANGE RATE REGIMES

As mentioned above, there are three basic types of exchange regimes: floating, fixed, and managed floating. We discuss each of the above types below.

9.2.1 Floating Exchange Rate

A floating exchange rate is a type of exchange rate regime wherein a currency's value is allowed to fluctuate according to the foreign exchange market. A currency that uses a floating exchange rate is known as a floating currency. The dollar is an example of a floating currency.

Many economists believe that floating exchange rate is the best possible exchange rate regime because it automatically adjusts to economic circumstances. It enables a country to dampen the impact of shocks and foreign business cycles. Further, it pre-empts the possibility of having a balance of payments crisis. However, they also engender unpredictability as the result of their dynamism.

9.2.2 Fixed Exchange Rate

A fixed exchange rate system, or pegged exchange rate system, is a currency system in which governments try to maintain a currency value that is constant against a specific currency or good. In a fixed exchange-rate system, a country's

government decides the worth of its currency in terms of either a fixed weight of an asset, another currency, or a basket of other currencies. The central bank of a country remains committed at all times to buy and sell its currency at a fixed price. In these countries, the central bank does not let the exchange rate adjust freely in whatever manner as implied by equilibrium in the foreign exchange market. Central banks act under implicit or explicit exchange rate targets and use monetary policy to achieve those targets. The targets are sometimes implicit, sometimes explicit; they are sometimes specific values, sometimes bands or ranges. These exchange rate arrangements (or *regimes*, as they are called) have many names. China at present has a fixed exchange rate.

Pegs, Crawling Pegs, Bands

At one end of the spectrum are countries with flexible exchange rates, such as the USA or Japan. These countries do not have explicit exchange rate targets. At the other end are countries that operate under *fixed exchange rates.* These countries maintain a fixed exchange rate in terms of some foreign currency. Some peg their currency to the dollar. Still other countries peg their currency to a basket of foreign currencies, with the weights reflecting the composition of their trade.

To ensure that a currency will maintain its 'pegged' value, the country's central bank maintains reserves of foreign currencies and gold. They can sell these reserves in order to intervene in the foreign exchange market to make up excess demand or take up excess supply of the country's currency.

Between these extremes are countries with various degrees of commitment to an exchange rate target. For example, some countries operate under a crawling peg. The name describes it well: these countries typically have inflation rates that exceed the US inflation rate. If they were to peg their nominal exchange rate against the dollar, the more rapid increase in their domestic price level above the US price level would lead to a steady real appreciation and rapidly make their goods uncompetitive. To avoid this effect, these countries choose a predetermined rate of depreciation against the dollar. They choose to 'crawl' (move slowly) vis-à-vis the dollar.

9.2.3 Managed Floating

Under this exchange rate regime, the central bank attempts to influence the exchange rate without having a specific exchange rate path or target. Indicators for managing the exchange rate are broadly judgmental (e.g., balance of payments position, foreign exchange reserves, parallel market developments), and adjustments may not be automatic. Intervention may be direct or indirect. The Reserve Bank of India follows a managed floating exchange rate as of now.

9.3 NOMINAL VS. REAL EXCHANGE RATES

Central to the decision of whether to buy domestic goods or foreign goods is the price of domestic goods relative to foreign goods. We call this relative price the real exchange rate. The real exchange rate is not directly observable, and you will not find it in newspapers. What you will find in newspapers are nominal exchange rates, the relative prices of currencies.

9.3.1 Nominal Exchange Rate

Nominal exchange rate between two currencies can be quoted in one of the following two ways:

- It is the price of the domestic currency in terms of the foreign currency – If, for example, we look at the US and the Euro area and think of the dollar as the domestic currency and the Euro as the foreign currency, we can express the nominal exchange rate as the price of a dollar in terms of Euros. For instance, an exchange rate of 0.86 means $1 is worth €0.86.
- As the price of the foreign currency in terms of the domestic currency – continuing with the same example, we can express the nominal exchange rate as the price of a Euro in terms of dollars. For instance, the exchange rate defined this way is 1.15 which implies €1 is worth $1.15.

Either definition is fine; we define the nominal exchange rate as the price of the domestic currency in terms of foreign currency and denote it by E. When looking, for example, at the exchange rate between the US and the Euro area (from the viewpoint of the US, so the dollar is the domestic currency), E denotes the price of a dollar in terms of Euros (so, for example, E was €0.86/$).

9.3.2 Change in Exchange Rate

Exchange rates between most foreign currencies change every day and every minute of the day. These changes are called nominal appreciations or nominal depreciations – appreciations or depreciations for short:

An *appreciation* of the domestic currency is an increase in the price of the domestic currency in terms of a foreign currency. In other words, a unit of domestic currency can buy more units of foreign currency. Given our definition of the exchange rate, an appreciation corresponds to an increase in the exchange rate. When the dollar becomes more valuable relative to other currencies, we say that the dollar has appreciated.

A *depreciation* of the domestic currency is a decrease in the price of the domestic currency in terms of a foreign currency. . In other words, a unit of its currency can buy fewer units of foreign currency. So, given our definition of the exchange rate, a depreciation of the domestic currency corresponds to a decrease in the exchange rate, E. In our example, we say that the dollar has depreciated when it becomes less valuable relative to other currencies.

Although the terms appreciation and depreciation are used to describe movements of exchange rates in free markets, a different set of terms is employed to describe increases and decreases in currency values that are set by government decree. These are called *devaluation* and *revaluation*. These two terms are used when countries operate under fixed exchange rates. The label 'fixed' is a bit misleading: it is not the case that the exchange rate in countries with fixed exchange rates never actually changes. But changes are rare. Because these changes are rare, economists use specific words to distinguish them from

the daily changes that occur under flexible exchange rates. A decrease in the exchange rate under a regime of fixed exchange rates is called devaluation rather than depreciation, and an increase in the exchange rate under a regime of fixed exchange rates is called a revaluation rather than an appreciation. In other words, when an officially set exchange rate is altered so that a unit of a country's currency buys fewer units of foreign currency, we say that the devaluation of that currency has occurred. When the exchange rate is altered so that the currency buys more units of foreign currency, we say that an upward revaluation has taken place.

9.3.3 From Nominal to Real Exchange Rate

How do we construct the real exchange rate between the Dollar and the Euro? The US and the Euro area produce many goods, and we want to construct a real exchange rate that reflects the relative price of all the goods produced in the US in terms of all the goods produced in the Euro area. We must use a price index for all goods produced in the US and a price index for all goods produced in the Euro area.

Let P be the GDP deflator for the US, P* be the GDP deflator for the Euro area (as a rule, we shall denote foreign variables with an asterisk) and E be the dollar–euro nominal exchange rate. Two steps are involved in calculating real exchange rate from nominal exchange rate.

1. The price of US goods in dollars is P. Multiplying it by the exchange rate, E – the price of dollars in terms of Euros – gives us the price of US goods in Euros, EP.
2. The price of Euro area's goods in Euro is P*. The real exchange rate (in symbols, say, R), the price of US goods in terms of Euro area's goods, is thus given by

$$R = EP/P^* \quad \text{... (9.1)}$$

The real exchange rate is constructed by multiplying the domestic price level by the nominal exchange rate and then dividing by the foreign price level. Similar to nominal exchange rates, the real exchange rates move over time. These changes are called real appreciations or real depreciations.

An increase in the real exchange rate – that is, an increase in the relative price of domestic goods in terms of foreign goods – is called a **real appreciation**. A decrease in the real exchange rate – that is, a decrease in the relative price of domestic goods in terms of foreign goods – is called a **real depreciation**.

9.4 INTEREST PARITY EQUATION

Openness in financial markets implies that people (or financial institutions, for example, investment trusts, that act on their behalf) face a new financial decision: whether to hold domestic assets or foreign assets. They have to make a choice between the holdings of domestic interest-paying assets versus foreign interest-paying assets. Let us think of these assets for now as domestic one-year bonds

and foreign one-year bonds. Consider, for example, the choice between US one-year bonds and Euro one-year bonds, from your point of view, as a US investor: Suppose you decide to hold US bonds.

Let r_t be the one-year US nominal interest rate in year t (the subscript t refers to the year). Then, for every \$1 you put in US bonds, you will get $\$(1 \times r_t)$ next year.

Suppose you decide instead to hold Euro bonds. To buy Euro bonds, you first buy Euros at nominal exchange rate. Let E_t be the nominal exchange rate between the Euro and the Dollar at the start of year t. For every \$1, you get € E_t. Let r_t^* denote the one-year nominal interest rate on Euro bonds (in Euros) in year t. When the next year comes, you will have € E_t $(1 \times r_t^*)$. You will then have to convert your Euros back into dollars. If you expect the nominal exchange rate next year to be E_{t+1}^e(the superscript 'e' indicates that it is an expectation; you do not yet know what the euro/dollar exchange rate will be in year $t + 1$), each euro will be worth $\$ \frac{1}{E_{t+1}^e}$. So you can expect to have $\$ E_t (1 + r_t^*) \left(1/E_{t+1}^e\right)$ next year for every \$1 you invest now.

Thus, two factors are important while deciding on the bonds you should hold, viz., (i) the relative interest rates in the US and the Euro area; and (ii) the expected nominal exchange rate between Dollar and Euro. You should note that, it is expected exchange rate – therefore, involves certain uncertainty. If investment in a currency is found to be risky (because of country specific incidents such as war, recession, political instability, etc.), there is sudden and widespread outflows of capital from that country. Such conditions lead to unexpected and substantial depreciation of that currency.

Let us now assume that financial investors care only about the expected rate of returns and therefore want to hold only the asset with the highest expected rate of returns. In that case, if both US bonds and Euro bonds are to be held, they must have the same expected rate of returns. In other words, the following relationship must hold:

$$(1 + r_t) = E_t (1 + r_t^*) \left(1/E_{t+1}^e\right) \quad \text{... (9.2)}$$

Reorganising the above, we have

$$(1 + r_t) = (1 + r_t^*) \left(E_t/E_{t+1}^e\right) \quad \text{... (9.3)}$$

Equation (9.3) is called the 'uncovered interest parity relation'. The assumption that financial investors will hold only the bonds with the highest expected rate of returns is obviously too strong, for two reasons:

1) It ignores transaction costs. Going into and out of US bonds requires three separate transactions, each with a transaction cost.

2) It ignores risk. The exchange rate a year from now is uncertain; holding US bonds is therefore more risky, in terms of Euros, than holding Euro bonds.

The adjective 'uncovered' is added to distinguish this relation from another relation called the 'covered interest parity condition'. The covered interest parity condition is derived by looking at the following choice: Buy and hold Euro bonds for one year. Or buy dollars today, buy one-year US bonds with the proceeds and agree to sell the dollars for Euros a year ahead at a predetermined price (called the forward exchange rate). The rate of returns to these two alternatives, which can both be realised at no risk today, must be the same. The covered interest parity condition is a riskless arbitrage condition.

Interest Rate and Exchange Rate

Let us get a better sense of what the interest parity condition implies. First, let us rewrite E_t/E^e_{t+1} as $\mathbf{1}/[\mathbf{1} + (\boldsymbol{E^e_{t+1}} - \boldsymbol{E_t})/\boldsymbol{E_t}]$

Replacing E_t/E^e_{t+1} with above expression in equation (9.2) gives

$$(\mathbf{1} + \boldsymbol{r_t}) = \frac{(1+r^*_t)}{[1+(E^e_{t+1}-E_t)/E_t]} \quad \text{... (9.4)}$$

Equation (9.4) indicates the relationship between domestic nominal interest rate, r_t and foreign nominal interest rate, r_t^*, and expected rate of appreciation of the domestic currency,

$(E^e_{t+1} - E_t)/E_t$

A good approximation to the above is given by

$$\boldsymbol{r_t} \approx \boldsymbol{r^*_t} - \left(\boldsymbol{E^e_{t+1} - E_t}/\boldsymbol{E_t}\right) \quad \text{... (9.5)}$$

Equation (9.5) is called the interest parity condition. The left-hand side of equation (9.5) is the rate of return on dollar assets and the right-hand side is the expected rate of return on euro assets when expressed in dollars. The interest parity condition thus holds when the expected returns on deposits of any two currencies, measured in the same currency are equal. This is the form of the interest parity condition you must remember: *arbitrage by investors implies that the domestic interest rate must be equal to the foreign interest rate minus the expected appreciation rate of the domestic currency*. Note that the expected appreciation rate of the domestic currency is also the expected depreciation rate of the foreign currency. Thus, equation (9.5) is equivalent to the following: *the domestic interest rate must be equal to the foreign interest rate minus the expected depreciation rate of the foreign currency*.

Check Your Progress 1

1) What are the different kinds of exchange rate regimes? State the difference among them.

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2) What is meant by interest parity condition?

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9.5 ASSET MARKET APPROACH TO EXCHANGE RATE DETERMINATION

Market determined exchange rates exhibit considerable volatility. A variety of studies shows that the volatility of short-run exchange rate returns is indistinguishable from stock or bond market volatility. Because of this similarity, most economists rely on asset market models to explain short-run exchange rate behaviour. The chief characteristic of an asset market model is its emphasis on forward-looking behaviour. Asset prices today are determined in large part on expectations of the future performance of an asset. If people think an asset will rise in value in the future, they will be willing to pay more for that asset today, and its price will tend to rise. The same logic holds for foreign currencies.

9.5.1 Expected Rate of Return to Assets

Suppose today's euro/dollar rate is €1.00 per dollar and the exchange rate you expect after one year is €1.05 per dollar. Then the expected rate of dollar appreciation against the euro is $(1.05 - 1.00)/1.00 = 0.05$ or 5 percent per year. It means that a euro deposit must give 5% extra returns than a dollar deposit to compensate for the loss in value on converting euro into dollar after a year because of dollar appreciation.

Now suppose that today's exchange rate suddenly jumps up to €1.03 per dollar (an appreciation of dollar and a depreciation of euro) but the expected future rate is still €1.05 per euro. The expected rate of appreciation is now only $(1.05 - 1.03)/1.03 = 0.019$ or 1.9 percent instead of 5 percent. Since r_E has not changed, the dollar return on euro deposits, which is the difference between r_E and the expected rate of appreciation, has risen by 3.1 percentage points per year (5 percent – 1.9 percent).

An appreciation of dollar against the euro makes euro deposits more attractive relative to dollar deposits (by increasing the expected dollar returns on euro deposits). To arrive at this result, we have assumed that the expected future euro/dollar rate and interest rates do not change. A dollar appreciation today, for example, means the dollar now needs to appreciate by a smaller amount to reach any given expected future level.

Figure 9.1 shows that for fixed values of the expected future euro/dollar exchange rate and the euro interest rate, the relation between today's euro/dollar exchange rate and the expected dollar returns on euro deposits is an upward sloping schedule.

Fig. 9.1: Expected Rate of Return of Euro Assets in Dollars

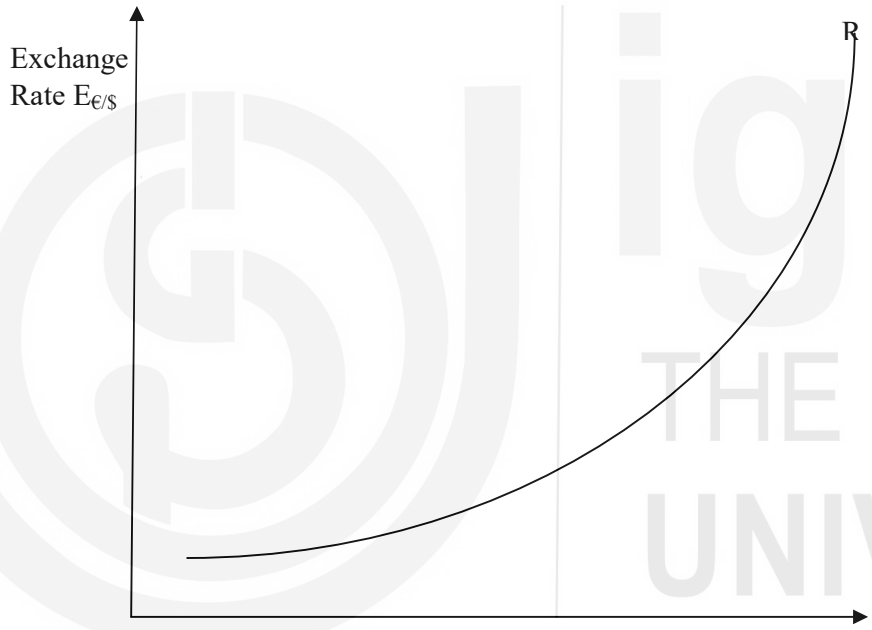


Fig. 9.1 illustrates the RR schedule as a relation between today's euro/dollar exchange rate and the expected dollar return on euro deposits.

9.5.2 Foreign Exchange Market Equilibrium: Asset Market Approach

Foreign exchange market will be in equilibrium when interest parity condition holds. Foreign exchange market is in equilibrium when deposits of all currencies offer the same expected rate of returns. The condition that the expected returns on deposits of any two currencies are equal when measured in the same currency is called the interest parity condition. Let us see why foreign exchange market is

in equilibrium when the interest parity condition holds. Suppose that the dollar interest rate is 6 percent and euro interest rate is 10 percent but dollar is expected to appreciate at 6 percent over a year. In this circumstance, the expected rate of returns on euro deposits would be 2 percent lower than that on dollar deposits. This means that no one will be willing to continue holding euro deposits and the holders of euro deposits will be trying to sell them for dollar deposits. There will therefore be an excess supply of Euro deposits and an excess demand for Dollar deposits in the foreign exchange market.

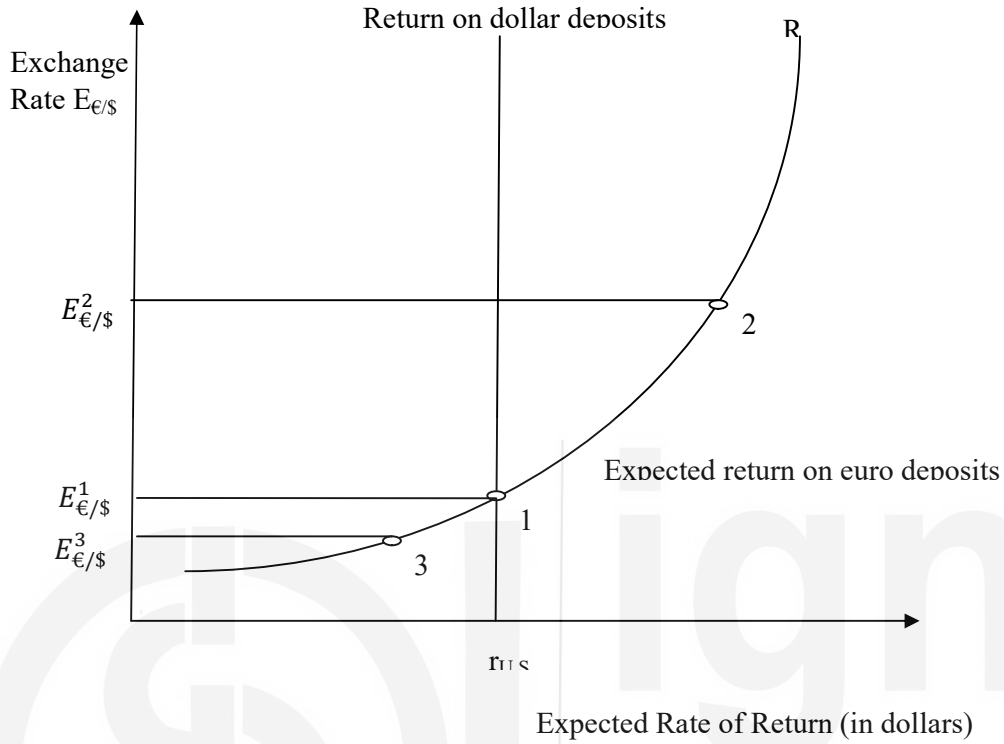
When all expected rates of returns are equal (that is, when interest parity holds), there is no excess supply of certain type of deposit and no excess demand for another. Thus, the foreign exchange market is in equilibrium when the following condition is met:

Expected rate of return on Dollar deposits = Expected rate of return on Euro deposits

$$r_{US} = r_E - \left(\frac{E^e_{€/\$} - E_{€/\$}}{E_{€/\$}}\right) \quad \text{... (9.6)}$$

In Figure 9.2, the vertical schedule indicates r_{US} , the return on dollar deposits measured in terms of dollars. The upward sloping schedule, RR shows how the expected return on euro deposits, measured in terms of dollars depends on the current euro/ dollar exchange rate. The equilibrium euro/dollar rate is the one indicated by the intersection of the two schedules at point 1, $E^1_{€/\$}$. At this exchange rate, the returns on dollar and euro deposits are equal, so that the interest parity condition, $r_{US} = r_E - \left(\frac{E^e_{€/\$} - E_{€/\$}}{E_{€/\$}}\right)$, is satisfied. The upward sloping schedule measuring the expected euro return on dollar deposits tells us that at the exchange rate $E^3_{€/\$}$, the rate on euro deposits is less than the rate of return on dollar deposits, r_{US} . In this situation anyone holding euro deposits wishes to sell them for the more lucrative dollar deposits. The foreign exchange market is out of equilibrium. The unhappy owners of euro deposits attempt to sell them for dollar deposits, but because the return on dollar deposits is higher than that on euro deposits at the exchange rate, $E^3_{€/\$}$, no holder of a dollar deposit is willing to sell it for euro at that rate. As euro holders try to entice dollar holders to trade by offering them a better price for dollar, the euro/dollar exchange rate rises towards $E^1_{€/\$}$ that is, euors become cheaper in terms of dollars. Once the exchange rate reaches $E^1_{€/\$}$, euro and dollar deposits offer equal returns and holders of euro deposits no longer have an incentive to try to sell them for dollars. The same process works in reverse if we were initially at point 2 with an exchange rate of $E^2_{€/\$}$. At point 2, the return on euro deposits exceeds that on dollar deposits, so there is now an excess supply of the latter. As unwilling holders of dollar deposits bid for the more attractive euro deposits, the price of euro in terms of dollars tends to rise that is, the Dollars tend to depreciate against the Euro. When the exchange rate has moved to $E^1_{€/\$}$, rates of return are equalized across currencies and the market is in equilibrium.

Fig. 9.2: Equilibrium in the Foreign Exchange Market: Asset Approach



In Fig. 9.2, the vertical schedule indicates the returns to dollar deposits measured in dollars and the RR schedule which represent the relation between the expected return on euro deposits measured in dollars and the current exchange rate. Equilibrium occurs at point 1, where two schedules intersect.

9.6 PURCHASING POWER PARITY (PPP)

The short run movements in the exchange rates are governed by asset market conditions, the long run fluctuations in the exchange rates are anchored by goods market conditions. The long run pattern is known as purchasing power parity. The notion of PPP is one of the oldest concepts in economics.

Purchasing Power Parity (PPP) theory is based on the 'Law of One Price'. Goods denominated in the same currency should have identical price between markets after adjusting for transportation costs. If a price difference exists between two markets, then *arbitrage* is possible. Traders would buy products from the low-price market and sell it in the high-price market. Consequently, prices would converge to one price across all markets as traders shift the supply of goods from the low-price market to the high-price market.

The prices in the high-price market would fall while prices in the low-price market would rise over time.

Price could differ between markets because the price differential reflects the transportation costs of the product from one market to another. Nevertheless, the PPP helps predict changes in exchange rates.

The PPP refers to the idea that the same basket of goods should cost the same when prices are measured in the same currency regardless of where it is located. So, for instance, suppose $P_{\$}$ is the price of a bundle of goods in the United States and let $P_{€}$ equal the price of an identical bundle in Italy (measured in Euros). If the two bundles are to have the same price, the following relationship must hold:

$$\mathbf{E_{€/\$} = \frac{P_{€}}{P_{\$}}} \quad \textbf{... (9.7)}$$

The theory of PPP says that the long-run equilibrium value of the actual exchange rate will be $E_{€/\$}$. The PPP theory therefore predicts that a fall in a currency's domestic purchasing power (as indicated by an increase in the domestic price level) will be associated with a proportional currency depreciation in the foreign exchange market. Symmetrically, PPP predicts that an increase in the currency's domestic purchasing power will be associated with a proportional currency appreciation.

By re-arranging, we get

$$\mathbf{P_{\$} = \frac{P_{€}}{E_{€/\$}}} \quad \textbf{... (9.8)}$$

The left side of equation (9.8) is the dollar price of the reference commodity basket in the US; the right side is the dollar price of the reference basket when purchased in Euro area. Thus, PPP asserts that the price levels of all the countries are equal when measured in terms of the same currency.

Let us take an example to understand this. Suppose the CPI for the US equals $755.3 while the CPI for Euro area is €1,241.2 Euros. Thus, the absolute PPP predicts the exchange rate should be 1.64 Euros per dollar.

$$\mathbf{E_{€/\$} = \frac{P_{€}}{P_{\$}} = \frac{1241.2\ Euros}{755.3\ Dollars} = \frac{1.64\ Euros}{1}}$$

If the spot exchange rate is 1.4 Euros per 1 dollar, subsequently, traders use arbitrage. The CPI in U.S. in Euros is 1057.42 (or $755.3 * 1.4 €/$) which is smaller than the CPI of the Euro area. Thus, traders could profit by purchasing a basket of goods from US and selling it in the Euro area. Thus, they potentially earn €1,241.20 – €1,057.42 = €183.78 per basket of goods.

Absolute PPP and Relative PPP

The statement that exchange rates equal relative price levels is sometimes referred to as the absolute PPP. Absolute PPP implies a proposition known as the relative PPP, which states that the percentage change in the exchange rate between two currencies over any time period equals the difference between percentage changes in national price levels during the same time period. Relative

PPP thus translates absolute PPP from a statement about price and exchange rate levels into one about price and exchange rate changes. It asserts that prices and exchange rates change in a way that preserves the ratio of each currency's domestic and foreign purchasing power.

Foreign country's (Euro area in our example) inflation between now and period T = $\pi_€$

Domestic country's (US in our example) inflation between now and period T = $\pi_\$$

$E^0_{€/\$}$ and $E^T_{€/\$}$ are the domestic exchange rates (defined as euros per dollar) measured at time 0 and T. Thus, the exchange rate at time 0 is $E^0_{€/\$} = \frac{P_€}{P_\$}$

The exchange rate at time T is $\boldsymbol{E^T_{€/\$} = \frac{P_€(1+\pi_€)}{P_\$(1+\pi_\$)}}$ **... (9.9)**

Exchange rate change will then be

$$\frac{E^T_{€/\$} - E^0_{€/\$}}{E^0_{€/\$}} = \frac{\frac{P_€(1+\pi_€)}{P_\$(1+\pi_\$)} - \frac{P_€}{P_\$}}{\frac{P_€}{P_\$}} \quad \text{... (9.10)}$$

$$= \frac{1+\pi_€}{1+\pi_\$} - 1 \quad \text{... (9.10 a)}$$

We use linear approximation to obtain the following

$$\frac{E^T_{€/\$} - E^0_{€/\$}}{E^0_{€/\$}} \approx \pi_€ - \pi_\$ \quad \text{... (9.10 b)}$$

If the US price level rises by 10 percent over a year and Euro area's rises by only 5 percent, for example, relative PPP predicts a 5 percent depreciation of the dollar against the euro. The dollar's 5 per cent depreciation against the Euro just gets cancelled with the 5 per cent extra inflation in the US than the Euro area, leaving the relative domestic and foreign purchasing powers of both currencies unchanged.

9.7 MONETARY APPROACH TO EXCHANGE RATE DETERMINATION

The theory of PPP is a statement that exchange rates and domestic and foreign price levels should move together in the long run. It says nothing about what causes any of these three variables to move. To close the circle, we need to add elements to the model. This is done with a theory of exchange rate behaviour known as monetary approach to exchange rate determination. The monetary approach to exchange rate is the workhorse theory of long-run exchange rate behaviour. It was developed in the 1970s by economists at University of Chicago and has been widely studied over the past 40 years.

The monetary approach to exchange rate has two fundamental building blocks. The first is purchasing power parity. The second is the agents in the two countries in question have well defined stable demands for real money balances as a function of national income and interest rates. Imposing money market equilibrium and PPP, it is straight forward to show that the theory predicts the following equation for the exchange rate:

$$\mathbf{E}_{€/\$} = \frac{\mathbf{P}_€}{\mathbf{P}_\$}$$

Money Market will be in equilibrium when the demand for money exactly matches the supply of money. The money is demanded for three motives namely transaction motive, precautionary motive and speculative motive by households, firms and governments. The aggregate demand for money in turn is affected by three factors: (i) The interest rate: A rise in the interest rate causes each individual in the economy to reduce their demand for money; (ii) The price level: If the price level rises, agents will have to spend more than before to purchase the same basket, they will therefore have to hold more money; and (iii) Real national income: An increase in the real national income raises the demand for money, given the price level. If P is the price level, r is the interest rate, and Y is real GNP, the aggregate demand for money, M^d , can be expressed as

$$\boldsymbol{M^d = P \times L(r, Y)} \quad \textbf{... (9.11)}$$

Thus, aggregate real money demand, (r, Y) , is equal to

$$\frac{\boldsymbol{M^d}}{\boldsymbol{P}} = \boldsymbol{L(r, Y)} \quad \textbf{... (9.12)}$$

Money Supply: An economy's supply of money is controlled by the central bank. We will thus take the real money supply, $\frac{M^s}{P}$, as given.

The equilibrium in the money market is given by the equality between real money demand and real money supply.

$$\frac{\boldsymbol{M^s}}{\boldsymbol{P}} = \frac{\boldsymbol{M^d}}{\boldsymbol{P}} \quad \textbf{... (9.13)}$$

From equation (9.12) we get:

$$\frac{\boldsymbol{M^s}}{\boldsymbol{P}} = \boldsymbol{L(r, Y)} \quad \textbf{... (9.14)}$$

By re-arranging equation (9.14), we can explain the domestic price level in terms of domestic money demand and supply.

$$\boldsymbol{P_{US}} = \frac{\boldsymbol{M^s_{US}}}{\boldsymbol{L(r_{\$}, Y_{\$})}} \quad \textbf{... (9.15)}$$

In the case of Euro area

$$\boldsymbol{P_E} = \frac{\boldsymbol{M^s_E}}{\boldsymbol{L(r_€, Y_E)}} \quad \textbf{… (9.16)}$$

The monetary approach makes the general prediction that the exchange rate, which is the relative price of the US and the Euro area, is determined in the long run by the relative supplies of those monies and the relative real demands for them. Shifts in interest rates and output levels affect the exchange rate only through their influences on money demand. In addition, the monetary approach makes a number of specific predictions about the long run effects on the exchange rate of changes in money supplies, interest rates and output levels.

a) Money supplies: Other things equal, a permanent rise in US money supply M_{US}^{S} causes a proportional increase in the long run US price level P_{US}. Under PPP, an increase in the U.S. money supply causes a proportional long run depreciation of the dollar against the euro. Predictions in part (a) should seem straightforward. In essence, they say that if a country prints more of its own money (everything else held constant), it will decrease in value in foreign exchange markets. This is because a rise in home (foreign) money will introduce inflationary pressures in home (foreign) country.

b) Interest rates: A rise in the interest rate $r_{\$}$ on dollar denominated assets lowers real U.S. money demand, $L(r_{\$}, Y_{US})$. By equation 9.15, the long run U.S. price level rises, and under PPP the dollar must depreciate against the euro in proportion to this U.S. price level increase.

c) Output levels: A rise in U.S. output raises real U.S. money demand $(r_{\$}, Y_{US})$, leads to a fall in the long run U.S. price level (equation 9.15). According to PPP, there is an appreciation of the dollar against the euro.

Predictions (b) and (c) show how changes in variables that influence money demand (everything else held constant) also can influence the exchange rate. In particular, growth in the home (foreign) interest rate lowers money demand and raises home (foreign) prices. Working through PPP, this depreciates (appreciates) the exchange rate. Growth in home (foreign) income raises money demand and puts downward pressure on home (foreign) prices. Working through PPP, this appreciates (depreciates) the exchange rate.

Check Your Progress 2

1) State the difference between absolute PPP and relative PPP.

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2) Explain the general prediction of the monetary approach to long run exchange rate determination.

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9.8 LET US SUM UP

In this unit, we understand how exchange rates are determined through interplay of interest rates, price level and money supply-demand. Exchange rates which are the price of domestic goods relative to foreign goods is central to the decision of export and import and hence, to international trade. A country's decision on whether market forces will determine its exchange rate or government will maintain a constant exchange rate or monetary authority will influence exchange rate, will determine its exchange rate regime- fixed; floating or managed floating. The asset approach to exchange rate determination is based on the premise that asset prices today are determined in large part on expectation of the future performance of an asset. Central to the determination of exchange rate is the interest parity condition which holds when the expected return on deposits of any two currencies, measured in the same currency are equal. Foreign exchange market attains equilibrium when interest parity holds. This is how equilibrium exchange rate is determined. Economists believe that long run exchange rates are determined by the monetary approach to exchange rate determination based on (a) PPP and (b) stable demands for real money balances as a function of national income and interest rates. PPP implies that exchange rates are determined by relative price levels. Imposing money market equilibrium and PPP, the monetary approach makes the general prediction that the exchange rate is fully determined in the long run by the relative supplies of those monies and the relative real demands for them.

9.9 ANSWER TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) There are three basic types of exchange rate regimes: floating – wherein a currency's value is allowed to fluctuate according to the foreign exchange market; fixed – wherein government try to maintain a currency value that is constant against a specific currency or good; managed floating- wherein monetary authority attempts to influence the exchange rate without any specific target.

2) Interest parity condition holds when the expected return to deposits of two currencies are equal, when measured in the same currency. This implies that

domestic interest rate must equal foreign interest rate minus the expected appreciation rate of the domestic currency.

Check Your Progress 2

1) Absolute PPP implies that the exchange rates equal relative price levels. Relative PPP states that the percentage change in the exchange rate between two currencies over any period equals the difference between percentage changes in national price levels.

2) It states that the exchange rate is fully determined in the long run by the relative supplies of those monies and the relative real demands for them. Shifts in interest rates and output levels affect the exchange rate only through their influences on money demand.