PGBA (S4) 04

INTERNATIONAL FINANCE

SEMESTER - 4

BUSINESS ADMINISTRATION

(Finance Specialisation)

BLOCK - 1

KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY

Subject Experts

Prof. Nripendra Narayan Sarma, Maniram Dewan School of Management, KKHSOU.
Prof. U. R Dhar, Retd. Professor, Dept of Business Administration, GU.
Prof. Mukulesh Baruah,Director, Assam Institute of Management.

Course Co-ordinator : Dr. Chayanika Senapati, Asst. Prof., KKHSOU
Dr. Smritishikha Choudhury, Asst. Prof., KKHSOU

SLM Preparation Team

UNITS	CONTRIBUTORS
1 & 3	Dr Devajeet Goswami,KKHSOU
2,5,6,7	Suman Sarmah, Gauhati Commerce College
4	Dr. Dipankar Malakar,KKHSOU

Editorial Team

Content :
1,2,3,4,5,6,7, Sweta Jalan,NERIM

Structure, Format & Graphics: Dr. Chayanika Senapati, KKHSOU
Dr. Smritishikha Choudhury,KKHSOU

June , 2018

ISBN :

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Printed and published by Registrar on behalf of the Krishna Kanta Handiqui State Open University.

Headquarters: Patgaon, Rani Gate, Guwahati-781017
City Office: Housefed Complex, Dispur, Guwahati-781006; Web: www.kkhsou.in

The University acknowledges with thanks the financial support provided by the Distance Education Bureau, UGC for preparation of this material.

MASTER IN BUSINESS ADMINISTRATION

INTERNATIONAL FINANCE
(FINANCE SPECIALISATION)
Block 1

DETAILED SYLLABUS

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UNIT 6: Currency & Interest Futures **Page No. : 131 – 157**

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Exchage Rate System:An Introduction, Purchasing Power Parity Relationship,Level of Appreciation/Depreciation, Interest Rate Parity Relationship, Exchange Rate and Foreign Exchange Reserves, Exchange- Rate and Balance of Payments (BOP), Exchange Rate and Technical Analysis

COURSE INTRODUCTION

The course deals with contemporary financial environment and strategies and the functional as well as operational aspects in the international financial arena. The global financial landscape is changing fast with the integration of financial markets and mind-boggling technological advances. Economic events, government policies, and investor sentiments in any part of the world impact the financial markets across the world, exposing most businesses to market fluctuations.

This book, an updated and enlarged edition of 'International Finance: A Business Perspective', equips corporate treasurers and finance managers with the conceptual understanding of global financial markets, instruments and products. It enables them to analyze market opportunities and associated financial risks, and also familiarizes them with the available funding avenues.

Considering these factors the course 'International Finance' has been developed. The course has 14 units and is divided into two blocks: Block 1 and Block 2.

Block 1 deals with the introductory concepts of Financial Management in Global Context,Nature and Management of Exchage Rate Risk,Balance of Payment,Foreign Exchange Market ,Fututre, Options, Swaps and Parity,Currency & Interest Futures, Exchange Rate Determination, Foreign Trade Finance

Block 2 concentrates on nature and Measurement of Foreign Exchange Exposure,International Capital Structure,International Capital Budgeting,International Taxation,International Portfolio Investment and Global Financial Instrument

Each unit of these blocks includes some along-side boxes to help you know some of the difficult, unseen terms. Some "EXERCISES" have been included to help you apply your own thoughts. You may find some boxes marked with: "LET US KNOW". These boxes will provide you with some additional interesting and relevant information. Again, you will get "CHECK YOUR PROGRESS" questions. These have been designed to self-check your progress of study. It will be helpful for you if you solve the problems put in these boxes immediately after you go through the sections of the units and then match your answers with "ANSWERS TO CHECK YOUR PROGRESS" given at the end of each unit. you in making your learning more active and efficient. And, at the end of each section, you will get "CHECK YOUR PROGRESS" questions. These have been designed to self-check

BLOCK INTRODUCTION:

This is the first block of the course 'International Finance'. The Block is divided into 8 units and is primarily a learner oriented Self learning material, as it satisfies the requirements of the learners in the filed of 'International Finance'.

This block comprises of the following eight units:

The first unit introduces us to conceptualization of Financial Management in Global Context, Globalization in Indian Context,Globalization: Expanding the Scope for Business Organizations,Features and Scope of International Financial Management,Domestic Vs International Financial Management,International Finance Functions and Challenges in International Financial Management

The second unit gives us to idea about Exchange Rate Risk: An Introduction, Different Types of Exchange Rate Risk,Transaction Exposure, Translation Exposure,Economic Exposure,Exchange Risk Management

The third unit gives us an idea on the Concept of Balance of Trade, Concept of Balance of Payment, Structure of Balance of Payment, Equilibrium in Balance of Payment, Causes of Disequilibrium in Balance of Payment, Methods of Correcting Disequilibrium and Economic Development and BoP

The fourth unit will help us in undersatnding the Concept of foreign exchange market, Functions of Foreign Exchange Market, Dealers in the Foreign Exchange Market, Exchange Rate, Advantages and Disadvantages of Fixes and Flexible Exchange Rate, Exchange Quotations, Merchant Rate and Transactions in the Foreign Exchange Market

The fifth unit gives us a broad idea on concept of Fututre, Option and Swap, Features of Currency Futures,comparison Between Forward and Futures Contract,Currency Options,Important Terms relating to Options,Dealing in Currency Options,put-Call Parity Relationship and Currency Swaps

The sixth unit will help us in understanding the meaning of Spot Exchange Market,Participants in the Spot Market,Exchange Rate Quotations:Direct and Indirect Quotation,Reciprocal Rates,Cross Rates,Arbitrage, Forward Rate and Forward Market

The seventh unit gives us an idea on concept of Exchage Rate System:An Introduction, Purchasing Power Parity Relationship,Level of Appreciation/Depreciation, Interest Rate Parity Relationship, Exchange Rate and Foreign Exchange Reserves, Exchange- Rate and Balance of Payments (BOP), Exchange Rate and Technical Analysis

The Block is devided into eight units:

UNIT 1: Financial Management in Global Context

UNIT 2: Nature and Management of Exchage Rate Risk

UNIT 3: Balance of Payment

UNIT 4: Foreign Exchange Market

UNIT 5: Fututre, Options, Swaps and Parity

UNIT 6: Currency & Interest Futures

UNIT 7: Exchange Rate Determination

UNIT 1: FINANCIAL MANAGEMENT IN GLOBAL CONTEXT

UNIT STRUCTURE

1.1 Learning Objectives

1.2 Introduction

1.3 Conceptualization of Financial Management in Global Context

1.4 Globalization in Indian Context

1.5 Globalization: Expanding the Scope for Business Organizations

1.6 Features and Scope of International Financial Management

1.7 Domestic Vs International Financial Management

1.8 International Finance Functions

1.9 Challenges in International Financial Management

1.10 Let Us Sum Up

1.11 Further Reading

1.12 Answers to Check Your Progress

1.13 Model Questions

1.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- learn international financial management
- explain the impact of globalization in India
- discuss the impact of globalizations on business firms
- explain the features and scope of international financial management
- describe the international finance functions
- explain the challenges in international financial management.

1.2 INTRODUCTION

You are aware that finance is the life blood of any business organization. Therefore, financial management plays a crucial role in business organizations. The responsibility of the finance manager is multifold. A finance manager is responsible for making available the required funds

for the company and at the same time the finance manager must also be cautious about the profitability of the firm and capital appreciation of the shareholders. He/ she have to make a balance among the varied objectives of the firm. The finance manager must be aware about the different sources of funds and their advantages and disadvantages, lending rates etc. These functions become more complicated in international business where he/ she have to consider the international financial market, international financial instruments to raise funds and to bear the risk of volatility of foreign exchange market, currency convertibility, different tax systems, change in political, economic, legal environments of the foreign countries etc.

In this unit we will discuss the different aspects of international financial management. This unit will help you in gaining knowledge about the different features of international financial management, differences between domestic and international financial management as well as the different international finance functions and the challenges in international financial management.

Perhaps you are aware about the different economic zones created by countries to enhance their trade like, Eurozone, Association of Southeast Asian Nations (ASEAN), South Asian Association for Regional Cooperation (SAARC), Brazil, Russia, India and China (BRIC) etc. as well as the recent trend in the form of withdrawal of Britain from Eurozone, trade war between USA and China etc. All these trends make this topic more interesting and challenging.

1.3 CONCEPTUALIZATION OF FINANCIAL MANAGEMENT IN GLOBAL CONTEXT

Financial management is a part and parcel of everyone's life. An individual's financial management may be limited to certain activities like, matching the expenditure with income, savings for the future, investment in mutual funds, shares, risk coverage through life and non- life insurance and the like. Financial management becomes more important and complex when it is connected with a business organization. Considering the different projects a business firm undertakes, it has to find out the sources of funds,

profitability, structuring of capital structure and so on. All these functions have an impact on the organization and more prudent a firm is in managing its financial activities better will be the result in terms of efficiency, profitability and success.

As in this unit we are going to discuss financial management in global context, we will focus on certain aspects of international financial management emphasizing on globalization, scope as well as challenges of international finance functions etc. In this respect, let us first have a brief discussion on what globalization is. International Financial Management (IFM) refers to the financial management in global business environment. It is also termed as international finance. As international business is done through foreign exchange, IFM is concerned with exchange rate, international financial market, risk management in international business etc.

1.4 GLOBALIZATION IN INDIAN CONTEXT

Globalization dates back to the post- World War II when World Bank and IMF were set up in 1944 and 1945 respectively. Globalization refers to removing the barriers for free movement of goods, services, finance, people, ideas and knowledge across the globe. It enables a country to merge its economy with the rest of the world and thereby it becomes a part of global economy. The economy of the home country integrates with the global economy and a result, the economic waves in the global economy are bound to feel in the home country. The fruits of growth of the global economy can be enjoyed in the home country. However, slow down in the global economy may produce adverse affects on the economy of a home country.

India is one of the founder members of these international organizations viz. the World Bank and the IMF. In the context of India, the importance of international financial management become important after India opened up its economy by ushering the policy of globalization in the year 1991. As a consequence of globalization, Indian economy received a boost up and from a very uncomfortable economic situation, it evolved as a great economic power in the present time. Globalization supported by policies of liberalization and privatization make India a super economic power.



CHECK YOUR PROGRESS

Q 1: Define international financial management.

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Q 2: What is meant by globalization?

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1.5 GLOBALISATION: EXPANDING THE SCOPE FOR BUSINESS ORGANISATIONS

Globalization created new markets. These markets are outside the national boundaries having different features as opposed to national markets. These markets are full of opportunities as well as challenges. Companies have taken advantage of these and expanded their businesses. Now, they have shifted their focus from national to global customer and from local to international production facilities. Obviously, finance function is not an exception to this. The companies started to tap the multidimensional and complex international financial markets to meet the requirements of finance for their companies. Hence, it increases the importance of studying the international financial management. Finance managers have to think about raising funds from international markets, international mergers and acquisition, exchange rate etc.

1.6 FEATURES AND SCOPE OF INTERNATIONAL FINANCIAL MANAGEMENT

International financial management (IFM) is related with international business. It is concerned with financing decisions to optimize the utilization of finance in the sphere of international business.

IFM has certain special features which may be stated as under-

- **Foreign Exchange Risk:** In simple terms, foreign exchange means the currency of a foreign country. For example, India Rupee is foreign

exchange for Japanese people and the Yen is the foreign exchange for an Indians. In international trade, payments are made through the foreign exchange and the exchange rate always a play a decisive role in such payments. Exchange rate refers to the rate at which one currency is exchanged for another. The foreign exchange rates depend on various factors and it is very volatile. Any change in exchange rate will have a bearing on the profitability of the firm that deals in international market.

- **Political Risk:** IFM is always surrounded by political risks which may arise from any change in political environment in a country where an MNC is operating. Change in government policies, war between the countries etc. will have an adverse affect on the business which possesses a challenge for the finance manager.
- **Market Imperfection:** International business is full of market imperfection in the form of varied national laws, tax system, changing customers' demands, social and cultural environments etc. All these possess risks as well as the opportunities for international business firms.

  The scope of international financial management is very wide and includes different aspects of macro economics. Some of these are listed below-

  - International institutions
  - Balance of Payments
  - International Financial Markets
  - Forex markets
  - International financial services
  - International taxation
  - International accounting



CHECK YOUR PROGRESS

Q 3: State two features of IFM.

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1.7 DOMESTIC Vs INTERNATIONAL FINANCIAL MANAGEMENT

The integration of national economies created the concept of global economy leading to the emergence of business organizations which operates in different countries. They are called Multinational Corporations (MNCs) and Transnational Corporations (TNCs). The financial managers of these corporations are performing the same finance functions as in domestic business organizations, like, raising and investment of funds, dividend payment etc. but the nature of their work is different owing to their multinational presence. Different countries have their own set of rules and regulations governing the business environment and the MNCs have to operate in accordance with the local rules and regulations of each country. The job of a finance manager becomes difficult in MNCs. The job is complex because of complexity of international finance market, different financial instruments, investment products etc. Any change in export- import policy, exchange rate, interest rate, inflation or deflation, competition in international market etc. may affect their business interest and required quick response.

1.8 INTERNATIONAL FINANCE FUNCTIONS

You may have heard that companies adopt measures to control cost like job cut, discontinuance of a product etc. or innovate production methods to increase efficiency. The objective of all these activities is to make the organization efficient. This is done through finance function. Finance function plays the crucial role in every organization whether it is operating domestically or internationally. Finance function is the part of financial management and the financial manager is responsible for the finance functions.

The finance functions are concerned with designing the capital structure, working capital management, capital budgeting, long- term financing etc. In case of international business, the scope of these functions becomes very wide and complex as well. The global firms have access to international financial markets, international financial instruments, and

international investors. The finance functions in international perspective may be discussed as under-

- **Financing decisions:** Financing decisions are concerned with raising of funds required for the company. The sources of financing are classified as equity and borrowed. MNCs having access to international financial market raise funds from international stock market, borrow money from global debt market in different currencies. They confront with issues in foreign exchange, currency convertibility, money transfer, different tax system, exchange control, dividend remission policies etc. An unique internal source of fund for an MNC include loans, investment through equity capital, interfirm receivables and payables and dividends. Funds can move from the parent to subsidiary or subsidiary to parent or among the subsidiaries. Transfer pricing is used in such movements. They can borrow fund from the countries where there is high tax rate and can lend the excess cash to subsidiaries in countries with lower rates.
- **Investment decisions:** Investment decisions relates to the application of company's funds in profitable avenues so as to maximize company's profits and wealth of shareholders. It involves working capital management, capital budgeting decisions, acquisition and merger etc. When investing in a foreign project, an MNC has to consider the net present value or the internal rate of return from the potential project and compare it with other projects in other foreign countries to determine where its resources would be invested so as to earn maximum profits. The company may enjoy the benefit of diversification of investment projects but at the same time certain factors have to be considered while taking investment decisions like, the economic, legal, political environments; exchange rates, interest rate, inflationary pressure in the countries where it desires to operate etc.
- **Dividend decisions:** Dividend means the share of profit distributed among the owners of the company. Here, the company have to decide how much to retain as reserve for future requirements of the company, how much to pay as dividend and how to satisfy the objective of wealth

maximization of shareholders. The dividend decision is influenced by the tax rate, exchange rate, interest rate etc.



CHECK YOUR PROGRESS

Q 4: Discuss the financing decision of IFM.

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1.9 CHALLENGES IN INTERNATIONAL FINANCIAL MANAGEMENT

International financial system operates under multiple factors and these become complex because international business is influenced by the policies of national economies merged into the global economy. There are global institutions which monitor the international trade and business like, World Trade Organization (WTO), International Monetary Fund (IMF), United Nations Conference on Trade and Development (UNCTAD), besides the multiple economic cooperation among the countries like Euro zone, Organization of Petroleum Exporting Countries (OPEC), the various bilateral and multilateral trade agreements. Therefore, even a small export unit requires to be well versed in international trade and must understand the effect of change in exchange rate, FOREX market, economic and political environments of the trading countries and so forth. The challenges in IFM may be discussed as under-

- **Diverse Economic Environment:** The business firms have to operate under the different economic conditions of the countries. The economic policies, economic conditions, tax system and other legal conditions are unique in each country. Therefore, the Chief Financial Manager (CFO) has to continuously monitor the happening in the trading countries.
- **Risk management:** The international business firms have to assess the risks that they may encounter in the course of trading with different countries. Uncontrolled inflationary or deflationary pressure, war, change in political regime etc. may hamper investments and profitability

of the business. All these conditions create challenges in IFM.

- **Dynamic Foreign Exchange:** There is always a pressure on the financial management of international businesses to keep an eye on the fluctuating exchange rate of currencies. Any upward or downward movement of exchange rate in relation to home currency may call for change in business policies. The CFO has to monitor the various factors that influences the exchange rate and must be able to forecast the likely changes in exchange rate.
- **Banking Regulations:** The central bank of every country monitor the domestic financial system and the affect of international trade on the country's economic condition. They set borrowing and lending rates which have a bearing on the country's banking structure which will also influence the business of MNCs in the respective countries. Such changes possess challenges in the IFM.



CHECK YOUR PROGRESS

Q 5: State two challenges in IFM.

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1.10 LET US SUM UP

- International Financial Management is the financial management in global business environment.
- IFM is concerned with exchange rate, international financial market, risk management in international business etc.
- India is one of the founder members of the World Bank and the IMF. India opened up its economy in the year 1991.
- The features of IFM are Foreign Exchange Risk, Political Risk and Market Imperfection.

- The scope of IFM may be discussed in the forms of international institutions, balance of payments, international financial markets etc.
- The finance functions of IFM may be discussed as investment, financing and dividend decisions.



1.11 FURTHER READING

1) Paul R.R. (1998). Money, Banking and International Trade. Kalyani Publishers, New Delhi.

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https://www.managementstudyhq.com/financial-function-types-importance-objectives.html

1.12 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: International Financial Management (IFM) refers to the financial management in global business environment. It is also termed as international finance. As international business is done through foreign exchange, IFM is concerned with exchange rate, international financial market, risk management in international business etc.

Ans to Q No 2: Globalization refers to removing the barriers for free movement of goods, services, finance, people, ideas and knowledge across the globe. It enables a country to merge its economy with the rest of the world and thereby it becomes a part of global economy.

Ans to Q No 3:

- Foreign Exchange Risk
- Political Risk

Ans to Q No 4: Financing decisions of IFM are concerned with raising of funds required for the company from various sources MNCs having access to international financial market raise funds from international stock market, borrow money from global debt market in different

currencies. In selecting the sources they encounter certain factors like foreign exchange, currency convertibility, money transfer, different tax system, exchange control, dividend remission policies etc.

Ans to Q No 5:

- Diverse Economic Environment.
- Dynamic Foreign Exchange.



1.13 MODEL QUESTIONS

Q 1: Define international financial management.

Q 2: State the features of international financial management.

Q 3: Discuss the impact of globalization on business organizations.

Q 4: Discuss the international finance functions.

Q 5: Discuss the challenges of international financial management.

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UNIT 2 : NATURE AND MANAGEMENT OF EXCHANGE RATE RISK

UNIT STRUCTURE

2.1 Learning Objectives

2.2 Introduction

2.3 Exchange Rate Risk: An Introduction

2.4 Different Types of Exchange Rate Risk

- 2.4.1 Transaction Exposure
- 2.4.2 Translation Exposure
- 2.4.3 Economic Exposure

2.5 Exchange Rate Risk Management

- 2.5.1 Management of Transaction Exposure
- 2.5.2 Management of Translation Exposure
- 2.5.3 Management of Economic Exposure

2.6 Let Us Sum Up

2.7 Further Reading

2.8 Answers to Check your Progress

2.9 Model Questions

2.1 LEARNING OBJECTIVES

After going through this unit, you will be able to-

- define the meaning of Exchange Risk or Exposure
- explain the different types of Exchange Exposures and
- describe the techniques of managing Exchange Exposures.

2.2 INTRODUCTION

In this unit we will discuss on the nature and measurement of exposure and risks. Exchange rate risk or exchange rate exposure results from fluctuations in the exchange rate. In this unit, we have used exchange rate risk and exposure interchangeably.

At the end of this unit we will discuss Different Types of Exchange

Rate Exposures like Transaction Exposure, Translation Exposure and Economic Exposure.Also we will also discuss Exchange Risk Management, Management of Transaction Exposure, Management of Translation Exposure and Management of Economic Exposure.

2.3 EXCHANGE RATE RISK: AN INTRODUCTION

Exchange-rate risk, also called currency risk, is the risk that changes in the relative value of certain currencies will reduce the value of investments denominated in a foreign currency. Currency rate fluctuations affect the value of revenues, costs, cash flows, assets and liabilities of a business organisation. Transactions of business firms with foreign entities could be in the form of exports, imports, borrowing, lending, portfolio investment and direct investment etc. So a firm with any one or more types of transactions is subject to exchange rate exposure.Exchange-rate risk is the risk of receiving less in domestic currency when investing in a bond that is in a different currency denomination than in the investor's home country.

Firms have to become more and more careful about currency rate exposure as the process of globalisation gains further momentum. Suppose US dollar depreciation against euro. This change in the exchange rate can have significant consequences both for American as well as European firms. For example, it can adversely affect the competitive position of European firms in the highly competitive US market. They will be forced to raise dollar prices of their products by more than their US competitors. The same change in exchange rate, however, will strengthen the competitive position of import-competing US firms. On the other hand, should the dollar appreciate against the euro, it would enhance the competitive position of European firms at the exposure of US firms.

Exchange rate fluctuations can affect not only firms that are directly engaged in international trade but also purely domestic firms. Consider, for example, an Indian leather goods manufacturer who sources only domestic materials and sells exclusively in the Indian market, with no foreign currency receivables or payables. This seemingly purely domestic Indian firm can be

subject to foreign exchange exposure if it competes against imports, say, from Chinese leather goods manufacturer. When Chinese yuan depreciates against Indian rupee, this is likely to lean to a lower rupee price of Chinese goods, increasing their sales in India, thus harming Indian manufacturer.

Exchange rate variations affect not only the operating cash flows of a firms but also home currency values of the firm's assets and liabilities. If an Indian firms has borrowed pound sterling, it can gain or loose as the pound sterling depreciates or appreciates against the rupee. Thus, it is clear that exchange rate fluctuations can affect the value of the firm by influencing its operation cash flows as well as the domestic currency values of its assets and liabilities.

For the sake of better comprehension, exchange rate risk is classified into three categories:

(a) Transaction Exposure

(b) Translation Exposure

(c) Economic Exposure

Sometimes, a common term, namely**, accounting exposure** is used both for transaction as well as translation exposure.



CHECK YOUR PROGRESS

Q 1: Define Exchange Rate Risk

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Q 2: What are the three categories of exchange rate risk?

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2.4 DIFFERENT TYPES OF EXCHANGE RATE RISKS

As already mentioned, there are three types of Exchange rate Risks which are briefly described here.

2.4.1 Transaction Exposure

This exposure arises when a company has assets and liabilities the value of which is contractually fixed in foreign currency and these items are to be liquidated in the near future. For example, the value of assets in the form of foreign currency receivables or liabilities in the form of foreign currency payables will be sensitive to the exchange rate. Likewise, currency rate fluctuations would impact loans, interest, dividend and royalty etc. to be paid to the foreign entities or to be received from them.

To illustrate, let us consider that a company buys raw material from abroad the contractual price of which is $100. The payment will be settled after a credit period of six months within the current financial year. Till the date of settlement, this company has a transaction exposure of $100. If dollar appreciates during six months period, the company will have to pay more in rupees than what it would have paid on the date of contract. Conversely, depreciation of dollar will result in a smaller rupee outflow. Either way, the company remains under an uncertainty as to what rupee outflow will take place on the settlement date. This uncertainty of cash flows is what constitutes the exposure/risk. Like receivables or payables, repayment of principal and interest to foreign entities due during the current financial year also gives rise to transaction exposure.

From the above description, it becomes clear that transaction exposures affect operating cash flows during the current financial year and they have short time frame. As they arise from contractually fixed items, they are also called contractual exposures. Some examples of transaction exposure could be as follows:

i) a foreign currency receivable or payable arising out of sales or purchases of goods and services is to be liquidated in near future;

ii) a foreign currency loan or interest due thereon is to be paid or received shortly;

iii) payment of dividend or royalty etc. is to be made or received in foreign currency.

2.4.2 Translation Exposure

Translation exposure arises from the variability of the value of assets and liabilities as they appear in the balance sheet and are not to be liquidated in near future. Translation of the balance sheet items from their value in foreign currency to that in domestic currency is done to consolidate the accounts of various subsidiaries. Therefore, translation exposure is also known as Consolidation Exposure or balance sheet exposure.

For the purpose of illustration, let us take an Indian parent company having a subsidiary in the USA. In the beginning of the year, the US subsidiary has capital equipment, inventory and cash valued at $200 000, $100 000 and $20 000 respectively. The exchange rate is Rs 45 per dollar. Therefore the translated value of these assets is Rs 1,44,00,000. At the end of the year, the assets are $ 210 000 (capital equipment), $105000 (inventory) and $10000 (cash) respectively. At the exchange rate of Rs 46 per dollar, the translated value becomes Rs 1, 49,50,000. Thus, there is a translation “gain” of Rs 5,50,000 on asset side of the balance sheet. Likewise there must have been a translation “loss” on liabilities of the subsidiaries such as, debts . denominated in dollars.

Here; it must be noted that there is no movement of cash since these assets and liabilities are not being liquidated. Simply, their value is being worked out in the currency of the parent company. Thus, translation “gains” or “losses” are notional, assuming that there are no tax implications related thereto. As a matter of fact, the main difference between transaction exposure and translation exposure is that while the former has effect on cash flows, the latter does not.

A view about translation exposure is that it is only notional in character since the translation losses or gains will differ according to the accounting practices. However, this view is not accepted

unanimously. That is why an attempt is made to measure and manage it.

2.4.3 Economic Exposure

Economic exposure results from those items which have an affect on cash flows but the value of which is not contractually defined, as is the case of transaction exposure. Some examples of operating exposure are given below;

a) Tender submitted for a contract, remain as an item of operating exposure until the award of contract. Once the contract is awarded, it becomes transaction exposure.

b) A deal for buying or selling of goods is under negotiation. The price of goods being negotiated may be affected by fluctuations in the exchange rate.

c) If a part of raw material is imported, the cost of production will increase following a depreciation of the home currency.

d) Interest cost on working capital requirements may increase if money supply is tightened following a depreciation of the home currency.

e) Domestic inflation will increase input costs of the firm even if there is no change in the exchange rate. This will adversely affect its competitiveness vis-a-vis the firms of other countries.

Exchange rate will affect future revenues as well as costs and hence operating profits. Since these effects are of long-term nature and impact the competitiveness of firms, operating exposure is also called **Strategic Exposure**. It influences the long-term business decisions such as products, markets, sources of supply and location of production facilities etc.

For example, continued appreciation of dollar in early eighties rendered many American firms uncompetitive vis-a-vis their competitors because the value of revenue streams denominated in foreign currencies diminished when converted into dollars. On the contrary, in later part of eighties, many Japanese and German

companies were not able to keep their operating income at satisfactory level due to fall of dollar. Some of these companies shifted their manufacturing activities in USA:

Thus we see that the operating exposure may occur when firm has direct involvement in foreign transactions as well as when it does not have a direct involvement. Fluctuation in exchange rate has an effect on customers and suppliers as well as competitors. A firm selling only in domestic market with inputs denominated only in home currency is still exposed to competition from importing firms. An appreciation of home currency will put it at a disadvantage vis-a-vis another firm that sells imported product.



CHECK YOUR PROGRESS

Q 3: Define Transaction Exposure

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Q 4: What is Translation Exposure

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Q 5: What is Economic Exposure

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2.5 EXCHANGE RATE RISK MANAGEMENT

The discussion so far has shown that the uncertainty of exchange rates in future gives rise to uncertainty about cash flows of a business firm. The uncertainty is nothing but exposure or risk. Consequently, firms try to minimize the uncertainty. The process to minimize or eliminate uncertainty is variously referred to as managing or covering or hedging the risk.

2.5.1 Management of Transaction Exposure

The techniques used for hedging purpose can be categorised in

two classes: (a) Internal techniques and (b) External techniques. These are described hereunder in adequate detail.

A) Internal Techniques for Management of Transaction Exposure

The major techniques or methods included in this category are:

- Choice of a particular currency for invoicing receivables and payables
- Leads and lags
- Netting
- Back-to-back credit swap
- Sharing risk

It would be in order to say a word why these techniques are known as internal. It is because a firm does not have to take recourse to any external agency or market to apply these techniques. These are basically internal arrangements either between different subsidiaries of the same MNC or between two transacting but unrelated companies.

I) Choice of a particular currency for invoicing

A firm can negotiate with its counter party to receive or make payments in its own currency or another currency, which moves very closely with its own currency. For example, if an Indian company is able to invoice all its sales and purchases in rupees, then its revenues and costs will not be affected at all by currency fluctuations. Thus, its currency exposure will be totally eliminated.

On the face of it, this is the simplest techniques to hedge exchange exposure. However, it is easier said than done. A company should be in a very strong bargaining position in order to impose the currency of its choice on its counterparts. For example, companies selling essential products like petroleum may be able to impose currency of their choice. Otherwise, for a majority of transactions, companies will have to negotiate hard to have such a choice.

In some cases, it may be possible to diversify exchange exposure by using currency basket units like SDR (special drawing

rights). The SDR comprises five currencies, the US dollar, the Japanese yen, the British pound, the German mark and the French franc. The last two currencies have since ceased to be in use, after the introduction of euro. Since the SDR is a weighted portfolio of several currencies, its value is more stable than the value of any individual constituent currency.

II) Leads and Lags

A firm will accelerate or delay receiving from or paying to foreign counter parties, depending upon what is beneficial to it. In case, home currency is expected to depreciate, a firm would like to expedite (lead) payments of the payables due. On the other hand, an exporting firm will be better off by delaying (lagging) the receipts in foreign currency. It should be kept in mind that the action of leading or lagging will not be possible without a cost for the firms desiring to do so. For example, a firm has payables of $100 due in three months. Fearing depreciation of rupee, it may renegotiate to make payment in two months.

Conversely, importing firms will delay (lag) the payment if an appreciation of home currency is anticipated and exporting firms will advance (lead) the settlement in similar situation.

For example, a firm has payables of euro 100 000 due in one month. Anticipating appreciation of rupee it delays payment to 3 months. The rates after one month and three months turn out to be Rs 56 per euro and Rs 55.50 per euro respectively. As a result, the firm stands to save Rs 500 000 [100 000 (56.00 - 55.50)] by delaying payments. Of course, it will have to negotiate with its counter party and as a result, the savings will be less than Rs 500 000. Let us suppose that the counter party agrees to delay the settlement if it is paid euro 100 750 instead of euro 100 000. So the Indian firm will effectively be paying Rs 5,591,625. Still the firm saves Rs 8.375 (100 000 x 56 - 100 750 x 55.50).

However, it must be kept in mind that home currency may further appreciate if such actions are generalized.

iii) Netting

Normally, different affiliates of a multinational company have dealings between themselves and with their parent. For example, a subsidiary supplies semi-finished product to its parent which, in turn, sells the final product to the subsidiary. If sales value of subsidiary to the parent is $100 while that of the parent to the subsidiary is $125. Now, the total exposure of the two (parent and subsidiary) combined is $ 225. But this exposure can be reduced to $25 if both of them resort to what is called netting of exposures. As the name implies, netting is a technique where transacting entities try to match the maturity dates and currencies of receivables and payables between themselves. As a result, net exposures are reduced to balance amounts. Netting can be either bilateral or multilateral. If it is done between two companies, it is called bilateral. It is called multilateral, if done between more than two transacting companies. Transacting companies may belong to the same MNC or they may be unrelated entities. However, it is easier to practise it between different companies belonging to the same MNC.

For example, Company A sells its products to company B for $100,000 and buys from B for $75 000. The movement of funds will appear as shown in the **Figure 2.1**

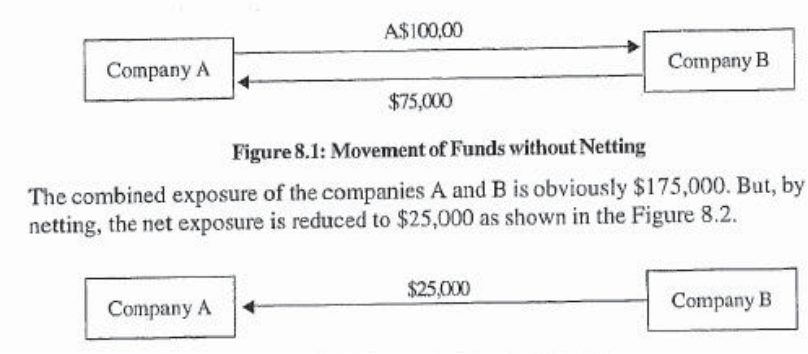


Figure 8.1: Movement of Funds without Netting

The combined exposure of the companies A and B is obviously $175,000. But, by netting, the net exposure is reduced to $25,000 as shown in the Figure 8.2.

Figure 2.1: Movement of Funds with Netting

IV) Back-to-Back Credit Swap

Under this method, two companies, located in two different countries, agree to exchange loans in their respective currencies.

Loans are given for a pre-decided fixed period at a pre-decided exchange rate. On maturity, the sums are again re-exchanged. This arrangement can work effectively between MNCs of two different countries, each having subsidiaries in the country of the other. For example, Mitsubishi (an MNC of Japan) has a subsidiary in USA while Microsoft (an MNC of USA) has a subsidiary in Japan. The subsidiary of Mitsubishi located in USA needs to raise a dollar loan whereas the subsidiary of Microsoft located in Japan needs yen loan. Each parent company can advance loans to the subsidiary of the other in the former's home currency. This arrangement is depicted in **Figure 2.2.**

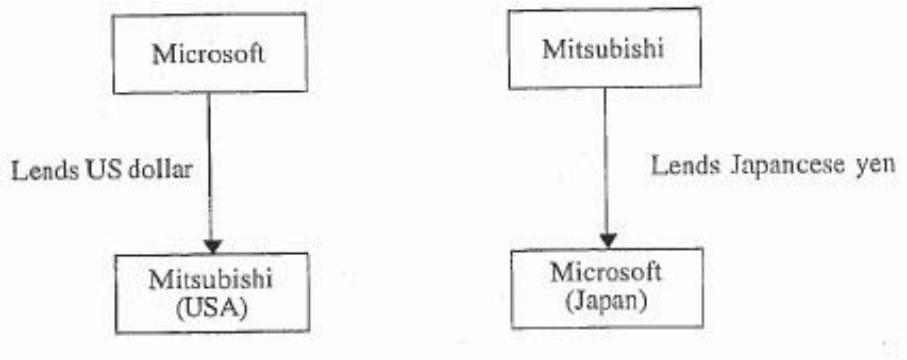


Figure 2.2: Back-toBack Credit Swap

The loan amount is equivalent in the two currencies. (US dollar and Japanese yen). After the period of loans is over, the sum will again be re -exchanged. Thus, the two companies have been able to manage their exchange risk internally.

V) Sharing Risk

Any two companies from two different countries can practise this technique. The basic principle underlying this technique is that neither the benefit of the favourable movement of the exchange rate should go to one party nor the entire loss due to the unfavourable movement of the exchange rate should be borne by the other party. For example, Airbus Industries (a French company) has sold aircrafts to a UK company. One way is to invoice the whole sales price of •10 million in euros. In this case the French company has shifted the

entire exchange risk to the UK Company. Or, alternatively the sales can be invoiced as £7 million. This means that the exchange risk is now totally shifted to the French company. The third possibility is that the sales be invoiced as •5 million plus £3.5 million. This arrangement enables both the parties to share the exchange risk.

Risk sharing can take different forms. For example, the two transacting parties (business organisations located in different countries) establish a Base Exchange rate and a permissible band around this base rate, also called Neutral Zone at the time of contract. As long as the exchange rate at the time of settlement is within the permissible band/neutral zone around the base rate, settlement takes place applying the base exchange rate. However, in case, exchange rate at the time of settlement is beyond the neutral zone, then its effects on the parties are shared as per a pre-determined formula. Example 2.1 will illustrate this technique.



Example 2.1

An Indian enterprise has exported goods worth euro I million to a German company. The two companies have agreed that the base rate will be Rs 55/euro with a neutral zone of Rs 54- Rs 56 per euro. The risk resulting from fluctuations of Re/euro exchange rate will be shared between the two on 50:50 basis at the time of settlement. Find out how much will the Indian enterprise receive in rupees at the time of settlement if the spot rate happens to be.

(a) Rs 52/•, (b) Rs 54.501•, (c) Rs 55.75/• and (d) Rs 57.50/ •.

As has been agreed between the two parties, the Indian company will get Rs 55 million as long as the exchange rate at the time of settlement is between Rs 541• and Rs 56/• and the risk in terms of gains or losses will be shared between the two in case exchange rate is either below Rs 54/• or above Rs 56/•. Keeping this in view,

the amounts received by the Indian company are worked out as given below.

(a) Exchange rate: Rs 52 / euro :

Since this rate is below the neutral zone, the effective exchange rate applicable will be

Rs [55 - (54 - 52) x 0.5] per euro

or Rs 54 per euro

This means that the Indian enterprise will get Rs 54 million rather than Rs 55 million. The rate has moved against the Indian enterprise. If it were to be paid at the actual market rate, it would receive only Rs 52 million. However because of the risk sharing arrangement, it is able to get Rs 54 million.

The German company will pay euro 1.0384 (1 x 54/52) million rather than euro 1 million.

(b) Exchange rate: Rs 54.501 / euro:

As this rate falls within the neutral zone, the rate of Rs 551• will apply. Again, since the exchange rate has moved against the Indian enterprise, it has benefited because of the risk sharing agreement. At the market rate, it would have got only Rs 54.50 million but it has been able to get Rs 55million in this case.

The German company pays • 1.0091 (1 x 5.5/54.50) million.

(c) Exchange rate: Rs 55.75 / euro:

Again the exchange rate is within neutral zone. So the Indian company will get Rs 55 million. This time the rate has moved in its favour. But it is not allowed to reap the full benefit of the favourable exchange rate movement. At the market rate, it would have got Rs 55.75 million but actually would get only Rs 55 million.

The German company has to pay only •0.9865 (1 x 55/55.75) million which is less than • 1 million.

(d) Exchange rate: Rs 57.50 / euro:

In this case, exchange rate is beyond the neutral zone. Therefore, the effective exchange rate applicable will be

Rs [55+ (57.50 -56) x 0.5] per euro

or, Rs 55.75 per euro.

Here the rate has moved in favour of the Indian company. Yet it is not able to reap the full benefit of favourable movement. Instead of receiving Rs 57.50 million as per the market rate, it is getting only Rs 55.75 million.

The German company will have to pay •0.9695 (1 x 55.75/ 57.50) million instead of euro 1 million.

Thus, it is seen that in risk sharing, the effect of exchange rate fluctuations does not pass on entirely as a benefit to one enterprise or loss to another party. Instead the two enterprises, share it.

B) External Techniques for Management of Transaction Exposure

The major techniques in this category are:

i) Use of Currency Forward Market

ii) Use of Money Market

iii) Use of Currency Options Market

iv) Use of Currency Futures Market

These techniques are known as External Techniques simply because the various instruments that are used are external to a business organisation. In order to hedge through one or more of these instruments, a company has to enter into a contractual agreement with external agencies dealing in these instruments. For this reason, they are also called Contractual Techniques.

Here we will discuss these instruments one by one considering as if at a given point of time, data relating to only one instrument is available. But in reality, a company could use one or more of them simultaneously depending upon the company's policies and choice.

I) Use of Currency Forward Market:

Currency Forward Market is the most frequently used market for covering the exchange risk. An organisation having foreign

currency receivables will sell them forward whereas the one having foreign currency payables will buy forward. Examples 8.2 and 8.3 will illustrate this process.



Example 2.2

A French exporter has sold goods worth £ l million to a British company. The receivables resulting from this transaction are due in three months. Fearing a depreciation of pound sterling, the French exporter covers his receivables in the forward market. The rates are as follows:

Spot rate: • 1.4120/£

3-m forward rate: • 1.3930/£

The value of exports on the date of transaction is •1.41.20 million. But, naturally, the exporter is not going to receive this amount on the date of settlement as UK£ is showing tendency to depreciate. To avoid any uncertainty about the amount that the French exporter is going to get in his country's currency (i.e. euro), he sells £ 1 million forward. He waits for 3 months. On the settlement date, after three months, he receives £1 million from the British company which he surrenders to the dealer (usually a bank) with whom he had entered into the agreement for forward sale, and receives • 1.3930 million. Thus, by covering his receivables in the forward market, the exporter has ensured that his receipts in his own currency are •1.3930, neither less nor more.

Now, suppose he had not covered in the forward market and the spot rate on the settlement date had come down to • 1.38/£. In that case, he would have got only • 1.38 million. So he would have made a notional loss of •13000 (• 1.3930 million minus •1.3800 million).

However, there is a possibility that the UK£ appreciated instead of depreciating. Suppose the rate had become •1.4260/£. In this situation, it would look, in retrospect, that the French exporter would have been better off if he had not covered his receivables by

selling them forward. His notional loss would work out to •46000 (-1.4260 million minus •1.3800 million) if compared with forward rate. And, his notional loss would be • 14000 (•1.4260 million minus • 1.4120 million) if compared with the spot rate prevailing at the time of the export transaction.

However, it should be kept in mind that notional losses or gains are only the calculations that are done as a post-mortem exercise. The main aim of hedging or covering an exposure is not to reduce loss or increase gain. Instead it is to avoid uncertainty by selling receivables forward as the exporter knows that he would get a definite sum of • 1.68 million.



Example 2.3

An Indian importer has bought goods worth $500,000 from an American company. The payables are due in six months. The US dollar has a tendency to appreciate. The rates available are as follows:

Spot rate	:	Rs 44.00/$
6-m forward rate	:	Rs 45.50/$

The value of payables on the date of transaction between the Indian and the American company is Rs 22 million ($500,000 x Rs 44/$). But the importer will have to pay more than this amount, if US dollar appreciates during the six months that remain before settlement. By how much more? There is no answer to this question because nobody knows what spot rate will prevail at the time of settlement. To avoid this uncertainty, the importer covers his payables by buying US dollars in forward market. Once he does so, he knows the value of his payable becomes Rs 22.75 million ($500,000 x Rs 45.50/$).

After the import transaction, he waits for 6 months and then he pays Rs 22.75 million to the foreign exchange dealer to receive $500,000 which he pays to the American company. By covering in

the forward market, he has ensured that he has to pay neither more nor less than Rs 22.75 million.

Let us suppose the spot rate on the date of settlement turns out to be Rs 46.00/$. It is easy to see that by buying forward, the importer has made a notional gain of Re 0.50 (40.00 - 45.50) per dollar. In other words, his total notional gain is Rs 250,000 (500,000 x 0.50). -

It is quite possible that, instead of appreciation, dollar actually depreciated to Rs 43. 80/$ on the date of settlement. In that case, the importer made a notional loss of Re 0.20/$ (Rs 44 - Rs 43.80) if compared with the spot exchange rate as it was on the date of transaction and a much bigger loss of Rs 1.70/$ (Rs 45.50 - Rs 43.80) if compared with the forward rate.

But as explained in the previous example, notional gains or losses are only post-event exercises. The main purpose of hedging was to reduce uncertainty about the amount in rupees to be paid out for the imports. That amount is Rs 22.75 million, neither more nor less, with no uncertainty whatsoever.

II) Use of Money Market

We consider that only spot exchange rate and money market data (interest rates) are available. How does an organisation having foreign currency exposure make use of the money market data for the purpose of hedging? This is illustrated by the examples 8.4 and 8.5.

Example 2.4



We consider the same French exporter as in example 4.2 above. He has an exposure of £1 million in the form of receivables. The following money market data are given:

3 - m interest rate:

Euro: 5.5% p.a.

Pound Sterling: 8% p.a.

Spot exchange rate: •1 .4120/£

Hedging in the money market means that the exporter, by making use of the money market, should be able to know what definite amount in his own currency (i.e. euro) he is going to receive after 3 months. For this purpose, he takes following steps:

Step I: Borrow a sum of pound sterling at 8% p.a. interest for three months such that this sum become £1 million along with the interest after 3 months. Say, the borrowed amount is B. Thus,

B (1 + 0.08 x 3/12) = £ 1 million

B = £1/1.02 = 0.98039 million

Step II: Sell this borrowed sum of pound sterling in the spot currency market at the rate of •1.4120/£ to get euros. The amount in euros is going to be £0.98039 x •1.4120/£ million.

= •1.3843 million

Step III: Place •1.3843 million for 3 months in the money market at the rate of 5.5% p.a. Thus, at the end of 3 months, the amount that the French exporter will have is •1.3843 x (1 + 0.055 x 3/12) million

= •1.4033 million

Step IV: Refund the loan and interest combined that works out to be £l million as soon as this amount is received from the British company. It is clear that irrespective of the movement of the exchange rate, the exporter will have a definite amount of •1.4033 million. There is no uncertainty about this amount. This has been possible due to a methodical use of money market, or in other words, through hedging in money market.



Example 2.5

Taking the case of Indian importer as in example 8.3, let us see how money market data can be made use of to hedge payables of $500 000. The data are as follows:

6 - m interest rate:

US $ 4.5% p.a.

Rupee: 7.5%p.a.

Spot exchange rate: Rs 44/$

The aim of the Indian importer is to know what definite amount he is going to pay in his own currency (i.e. rupee) after six months when he settles the import bill. For this purpose, he will take the following steps:

Step I: Buy an A amount of dollars and place this amount in the money market for 6 months at the rate of 4.5% p.a. The bought amount should be such that it should become $500, 000 including interest after 6 months.

Thus,

A (1 + 0.045 x 6/12) = 500 000

A = $500,000/(1 + 0.0225) = $488997.56

In order to buy this amount of dollars in the spot market, the sum of rupees required is Rs 44 x 488997.56

= Rs 21 515892 or Rs 21.516 million.

This sum can be borrowed at the rate of 7.5% p.a. for 6 months.

Step II: The dollar amount bought from the spot exchange market is placed in the money market for 6 months. At the end of 6 months, it would become $500,000 including interest. This sum is paid to the American company on the due date of settlement.

Step III: Refund the rupee loan along with interest after six months. This works out to be

Rs 21.516 (l +0.075x6/12)

= Rs 22.323 million

Thus, the Indian company has been able to know that it would have to pay Rs 22.323 million to clear its payables. There is no uncertainty about this sum. This has been made possible due to the methodical use of money market data.

III) Use of Currency Options Market:

Here, we are going to see how; options can be used for hedging currency exposures. The distinguishing feature of options is that they protect against the unfavourable movement of the exchange rate but allow the benefit of favourable change. Examples

8.6 and 8.7 show how payables and receivables can be hedged by using call and put options respectively.



Example 2.6

A German company has payables of $10 million due to be paid in one month. The company wants to hedge this exposure by using a call option. The data are as follows:

Spot exchange rate : $1.20%•

Option strike price : $1.19/•

Maturity : One month

Option premium : 2.5

The German company will need $10 million in one month. In case, dollar appreciates against euro, the company will have to pay a greater amount in its own currency than its expectation. What is more, it does not know how much that sum is going to be on the date of settlement after one month. It knows that the dollar has tendency to appreciate in near future. So it buys call option for the underlying dollar amount of $10 million. For this, it pays the premium upfront, which works out to be

• 0.025 x 10/1.20 million

= •0.2083 million

Then, the company waits for one month. On the maturity date, different scenarios can be envisaged as follows:

Scenario I: Dollar does appreciate against euro and the spot rate on the settlement date is $1.175/•. So the company exercises its call option and buys required amount of dollars at the rate of $1.19/•. Thus the total sum paid by the company is

• 10/1.19 + Premium already paid

= •8.4033 + 0.2083 million

=• 08.6116 million

Scenario II: Dollar appreciates and the spot rate on the date of maturity is $1.19/•. Now whether the company exercises its option

or abandons it, it will have to pay in any case at the rate of $1.19/• to get required amount of dollars. So the company is said to be indifferent between exercising and abandoning its call option. In either situation, it will pay

•10/1.19 + Premium already paid

= •8.4033 + •0.2083 million

= •8.6166 million

Scenario III: Contrary to expectation, dollar depreciates or even if it appreciates, it does not go beyond $1.19/•. Let the actual spot rate on the settlement date be $1.21/ •. In this situation, the company abandons its call option and buys required amount of dollars directly from the exchange market. The total outgo in euro works out to be

•10/1.21 + Premium paid on call option

= •8.2644+ 00.2083 million

= •8.4727 million

Thus we see the company does not have to pay more than 08.6166 irrespective of the degree of appreciation of dollar. But it benefits from the favourable movement (depreciation) of dollar. A table can be prepared to show the amount of euros to be paid by the company for various exchange rates observed on the date of settlement. **See Table 2.1.**

Table 2.1: Net Sum paid in euros to buy $10 m in Example 8.6.

Sl. No.	Spot Rate on Maturity(S_T)($/•)	Call Option exercised/ abandoned	Premium already paid	Net sum paid in euros (P)
1.	1.15	Exercised	• 0.2083 m	• 8.6166 m
2.	1.16	Exercised	•0.2083m	08.6166m
3.	1.17	Exercised	• 0.2083 m	•8.6166m
4.	1.18	Exercised	• 0.2083 m	• 8.6166 m
5.	1.19	Either exercised or abandoned	• 0.2083 m	• 8.6166 m
6.	1.20	Abandoned	•0.2083m	•8.54L6m

7.	1.21	Abandoned	• 0.2083 m	• 8.4727 m
8.	1.22	Abandoned	• 0.2083 m	• 8.4050 m
9.	1.23	Abandoned	• 0.2083 m	• 8.3384 m

Profile of net payment can also be depicted graphically as in **Figure 2.3.**

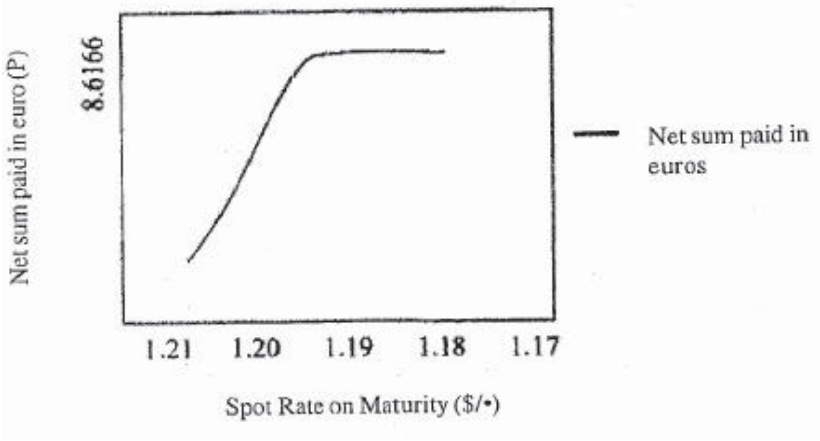


Figure 2.3: Net Sum to be paid with Call Option

Example 2.7

A British exporter has sold goods to a US company. The receivables of $2 million are clue in 2 months. The exporter would like to hedge this exposure by using a put option. He finds out the availability of put options and chooses to buy one with the following features:

Strike price : £0.5559 /$

Maturity : 2 months

Premium : 3 per cent

The current spot rate is £0.5600/$

The British exporter will be interested in ensuring that his receivables do not loose too much value due to expected depreciation of dollar. There is no certainty how much the final amount in pound-sterling is going to be when he receives the $2 million on the settlement date. So he buys put option and pays the premium amount right away. The sum paid as premium is equal to:

£2 x 0.03 x 0.5600 million

= £0.0336million

After this the exporter waits for two months. On the maturity date, following scenarios can be visualized.

Scenario I: US dollar depreciates (as anticipated) to £ 0.50. In this situation, the exporter will exercise his put option and sell his $2 million to the writer of the option. Thus, his total inflow in pound sterling will be

£2 x 0.5.559 - Premium already paid

= £ 1. I 1 l 8 - £0.0336 million = £1.0782million

Scenario II: US dollar depreciates to £ 0.5559/$ (a rare possibility) which is the same as strike price of the put option held by the hedger (exporter). In this scenario, he is indifferent between the use of his put option and its non-use. In either case, he will have the same cash inflow, that is,

£2 x 0.5559 - Premium already paid

= £ 1 .0782 million

Scenario III: US dollar appreciates as against the anticipation. Suppose the spot rate on the settlement day is £0.5660 /$. Now the exporter abandons his put option and sells $2 million directly in the market. The total inflow in this scenario works out to be

£2 x 0.5660 - Premium already paid

= £1.132 - £0.0336

= £1.0984 million

It is thus seen that the exporter never receives less than £1.0782 irrespective of actual spot rate on the date of settlement. His inflows are minimum at £1.0782 and he benefits from the favourable movement (appreciation) of dollar. For different possible spot rates, inflows in pound sterling are contained in Table 8.2.

Table 2.2: Net sum received by the exporter in Example 2.7

Sl. No.	Spot Rate on Maturity (S_T) pond sterling (R)	Put options exercised/abandoned	Premium	Net sum paid in already paid
1.	£0.5300/$	Exercised	£0.0336 million	$1.0782
2.	£0.5300/$	Exercised	£0.0336million	$1.0782
3.	£0.4400/$	Exercised	£0.0336 million	$1.0782
4.	£0.5500/$	Exercised	£0.0336 million	$1.0782
5.	£0.5559/$	Either exercised or abandoned	£0.0336 million	$1.0782
6	£0.5600/$	Abandoned	£0.0336million	$1.0864
7.	£0.5700/$	Abandoned	£0.0336 million	$1.1064
8.	£0.5800/$	Abandoned	£0.0336million	$1.1264
9.	£0.5900/$	Abandoned	£0.0336 million	$1.1464

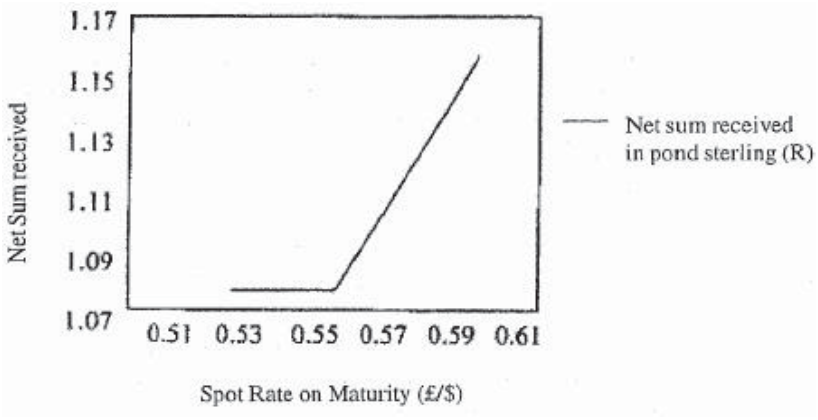


Figure 2.4: Net Sum received in Put Option

Profile of net receipt can be depicted graphically as in figure 2.4.

Note: Here we have learnt the use of call or put option for covering payables and receivables respectively. However, more complex methods can be used by combining options in different ways. The resultant payment/receipt will also accordingly be different.

IV) Use of Currency Futures Market

Another important derivative instrument that can be used for hedging currency exposure is Futures. Currency futures have four maturities: March, June, September and October respectively. Since

these are standardised in terms of contract value, exposures (if they are not exact multiples of contract size) are either over hedged or under hedged. For example, standard size of a futures in pound sterling is £62500.

The exposed amount happens to be £140,000. Now, using sterling futures, either £187 500 (£62500 x 3) can be hedged (a case of over hedging) or £1 250,000 (£62500 x 2) can be hedged (a case of under hedging) but not £140,000 as such because this amount is not an exact multiple of £62500. Normally hedged amount is more close to an exact multiple of contract size. In other words, hedge ratio should be as close to 1 as possible.

In the data given above, there are two possibilities:

Possibility I: £187,500 is hedged. In that case,

Hedge ratio =1.87,500/ 140,000 = 1.339

Possibility II: £125 000 be hedged. In that case,

Hedge ratio = 125,000/140,000 = 0.893

It is clear that second possibility gives hedge ratio, which is more close to 1. Therefore, it would be preferred that exposure be under hedged. That is, for an exposure of £140 000, only £125 000 be hedged, leaving £15 000 unhedged as far as the use of futures is concerned.

Now, let us look at two examples 4.8 and 4.9 to illustrate hedging through futures.



Example 2.8

An American company expects to receive •6 million in December from its European client. It is likely that euro would depreciate against dollar between now and settlement date. The exchange data available now are as follows:

Spot rate : $1.200/•

December euro futures : $1.195/•

The American company decides to hedge its exposure in

futures market. The standard size of euro futures is •125 000. The number of euro futures needed for hedging the exposure is:

•6 000 000/•l 25 000 = 48

The number of euro futures required being an exact number, it is clear that the hedge ratio is I and the full amount of •6 million can be hedged.

The American company sells 48 December euro futures by depositing guarantee margin and follows daily movement of futures. It pays variation margin whenever called upon to do so or withdraws excess amount from its margin account.

On 15 December, it decides to close the futures contract by a reverse operation. The rates on 15 December are:

Spot rate : $1.1925/•

December futures : $1.1890/•

It is clear that the American company suffered a loss on spot market as the rate has come down from $1.20/• to $ 1.1925/•. But on the future market, it makes a gain as the futures which was sold at $1.195 is trading at a lower rate of $1.1890/•.

The loss on spot market = $6 million x (1.200 - 1.1925)

= $0.045 million

The gain on Futures = $6 million x (1.195 - 1.189)

= $0.036 million

Thus, a part of the loss suffered on spot market has been compensated by the gain on futures market. The hedge efficiency is 80 per cent (0.036/0.045).



Example 2.9

A German company has to pay SFr 200,00 in March next. Swiss franc is likely to appreciate against euro (the German currency). The current rates are as follows:

Spot rate : SFr] .690/•

March euro future : SFr1.675/•

The German company covers its payables with March euro futures. The amount of exposure is SFr200,000 which is equal to •1I 8343.19 (200 000/1.690) at the current exchange rate. The standard size of Euro-SFr futures is considered to be •125,000. So the number of euro futures needed for hedging purpose is 118343.19/125000 = 0.9467.

This number is very close to l and far above zero. Therefore, it is preferred to over hedge (hedging to the extent of • 125 000). So one euro futures maturing in March is sold.

On the date of settlement of payables in March, the March futures is closed by a reverse operation. The market rates on that date are:

Spot rate : SFr1.68/•

March futures rate : SFr 1.668/•

Thus, the loss on spot rate is

• 200,000 (1/1.68 - 1/1.69)

= •119047.62- •1.18343.19

= •704.42

At the same time, there is a gain on futures contract. The gain works out to be

SFr 125000 (1.675 - 1.668)

= SFr 875

At the spot rate of SFr1.68/•, on the date of maturity the gain is • 875/1.68 = • 520.83

Thus, the loss on spot market has been partly compensated by gain on futures market. This compensation is to the extent of 73.93% (520.83/704.42). The compensation is not 1 00 per cent for two reasons:

i) There is over hedging of the exposed amount since hedging has been clone to the extent of 105.62 per cent (125 000/ 118343.19). Hedge ratio is more than 1.

ii) The difference between spot rate and futures rate did not remain same as the time elapsed. Initially this difference was

SFr 0.015/• (SFr1.690/• - SFr1.675/•) while on the date of closure, it was SFrO.012/• (SFr1.680/• - SFr1.668/•).

2.5.2 Management of Translation Exposure

Before something is said about how or why to manage translation exposure, it would be appropriate to understand the four methods used for foreign currency translation. These are: (i) the current/noncurrent method, (ii) the monetary/nonmonetary method, (iii) the temporal method, and (iv) the current rate method. Each one of the than is described hereafter:

- **Current/Non-current Method:** The basic principle behind the current/ noncurrent method is that assets and liabilities are translated on the basis of their maturity. Current assets and liabilities are translated at the current exchange rate. Noncurrent (long-term) assets and liabilities are translated at the historical exchange rate which prevailed at the time when they were recorded for the first time in the balance sheet. It is obvious that under this method, there will be a translation gain (loss) if the foreign currency (the currency in which the subsidiary keeps its books) appreciates (depreciates) in case the subsidiary has net positive working capital. Reverse will happen in case of net negative working capital. The reader will recall that net working capital is defined as current assets minus current liabilities.

  As regards the income statement (or profit-loss account), the most items, under this method, are translated at the average exchange rate for the accounting period. Only the revenues and expenses associated with the noncurrent assets and liabilities, such as depreciation expense, are translated at the historical rate applicable to the corresponding balance sheet item.

- **Monetary/Nonmonetary Method:** As per this method, all monetary items of balance sheet of a foreign subsidiary are

translated at the current exchange rate. These terms include cash, marketable securities, accounts receivables and accounts/notes payable etc. All the nonmonetary items in the balance sheet, including equity, are translated at the historical exchange rate. The main difference between this method and current/noncurrent method is with respect to items such as inventory, long-term debts and other long-term receivables. This method distinguishes items on the basis of similarly of attributes rather than similarity of maturity.

The income statement items, under this method, are translated at the average exchange rate for the accounting period. The revenue and expense items associated with nonmonetary items such as cost of goods sold and depreciation are translated at the historical rates applicable to the corresponding balance sheet item.

- **Temporal Method:** Under this method, monetary accounts such as cash, receivables and payables, irrespective of their maturity (whether short-term or long-term) are translated at the current rate. Other items are translated at the current rate if their value is written in the balance sheet at current rather than historical valuation. On the other hand, if these items are carried at historical costs, they are translated at the historical rate. For example, inventory and fixed assets will have the same translated value under temporal as well as monetary/ nonmonetary method if they are recorded in the balance sheet at historical value.

  Most income statement items, under this method are translated at the average exchange rate for the accounting period. Depreciation and cost of goods sold are translated at historical rates applicable to corresponding balance sheet items if they have been carried at historical costs.

- **Current Rate Method:** This is the simplest method to use. Under this method, all items of the balance sheet are translated

at the current rate except equity, which is translated at the exchange rates which existed on the dates of issuance. In this method, a Cumulative Translation Adjustment (CTA) account is created to make the balance sheet balance since translation gains/losses do not go through the income statement unlike in other three methods.

Income statement items, ender this method, are translated at the exchange rate on the dates the revenue/expense items were recognized. However, to avoid too many exchange rates, a more practical way is to use an appropriately weighted average exchange rate for the period of translation.

Application of all the four methods is illustrated through Table 8.3. The example shows the translation of the balance sheet and the income statement of an European subsidiary of US MNC. Table 8.3(a) makes use of the appreciation of euro from •0.80/$ to $ 0.6/$ whereas Table 8.3(b) shows the translation when euro depreciates from •0.8/$ to •1/$.

Table 2.3(a): Effect of Translation Methods on Balance Sheet and Income Statement after Appreciation from .0.8/$ to •0.6/$. (Average rate is •0.7/$)

Item	Local Currency value of items	Value under current /non current	Value under monetary /non monetary method	Value under temporal current method	Value under rate method
Balance Sheet					
• Cash	•3300	$5500	$5500	$5500	$5500
• Inventory	·2200	$3667	$2750	$4500	$3667
• (Current value					
= ••2700)	•4500	$5625	$5625	$5625	$7500
Total assets	•10000	$] 4792	$13875	$15625	$16667
• Current liabilities	• 1800	$3000	$3000	$3000	$3000
• Long-term debt	•2700	$3375	$4500	$4500	$4500
• Common equity	•4000	$5000	$5000	$5000	$5000
• Retained	•]500	$34]7	$1375	$3125	$2143
• CTA	-	-	-	-	$2024
• Total liabilities	•I0000	$14792	$13875	$15625	$16667
and equity					
Income Statement	. 1 5000	$21429	$21429	$21429	$2I429
• Sales revenue					
• Cost of goods	• 11000	$]5714	$13750	$15714	$15714
• Depreciation	•1500	$1875	$1875	$1875	$2143
• Net operating	•2500	$3840	$5804	$3840	$3572
• Tax(40%)	•[000	$1536	$2322	$1536	$[429
• Profit after tax	•] 500	$2304	$3482	$2304	$2[43
• Foreign exchange	-	$1113	($2] 07)	$821	-
• gain (loss)	•1500	$3417	$1375	$3125	$2143
• Net income					
• Dividends	-	-	-	-	-
• Retained	•1500	$34]7	$1375	$3125	$2143
earnings					

As indicated in Table 2.3(a), historical exchange rate is •0.8/$. The next four columns show the translated values under all four methods after an appreciation of the euro to •0.6/ $. The average exchange rate for the accounting period is taken to be •0.7/$. It is seen that there has been an exchange gain of $1113 under current/noncurrent method whereas there is loss of $2107 under monetary/nonmonetary method. As is expected, the situation has reversed under the scenario of euro's depreciation. There is a gain of $1550 under monetary/ nonmonetary and a loss of $592 under current/ noncurrent method. Under the current rate method, there is a positive CTA of $2024 when euro appreciated and there is a negative CTA of $1167 under the scenario of depreciation,

Table 2.3(b): Effect of Translation Methods on Balance Sheet and Income Statement after Depreciation of euro f."om ·0.8/ $ to -1/$. (Average exchange rate is •0.9/$)

Item	Local Currency value of items current	Value under current /non method	Value under monetary /non monetary	Value under temporal method	Value under current rate method
Balance Sheet	•3300	$3300	$3300	$3300	$3300
• Cash					
• Inventory	•2200	$2200	$2750	$2700	$2200
• (Current value =	•4500	$5625	$5625	$5625	$4500
	2700)				
• Total assets	•10000	$11125	$1 1675	$1\625	$10000
• Current liabilities	•\800	$1800	$1800	$1800	$\800
• Long-term debt	•2700	$3375	$2700	$2700	$2700

• Common equity	•4000	$5000	$5000	$5000	$5000
• Retained earnings	E1500	$950	$2175	$2125	$\667
• CTA			-	—	($\ 167)
• Total liabilities and equity	E10000	$11125	$11675	$\\625	$10000
Income Statement	E15000	$16667	$16667	$16667	$16667
• Sales revenue					
• Cost of goods sold	Ell 000	$12222	$13750	$\2222	$\2222
• Depreciation	E1500	$1875	$1875	$1875	$\667
• Net operating income	E2500	$2570	$1042	$2570	$2778
• Tax (40%)	E1000	$1028	$417	$1028	llill
• Profit after tax	E1500	$1542	$625	$1542	$1667
• Foreign exchange	-				-
• (loss)		($592)	$1550	$583	$\667
• Net income	E1500	$950	$2175	$2125	
• Dividends	-	-	-	-	-
• Retained earnings	E1500	$950	$2175	$2\25	$1667

Having measured possible exchange gains/losses, resulting from different methods, now the question is how to manage translation exposure. Or, is it at all worth while to manage it? The translation process has no direct effect on cashflows of reporting currency (that is dollar in our above example). The realizable effect on net investment will be only upon the sale or liquidation of the assets.

It is possible to hedge losses using forward contract. For example, when euro is expected to depreciate, one can sell euro forward. Let us assume that the forward rate coinciding with the date of consolidation/translation is •0.98/$ and expected spot rate on the consolidation date is •1.00/$. If the exchange loss of $592 is to be eliminated, a forward sale of E euro will have to be done where E is given by

$$E\left(\frac{1}{forwardrat\ e}-\frac{1}{\exp ected\ \ spot\ \ rate}\right)=exchange\ \ \ loss$$

or $E\left(\frac{1}{0.98}-\frac{1}{1.00}\right)=592$

or $E\left(\frac{592\times0.98\times1.00}{0.02}\right)$

=.29008

The purchase of •29008 at the expected spot rate would cost $29008 whereas the forward sale of •29008 will fetch $29600, giving a net profit of $592. This eliminates totally the exchange translation loss.

However, it should be kept in mind that this hedge is based on expected spot rate and not on a definite rate. So the outcome may not be as certain as it seems. Basically, the forward position taken in euros is a speculative position. If the actual spot rate turns out to be less than •1.004, then there will be a loss from the forward position.

2.5.3 Management of Economic Exposure

With the increasing pace of globalization of economy, more and more firms are subject to international competition. Volatile exchange rates can affect the firms in domestic as well as foreign markets. The value of assets/liabilities and operating cashflows can change because of the exchange rate fluctuations. Unlike transaction exposure which relates to contractually determined assets and liabilities such as receivables and payables etc, the exposure of operating cashflows depends on the effect of exchange rate changes on the firm's competitive position. The problem is that competitive position is not readily measurable. It is quite possible that a firm's operating exposure may be much larger than contractual or transaction exposure. It is determined by the structure of the markets in which the firm sources its inputs, such as labor and material and

sells its products.

Let us illustrate the importance of market structure by taking the example of an imaginary European Company, ETCL, which is a subsidiary of an Indian Company, Tata Motors. Say, ETCL imports cars from Tata Motors and sells them in European market. If the Indian currency, rupee, appreciates against the European currency, euro, the costs of ETCL go up in euro terms. Suppose, ETCL faces competitors from European can makers whose euro costs did not go up, it will not be in a position to raise the euro price of imported Tata cars lest it might lead to reduction in sales. Since the car market in Europe is highly price elastic, ETCL can not afford to let the exchange rate charge pass through the euro price. As a consequence, an appreciation of rupee will reduce the profit of ETCL. This means that the parent company, Tata Motors, is subjected to a high degree of operating exposure.

As opposed to this scenario, it is possible to consider the case where ETCL faces import competitors only from other Indian car makers such as Maruti and others and not from local manufacturers. Since euro costs of other importers will be affected by the rupee appreciation in the similar manner, the competitive strength of ETCL remains intact or is marginally affected. In this kind of market structure, rupee appreciation will be reflected in higher euro price of the cars imported from India. As this happens, Tata Motors will be able to maintain its rupee profits, with minimal operating exposure.

In practice, exchange rate change is almost never fully absorbed through price adjustments of goods. One alternative is to pass the cost shock fully to selling price (complete pass-through) and the other is to fully absorb the shock (zero pass-through). However, firms often do resort to partial pass-through.

But price adjustment can, at best, be a short-term measure to manage economic exposure. Since a firm is exposed to exchange risk mainly through the effect of exchange rate changes on its

competitive strength, exposure management is to be seen in terms of the firm's long-term strategic planning. Managing operating exposure can not be a short-term tactical issue. It is to be considered in a longer perspective. The measure could be such as (i) selecting low-cost production location, (ii) adopting flexible sourcing policy, (iii) diversifying the market, (iv) making R&D effort for product differentiation and (v) hedging through financial products. We discuss these one-by-one.

- **Selecting low-cost production location:** In case domestic currency is already strong or is expected to become stronger in near future, it will have an effect of reducing competitive position of the firm. In such a situation, it can choose to set up its production facilities in a foreign country where costs are lower. Lower cost can be due to lower price of factors of production such as land and/or labour or depreciating currency of that country. In our example of the hypothetical company, ETCL, a possible action by Tata Motors could be to shift the production facilities to an European location to avoid the negative impact of appreciating rupee on operating cashflows. The other possibility is that instead of locating the production at one single place, it can be done at several places in different countries. Such a decision will provide the firm a great deal of flexibility. It can choose to produce where it is most advantageous to do so, keeping the exchange rates in view. There are, however, disadvantages associated with the decision of multiple locations. The firm may have to forego the advantage of economies of scale. So, a trade-off between flexibility of shifting production and economies of scale has to be found.
- Examples of shifting production facilities are provided by some of the Japanese and German companies. In the recent past, Daimler Benz and BMW of Germany and, Nissan and Toyota of Japan decided to establish production facilities in USA after

German and Japanese currencies appreciated against US dollar.

- **Adopting flexible sourcing policy:** Another way of reducing the economic exposure is to buy inputs from where they have lower cost. Sourcing from low cost countries is not limited to raw material or accessories but, also, the firms can hire low cost manpower from abroad. In the past, Japan Airlines did hire foreign employees to maintain their competitiveness in aviation industry. Likewise, many Japanese companies depended heavily on low cost countries like Thailand, Malaysia, Philippines and China etc to buy inputs such as spare parts and intermediate products.
- **Diversifying the markets:** Diversification of the market of the firm's product will reduce its economic exposure. Suppose Tata Motors sells its cars in Europe as well as in China. Also, suppose rupee appreciates against the European currency, euro, and depreciates against the Chinese currency yuan. The effect of these developments will be opposed to each other. While the sales of Tata cars will reduce in the European market, they are likely to increase in the Chinese market. So reduction in the European market is offset by the increase in the Chinese market. As a result, the cashflows of Tata Motors will be much more stable than they would be if it sold its cars only in one of the two markets. Of course, this strategy can not work if all the rates moved in the same direction. Normally, that does not happen. Hence, diversified market does help in reducing economic exposure.
- **Making R&D effort for product differentiation:** R&D activity aims at strengthening competitive position of a firm against the adverse effect of exchange rate changes. R&D can bring about gains in productivity, reduction in costs and, most importantly, differentiation in products that the firm offers. New or differentiated products have inelastic demand. That is, their

demand is not or less sensitive to price variations. Price inelasticity would make the firm immune to economic exposure.

- **Hedging through financial products:** Though various ways outlined above will be necessary for effective management of economic exposure, financial products should be used as supplements as far as possible. The firm can use forward, futures or option contracts. These contracts can be rolled over several times, if the situation so demands. Also, the firm can borrow and/or lend foreign currencies on long-term basis.



2.6 LET US SUM UP

Exchange rate risk or exposure results from the fluctuation in the exchange rate between pair of currencies. Exchange exposure is classified in three categories, namely, Transaction exposure, Translation exposure and Economic (or operating) exposure. Transaction exposure arises because of the assets or liabilities whose value is contractually fixed in a foreign currency and these assets or liabilities are to be liquidated in the near future. This type of exposure affects cash flows. Translation exposure results from the variability in the value of assets/liabilities contained in the balance sheet and denominated in foreign currency. This type of exposure does not have effect on cash flows. Economic exposure results from those items that have effect on cash flows but whose value is not contractually fixed. The terms 'Managing' or 'Covering' or 'Hedging' exchange risk are used synonymously. Exchange rate risk management techniques can be divided in two categories, namely, Internal and External. One of the simplest ways to manage exchange risk is to invoice all transactions in home currency. Though simple, it is difficult to get counter party agree to it. If home currency is likely to appreciate, it will be beneficial to delay the settlement of payables and expedite the settlement of receivables. Netting between the payment flows between two companies is known as Bilateral Netting. Under

the Back-to -Back Credit Swap technique, two companies located in two different countries agree to exchange equivalent loans in their respective currencies at a pre-fixed exchange rate. Two transacting parties share risk by establishing a base rate and a neutral zone around the base rate. If the exchange rate moves beyond the neutral zone, the risk is shared between the two parties. Hedging exchange risk in forward market involves selling receivables forward and buying payables forward. Hedging exchange risk in the money market means using interest rates rationally so as to fix in advance the value of receivables and payables in home currency. Currency options can be used for managing exchange risk. Normally, call option is used to hedge payables while put option is used to hedge receivables. Use of call option limits the value of payments to be made to settle foreign currency payables while it allows the benefit of lower exchange rate (i.e. depreciation of foreign currency). Use of put option ensures a certain minimum value of receivables while it allows the benefit of higher exchange rate (i.e. appreciation of foreign currency) . Like forwards, futures can be used for hedging exchange risk. It is advisable that hedging ratio be as close to 1 as possible. Since exposed amounts may not always be exact multiples of futures contract size, often under hedging or over hedging is done while using futures. Translation of balance sheet and income statement items is done in order to work out translation gains/losses. Four methods of translation are in use: (i) current/noncurrent method, (ii) monetary/ nonmonetary method, (iii) temporal method and (iv) current method. There is no definite view on whether translation exposure should be managed or not since it does not affect cashflows of the firm. Translation exposure can be managed by taking a position on forward market. Economic exposure has effect on operating cashflows. But it is difficult to measure unlike transaction exposure. Economic exposure can be managed by taking long-term measures such as (i) selecting low-cost production location, (ii) adopting flexible sourcing policy, (iii) diversifying the market, and (iv) using R&D for product differentiation etc. These measures can be supplemented with financial hedging products, as far as possible.



2.6 FURTHER READING

1) Apte, P. G. (1995), *"International Financial Management"*, Tata McGraw-Hill Publishing Company Ltd, New Delhi.

2) Bhalla, V. K., *"International Financial Management"*, Sultan Chand & Co., New Delhi.

3) Jain, P. K., Josette Peyrard and Surendra S. Yadav (1998), *"International Financial Management"*, Macmillan India Ltd., New Delhi.

4) Maurice D. Levi (1996), *"International Finance"*, McGraw-Hill Inc.

5) Shapiro, Alan C. (1999), *"Multinational Financial Management"*, John Wiley & Sons, Inc, New York.

6) Yadav, Surendra S., P. K. Jain and Max Peyrard (2001), *Foreign Exchange Markets: Understanding Derivatives and Other Instruments*, Macmillan India Ltd., New Delhi.



2.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1: Exchange-rate risk, also called currency risk, is the risk that changes in the relative value of certain currencies will reduce the value of investments denominated in a foreign currency.

Ans to Q2: Exchange rate risk is classified into three categories:

(a) Transaction Exposure

(b) Translation Exposure

(c) Economic Exposure

Ans to Q3: Transaction exposure arises when a company has assets and liabilities the value of which is contractually fixed in foreign currency and these items are to be liquidated in the near future.

Ans to Q4: Translation exposure arises from the variability of the value of assets and liabilities as they appear in the balance sheet and are not to be liquidated in near future.

Ans to Q5: Economic exposure results from those items which have an affect on cash flows but the value of which is not contractually defined, as is the case of transaction exposure.



2.8 MODEL QUESTIONS

1) Describe different types of exchange exposures.
2) Explain with examples the techniques of netting.
3) Explain the technique of risk sharing.
4) An Indian company has receivables of Y100 million. The base rate is decided to be Re 0.37A with a neutral zone between Re. 0.36 and Re 0.38 per yen. Calculate the rupees amount that the Indian company will get if the rates are as follows at the time of settlement:
   (a) Re 0.34/Y, (b) Rs 0.365/¥ and (c) Re 0.40/v.
   The risk is shared on 50:50 basis between the two parties
5) Read the following data: Receivables due in 3 months: • l million
   Spot rate: Rs 55/•
   3-m forward rate: Rs 54.50/•
   What do you suggest and why as regards hedging of these receivables.
6) Describe the process of hedging with the following data:
   Payables clue in 6-months: $600,000
   Spot rate: Rs 44/$
   6-mn interest rates: Rupee: 7% p.a. Dollar: 5% p.a.
7) The standard size of euro futures is • 125,000. For payables of •900,000 due in March, discuss the process of hedging with futures. Other data are as follows:
   January
   Spot rate: $1.190/•
   March euro futures rate: $1.120/•
   March
   Spot rate: $1.198/•
   March euro futures rate: $1.1.25/•

8) An importer is to pay $2 million to a US company after 2 months. To hedge his exposure, he buys an option by paying 2 per cent premium. The spot rate is Rs 44/$ while the strike price of the option is Rs 45/$. Which option has the importer bought? How is he going to use this option? Explain.

9) Foreign Exchange 9) List and describe various methods of translating balance sheet and income statement items from the currency of the subsidiary to that of the parent.

10) Take an example of your choice to show the use of each of the translation methods.

11) Suggest some ways of managing economic exposure.

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UNIT 3: BALANCE OF PAYMENTS

UNIT STRUCTURE

3.1 Learning Objectives

3.2 Introduction

3.3 Concept of Balance of Trade

3.4 Concept of Balance of Payment

3.5 Structure of Balance of Payment

3.6 Equilibrium in Balance of Payment

3.7 Causes of Disequilibrium in Balance of Payment

3.8 Methods of Correcting Disequilibrium

3.9 Economic Development and BoP

3.10 Let Us Sum Up

3.11 Further Reading

3.12 Answers to Check Your Progress

3.13 Model Questions

3.1 LEARNING OBJECTIVES

After going through this unit, you will be able to :

- define balance of trade
- explain the concept of Balance of Payment
- discuss the structure of Balance of Payment of a country
- discuss the causes of disequilibrium in Balance of Payment
- explain the measures for correcting the disequilibrium in Balance of Payment
- discuss the relationship between economic development and Balance of Payment.

3.2 INTRODUCTION

In this unit we are going to discuss the concepts related to Balance of Payments.We will discuss Concept of Balance of Trade,Structure of Balance of Payment, Causes of Disequilibrium in Balance of Payment. The

balance of payments is the record of all international trade and financial transactions made by a country's residents.

The balance of payments has three components. They are the current account, the financial account, and the capital account. The current account measures international trade, net income on investments, and direct payments. The financial account describes the change in international ownership of assets. The capital account includes any other financial transactions that don't affect the nation's economic output. Let us discuss these concepts in details in the following sections.

3.3 CONCEPT OF BALANCE OF TRADE

Perhaps you are aware that a country performs different economic transactions with other countries. The most common forms of these transactions are import and export. Let us first define these two terms. Import means bringing goods or services from one country into another. Generally, a country imports those goods or services which it cannot produce economically within the country or produce lesser quantity than the demand in the country. For example, India imports crude oil, gold etc. from other countries against which India has to make payments in foreign exchange.

On the other hand, export means sending goods or services to another country for sale against which the exporting country earns an income. In simple words, if a country imports goods, it has to make payments and if a country exports goods it will receive payments in terms of foreign exchange.

At this point, it is important to have a discussion on ‘Balance of Trade’. In simple terms, Balance of Trade shows the difference between the value of export and import of a country. It is also known as trade balance or international trade balance, which indicates the relative strength of a country in terms of economy. The effects of export and import in terms of balance of trade may be stated as: when a country’s import is more than its exports, it is said that the country has a negative or unfavourable balance of trade or trade deficit. If the country’s export is more than its import, it is said that the country has a positive or favourable balance of trade or trade surplus. The

balance of trade includes only the exports and imports of visible items like, clothes, machines etc.

Though balance of trade is one of the ways to measure an economy's strength, the favourable or unfavourable trade balance of a nation is to be considered in relation to stage of economic development of the nation, **business cycle** and other economic indicators. Generally, during recession, countries prefer to export more as it creates jobs, reduces unemployment, generate income and stimulate demand in the country. It helps the country to recover from the recessionary waves. During the period of business expansion, countries prefer to import more as it leads to price competition and limits inflation.



CHECK YOUR PROGRESS

Q 1: Define Balance of Trade.

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3.4 CONCEPT OF BALANCE OF PAYMENT

In this section, we will discuss about balance of payment. Balance of Payment is a statement of receipts and payments in terms of balance of trade (visible items), **invisible items** and capital transfer for a specified period. Thus, balance of payments or balance of international payments is a more comprehensive statement. It includes all the transactions done by individuals, companies and the government entities with the individuals, companies and the government entities of the rest of the world. According to Reserve Bank of India, "Balance of Payment is a statistical statement that shows

1. Transactions in goods, services and income between an economy and the rest of the world,
2. Changes of ownership and other changes in that economy's monetary gold, special drawing rights (SDRs), and financial claims on and liabilities to the rest of the world, and

3. Unrequited transfers." (https://economictimes.indiatimes.com)/definition/balance-of-payment).



CHECK YOUR PROGRESS

Q 2: Define Balance of Payment.

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3.5 STRUCTURE OF BALANCE OF PAYMENT

The balance of payment statement of a country is prepared by dividing the statement into two sides, the debit side and the credit side. It is prepared on the basis of **double entry system of book- keeping**. The items which generate income are entered on the credit side and the items which results in outflow of fund are recorded on the debit side of the Balance of Payment statement. However, there is a difference between business accounting and BoP accounting as the credits are shown on the left side and debits are shown on the right side.

The main items shown on the credit side are exports of goods and services, transfer (unrequited) receipts in the form of gifts, grants etc. from the foreigners, borrowings from abroad, investment made by foreigners in the country, the official sale of reserve assets, gold to foreign countries and international agencies.

The main items recorded on the debit side of the BoP are import of goods and services, transfer (unrequited) payments to foreigners in the form of gifts, grants etc. lending to foreign countries, investment by residents of the country in foreign countries, official purchase of reserve assets, gold from foreign countries and international agencies.

The BoP statement is divided mainly as Current Account and Capital account. Let us discuss these-

Current Account: In current account, the transactions related to exports and imports of visible and invisible items are included. These transactions results in actual transfer of goods and services and affect national income, expenditure and output. If exports are more than imports,

the current account shows surplus balance. If imports are more than exports, the current account shows deficit balance and accordingly it shows a country's earnings and payments in terms of foreign currency.

Capital Account: The financial transactions of capital account results in change in a country's foreign assets and liabilities. It consists of short-term and long- term (having maturity of one or more than one year) lending and borrowings, both private and government. Private transactions are in the form of direct, portfolio and short- terms. Government transactions are in the form of loans received from or granted to foreign countries. The inflows, for example, borrowings and direct investment from foreign countries are recorded on the credit side. The outflows, for example, lending and direct investment in foreign countries are recorded on the debit side. Like current account, capital account also shows a balance.

Another component of capital account is the 'Foreign Exchange Reserve' (Forex). It shows the reserve of foreign currencies which may be in the form of gold, dollar, pounds, **Special Drawings Rights** (SDRs). These are financial assets of the government, hold by the central bank of the country.

If the deficit of the current account of the BoP exceeds the inflow of capital account, then foreign exchange from the reserve account is used to meet the deficit. This is indicated by a plus (+) sign in BoP. On the other hand, any surplus in BoP account is transferred to the foreign exchange reserve. This transfer is indicated by minus (-) sign in the BoP account.

Errors and Omissions

The errors any occur due to some statistical discrepancy and omission may occur due to non- recording of certain transactions.



CHECK YOUR PROGRESS

Q 3: What is the current account of BoP?

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3.6 EQUILIBRIUM IN BALANCE OF PAYMENT

Equilibrium is that state of the balance of payment over the relevant time period which makes it possible to sustain an open economy without severe unemployment on a continuing basis.

Whether the Balance of Payments is in equilibrium or not, it can be justified with this help of the three following test:

(i) Decrease in Foreign Exchange: If gold continuously flows from the country, it may be assumed that the balance of payments is in disequilibrium. At present the decrease in foreign exchange reserves of our country indicate such a situation.

(ii) Increase in Foreign Debts and Loans:If the amount of foreign debts and loans increase, that indicates the balance of payment of the country is in disequilibrium i.e., exports are less than imports,

(iii) Decrease in Foreign Exchange Rates:If the foreign exchange rates of a country decrease, it may be said that the country is suffering from the disequilibrium in the balance of payments position.

3.7 CAUSES OF DISEQUILIBRIUM IN BALANCE OF PAYMENT

Disequilibrium in BoP means there is either surplus or deficit in the BoP. When exports are more than imports, there is surplus and when imports are more than exports, there is deficit in the BoP. The disequilibrium arises mainly in current account and the capital account is used to settle the position of imbalance. Accordingly, the country's forex may increase or decrease and represents the strength or weakness of the economy.

Now let us discuss the certain causes of disequilibrium in Balance of Payment.

- **Development and Investment Programmes:** Generally, developing countries face the problem of disequilibrium in BoP in the form of deficit BoP. This is mainly because of the development programmes of the developing countries which need continuous import of capital goods, some raw- materials not locally available, skilled labour etc. On the

other hands, their exports are minimal as the economy of these countries are primarily agriculture- based and the supplier of raw-materials.

- **Demonstration effect:** The demonstration effect also causes disequilibrium in BoP. When the people of developing countries try to imitate the consumption pattern of the developed countries, it leads to import of foreign goods whereas their export remain stsgnant.
- **Changes in Foreign Exchange Rates:** Any change in the foreign exchange rate may also create a situation of disequilibrium in BoP. The overvaluation of a country's currency makes import cheaper and export dearer. Therefore, the country imports more than export creating adverse BoP. If the country's currency is undervalued, it encourages exports and discourages imports creating favourable BoP.
- **Trade cycle:** The phase in trade cycle results in disequilibrium in BoP. During the period of depression, the exports and imports of a country generally comes down. Due to decrease in domestic production, the export may fall drastically creating adverse BoP. During boom period, both exports and imports increase. If the country exports more, it will create a surplus and if the country imports more, it will create deficit in BoP.
- **Price- Cost Structure:** The price and cost structure of the exporting industries of a country may create disequilibrium in BoP. High cost of labour, raw- materials etc. increases the price of export items. It reduces the export potentialities and subsequently creates disequilibrium in BoP.
- **International Lending and Borrowing:** The international borrowing and lending also create disequilibrium in BoP. If a developing country borrows large funds from other countries and international organizations, it may have a favourable BoP. But such a situation is unlikely to happen as these countries heavily depend on the import of capital goods, skilled labour etc. and exports raw- materials. The borrowings from the foreign countries may temporarily reduce the deficit in BoP. At the same time, a developed country which lends

heavily to other foreign countries and imports heavily will also have a deficit BoP.

- **Population Explosion:** The population explosion, generally faced by the developing countries is also a cause for creating deficit in BoP. Such countries tend to import more including food items resulting huge import bills.
- **Political factors:** Political factors within the country may cause deficit in BoP. Political instability and disturbance creates uncertainty in the minds of foreign investors and results in withdraw of foreign capital creating adverse BoP.



CHECK YOUR PROGRESS

Q 4: State two causes of disequilibrium in BoP.

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LET US KNOW

Disequilibrium in the BoP means there is either surplus or deficit balance in BoP and it occurs due to various reasons. Now, let us discuss the implications of disequilibrium in BoP. A disequilibrium in BoP either in the form of surplus or deficit is not desirable for a country. However, the favourable or unfavourable BoP is to be considered in the light of various factors like duration, source, location etc. A surplus in both current and capital account is desirable for a country but such a position is most unlikely to occur. A deficit in both current and capital account is not desirable. If there is a deficit in the BoP account, a sum equal to the deficit is taken from the official reserves account bringing the BOP into equilibrium. When surplus is moved to the foreign exchange reserve, it is displayed as minus in that specific year's balance of payment account. The minus sign (-) signifies a rise in forex and plus sign (+) exhibits the borrowing of foreign exchange from the forex account in order to meet the deficit.

3.8 METHODS OF CORRECTING DISEQUILIBRIUM

In this section we will discuss the different methods to correct the disequilibrium in BoP. These methods are –

- **Deflation:** Deflation means reducing the volume of money in the economy to reduce the prices and the money income of the people. The central bank by applying different methods, like raising the bank rate, by selling the securities in open market etc. reduce the volume of credit in the economy. This will result in falling prices and money income of the people. It will discourage imports and encourage exports. Besides that a high interest rate will attract foreign funds and this will help in correcting disequilibrium in BoP.
- **Depreciation:** BoP disequilibrium may be adjusted by depreciating the exchange value of home currency. It means fall in the rate of exchange of home currency (e.g. Indian Rupee) in terms of another currency (e.g. US Dollar). In other words, more Indian Rupee will be required to buy a unit of US Dollar. This will make export cheaper and import costlier in India.
- **Devaluation:** Devaluation means reduction of the external value of a currency by the government. The difference between devaluation and depreciation lies in the fact that devaluation is done by government whereas depreciation is the result of market mechanism. However, the net result of both these two methods is the same i.e. decrease in the value of the home currency in terms of a foreign currency. Thus, it will discourage imports and encourage exports. It will reduce deficit in BoP.
- **Exchange control**: Exchange control is used as a weapon to correct the deficit in BoP. Under this method, control is exercised over the use of foreign exchange. The central bank of a country ask the exporters to surrender the foreign exchange earnings and it is rationed out to the licensed importers and in this way certain restrictions are imposed on imports.
- **Export promotion**: To remove the disequilibrium in BoP, the

government should encourage exports which will help in earning foreign currency. The various export promotion measures are reduction in export duties, provision of export subsidies, incentives for exports etc.

- **Discouraging imports**: In correcting disequilibrium in BoP, certain measures to discourage imports may become necessary, like imposition of import duties, fixing import quotas, import substitution etc.

3.9 ECONOMIC DEVELOPMENT AND BoP

There is a close relationship between economic development and BoP. To be more specific, the deficit or surplus balance in BoP is closely related with the stage of economic development that a country attaints at a particular point of time. If we consider the components of current account, the deficit occurs due to higher imports than exports, whereas surplus occurs due to higher exports than imports. In capital account, if borrowings of a country are more, the country will face a situation of unfavourable BoP as foreign liability along with interest will be a heavy burden on the country.

A developing country, in the initial period of development has to depend on other countries in respect of import of machinery, technical know- how etc. This, of course, increases the import bill. On the other hand, its exports are minimal and therefore, foreign exchange earnings are very low. If the country is primarily an agrarian country and due to lack of export- oriented industries, their performance on export front is not so encouraging. The total result is more imports than exports which leads to disequilibrium in BoP. Taking the example of India, in its initial time of development , after independence, the exports were insignificant whereas imports were very high that created a huge deficit in BoP. As the country made progress in economic front and with the encouragement of export- oriented industries and various measures to control import, gradually the deficit in BoP shows a declining trend. Thus, there exist a strong connection between economic development and BoP.



3.10 LET US SUM UP

In this unit we have discussed the following aspects-

- Balance of Trade also known as trade balance or international trade balance shows the difference between the value of export and import of a country. It indicates the relative strength of a country in terms of economy.
- Balance of Payment is a statement of receipts and payments in terms of balance of trade (visible items**),** invisible items and capital transfer for a specified period.
- Balance of Payment includes all the transactions done by individuals, companies and the government entities with the individuals, companies and the government entities of the rest of the world.
- The Balance o Payment statement is divided mainly as Current Account and Capital account.
- In current account, the transactions related to exports and imports of visible and invisible items are included.
- The financial transactions of capital account results in change in a country's foreign assets and liabilities. It consists of short- term and long- term (having maturity of one or more than one year) lending and borrowings, both private and government.
- The different causes of disequilibrium in Balance of Payment are – Development and Investment Programmes, Demonstration effect, Changes in Foreign Exchange Rates etc.
- The different methods of correcting disequilibrium in Balance of Payment are – Deflation, Depreciation, Exchange control etc.
- The deficit or surplus balance in Balance of Payment is closely related with the stage of economic development that a country attaints at a particular point of time.



3.11 FURTHER READING

1) Paul R.R. (1998). *Money, Banking and International Trade*. Kalyani Publishers, New Delhi.

2) Dewett K.K. (1998). *Modern Economic Theory*. S. Chand & Company Ltd., New Delhi.

3) https://economictimes.indiatimes.com)/definition/balance-of-payment. Accessed on 25/10/2018

3.12 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Balance of Trade also known as trade balance shows the difference between the value of export and import of a country. When a country's import is more than its exports, it is said that the country has a negative or unfavourable balance of trade or trade deficit. If the country's export is more than its import, it is said that the country has a positive or favourable balance of trade. The balance of trade includes only the exports and imports of visible items like, clothes, machines etc. and indicates the relative strength of a country in terms of economy.

Ans to Q No 2: Balance of Payment is a statement of receipts and payments in terms of balance of trade (visible items**),** invisible items and capital transfer for a specified period. Balance of payments is a comprehensive statement that includes all the transactions done by individuals, companies and the government entities with the individuals, companies and the government entities of the rest of the world.

Ans to Q No 3: Current account includes the transactions related to exports and imports of visible and invisible items. These transactions results in actual transfer of goods and services and affect national income, expenditure and output. If exports are more than imports, the current account shows surplus balance. If imports are more than exports, the

current account shows deficit balance and accordingly it shows a country's earnings and payments in terms of foreign currency.

Ans to Q No 4: (a) Development and Investment Programmes

(b) Changes in Foreign Exchange Rates



3.12 MODEL QUESTIONS

Q 1: Define Balance of Payment.

Q 2: Discuss the different causes of disequilibrium in Balance of Payment.

Q 3: Discuss the measures for correcting disequilibrium in Balance of Payment.

Q 4: Differentiate between Balance of Trade and Balance of Payment.

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UNIT 4: FOREIGN EXCHANGE MARKET

UNIT STRUCTURE

4.1 Learning Objectives

4.2 Introduction

4.3 Concept of Foreign Exchange Market

4.4 Functions of Foreign Exchange Market

4.5 Dealers in the Foreign Exchange Market

4.6 Exchange Rate

4.7 Advantages and Disadvantages of Fixes and Flexible Exchange Rate

4.8 Exchange Quotations

4.9 Merchant Rate

4.9.1 Basis for Merchant Rates

4.10 Transactions in the Foreign Exchange Market

4.11 Let Us Sum Up

4.12 Further Reading

4.13 Answers To Check Your Progress

4.14 Model Questions

4.1 LEARNING OBJECTIVES

After going through this unit, you will able to-

- discuss the concept of foreign exchange market
- outline the functions of Foreign Exchange Market
- describe the dealers in the Foreign Exchange Market
- explain Exchange Rate and also discuss the Advantages and Disadvantages of Fixes and Flexible Exchange Rate
- discuss Exchange Quotations
- learn about transactions in the Foreign Exchange Market

4.2 INTRODUCTION

In this unit we are going to discuss about foregien exchage market.

We will discuss the concepts like concept of foreign exchange market, Functions of Foreign Exchange Market, Dealers in the Foreign Exchange Market, Exchange Rate its advantages and Advantages and Disadvantages of Fixes and Flexible Exchange Rate, Exchange Quotations, Merchant Rate and Transactions in the Foreign Exchange Market.

Foreign Exchange Market is a decentralized worldwide market in which currencies are traded.The foreign exchange market is the market in which participants are able to buy, sell, exchange and speculate on currencies. Foreign exchange markets are made up of banks, commercial companies, central banks, investment management firms, hedge funds, and retail forex brokers and investors. Let us discuss these concept in detail in the following section.

4.3 CONCEPT OF FOREIGN EXCHANGE MARKET

The foreign exchange market is a market in which currencies are bought and sold against each other. In other words, foreign exchange market is the market where the currency of one country is exchanged for the currency of another country. The market is an over the counter market. There is no single market place or an organized exchange (like a stock exchange) where traders meet and exchange currencies. According to Kindelberger, “Foreign exchange market is a place where foreign money are bought and sold.”

Foreign exchange market is the largest financial market. Foreign exchange markets were primarily developed to facilitate settlement of debts arising out of international trade. The largest foreign exchange market is London followed by New York, Tokyo, Zurich and Frankfurt. The markets are situated throughout the different time zones of the globe in such a way that when one market is closing the other is beginning its operations. Thus at any point of time one market or the other is open. Therefore, it is stated that foreign exchange market is functioning throughout 24 hours of the day.

There are two foreign exchange markets. Viz. the retail market and the wholesale market. In the retail foreign exchange market, Retail traders buy or sell currency for their genuine business/personal requirements.

Individuals like tourists, foreign students, patients traveling to other countries for medical treatment; small companies, small exporters and importers operate in the retail foreign exchange market. Money transfer companies are also major players in the retail market. The wholesale foreign exchange market is also called the inter-bank market. In the whole sale market Commercial banks are the market makers. This market serves to smoothen the excessive purchases or sales made by individual banks.

4.4 FUNCTIONS OF FOREIGN EXCHANGE MARKET

The foreign exchange market performs the following three functions:

a) **Transfer function:** The basic function of the foreign exchange market is to facilitate the conversion of one currency into another, i.e., to transfers purchasing power between two countries. It is the primary function of this market. Various instruments such as telegraphic transfers, bank drafts and foreign bills are used for transferring the purchasing power.

b) **Credit function:** Another function of foreign exchange market is to provide credit for promotion of foreign trade. Foreign exchange market provide credit by discounting bills of exchange arising out of foreign trade. Bills of exchange, with maturity period of three months, are generally used for international payments. Credit is required for this period in order to enable the importer to take possession of goods, sell them and obtain money to pay off the bill.

c) **Hedging function:** The third function of foreign exchange market is to hedge foreign exchange risk. Hedging means the avoidance of a foreign exchange risk. The exchange rates (price of one currency expressed in another currency) under free market situation can go up and down. Under this condition, a person or a firm undertakes a great exchange risk if there are huge amounts of net claims or net liabilities which are to be met in foreign currency.

For this the exchange market provides facilities for hedging anticipated or actual claims or liabilities through forward contracts in

exchange. A forward contract is a contract to buy or sell foreign exchange against another currency at some fixed date in the future at a price agreed upon now. Through hedging, the foreign exchange market tries to protect the interest of the persons dealing in the market from any such unforeseen changes in the exchange rate.

4.5 DEALERS IN THE FOREIGN EXCHANGE MARKET

Foreign exchange market is the largest market in the world. It operates 24 hours in a day and spread all over the world. Following are the important dealers of foreign exchange market in India:

Central Bank: Central banks of the country intervene in the foreign exchange market in order to maintain the exchange rate within a certain range. The central banks also execute the policies of the government. It act as the custodian of foreign exchange reserves.

Acceptance Houses: Acceptance houses also operate in foreign exchange market. They accept bills on behalf of their customers and helps in foreign remittance.

Foreign Exchange Dealers: Foreign exchange dealers are banks and non-banking financial institutions. Brokers are agents which merely match buyers and sellers and get a fee. They make profit from the spreads between the buying and selling prices. Before the invent of internet, brokers, dealers and clients were communicating over telephone or telex and through satellite communication. These dealers are also known as market makers. As market makers, these dealers stand willing at all time to buy and sell currencies at the quoted rate. Dealers do not necessarily make markets for all currency but specialize in some currency pair. Dealers also trade foreign exchange as part of their own proprietary trade. In proprietary trading, dealers invest their own capital and undertake currency trading. Unlike the smaller margin received by dealers from the bid-ask spread, in proprietary trades, dealers expect a larger profit margin.

Foreign exchange dealers trade among themselves through direct dealing and through brokers. In case of direct dealing, two dealers contact

each other directly and undertake a trade. Like any other traders, dealers may contact brokers for executing their proprietary trades if these dealers want anonymity in trading. In India, Reserve Bank of India gives permission to an entity to act as authorized dealer in foreign exchange.

Brokers: In the foreign exchange market banks do not deal directly with each other. The brokers bring together the buyers and sellers of foreign exchange. If a bank wants to buy or sell foreign exchange, it informs the broker the amount. If the broker succeeds in carrying out the transaction, he receives a commission from the selling bank.

Brokers help clients to get a better rate on the currency trade by making available different quotes offered by dealers. Traders can compare rates and accordingly take a decision. Communication between brokers and clients are done through dedicated telephone lines. A broker continuously remains active and connected to dealers to get latest quotes, depth of the market. The broker compares the rates offered by the dealers and provides the best rates to the clients. With the emergence of communication technology, now most of the deals are happening in electronic brokering system.

Hedgers: Hedgers are traders who undertake foreign exchange trading because they have assets or liability in foreign currency. For example, when an importer requiring foreign currency, sells domestic currency to buy foreign currency, he is termed as a hedger. The importer has a foreign currency liability. Similarly, an exporter sells foreign currency and buys domestic currency is a hedger. The exporter has assets denominated in foreign currency. An MNC enters into a foreign currency forward contract so that it can repatriate its earning to parent company. An Indian company swapping its foreign currency interest payment obligations to INR interest obligation. All these are examples of hedging. Hedgers use the foreign currency market to hedge the risk associated with volatility in foreign exchange market.



CHECK YOUR PROGRESS

Q 1: Mention two functions of foreign exchange market.

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Q 2: Name two dealers of foreign exchange market.

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4.6 EXCHANGE RATE

The rate of exchange is the price of one currency stated in terms of another currency i.e. the rate at which one currency is exchanged for another. The rate of exchange expresses the external purchasing power of a home currency. E.g.- If one US dollar can be exchange for 60 Indian Rupees, than the rate of exchange is 1US $ = Rs.60 or Rs.1=1/60 US $=0.017 $. In a foreign exchange market, there exist different types of exchange rates. Following are the some major exchange rates:

1. **Spot Rate:** The spot rate is the current exchange rate for any currency. A spot foreign exchange rate is the rate of a foreign exchange contract (buying and selling of foreign exchange) for immediate delivery. This rate is also known as cable rate or telegraphic transfer rate. It is a straightforward rate without any ambiguity.The spot rate is quoted differently for buyers and sellers. For example, $1=60.31 for buyers and $1=Rs60.15 for the seller. This difference arises because of transportation charges, dealer's commission, insurance etc. These costs are to be borne by the buyers.
2. **Forward Rate:** Forward rates are exchange rates for currency exchanges that will occur at a future date. The forward exchange rate is settled now but the actual exchange of foreign exchange take place in the future. A forward contract is generally entered into by exporters and importers who are exposed to foreign exchange rate fluctuations. The forward rate is quoted at a premium or discount to the spot price.



Current account: The current account deals with short-term transactions known as actual transactions. It consists of visible trade (export and import of goods), invisible trade (export and import of services), unilateral transfers, and investment income (income from factors such as land or foreign shares).

Devaluation: reduction in the exchange value of a currency by a lowering of its gold equivalency or its value relative to other currency.

Forward dates are typically 30, 90, 180 or 360 days in the future.

3. **Long Rate:** Long rate of exchange is the rate at which the banks purchase or sells foreign currency bills which are payable at a specific future date. The long rate is determined on the basis of the interest on the delayed payment.
4. **Fixed Rate:** A fixed exchange rate, also known as the pegged exchange rate, is "pegged" or linked to another currency or asset (often gold) to derive its value. Such an exchange rate mechanism ensures the stability of the exchange rates by linking it to a stable currency itself. Under fixed exchange rate system the rate of exchange between two or more countries does not vary or varies only within narrow limits. Under this system, the government or the Central Bank intervenes in the foreign exchange market so as to maintain the exchange rate stays close to an 'exchange rate target'.
5. **Flexible exchange rate:** In flexible exchange rate system value of one currency in terms of another is determined through the market forces of demand and supply. Under the flexible exchange rate system the rate of exchange is allowed to vary to suit the economic policies of the government. There are no restrictions on buying and selling of foreign exchange and the exchange rates are free to change according to the changed in the demand and supply of foreign exchange. A currency that uses a floating exchange rate is known as a floating currency.
6. **Dual Exchange Rate:** In dual exchange rate system, the currency rate is maintained separately by two values. One rates applicable for the foreign transactions and another for the domestic transactions. Such systems are normally adopted by countries that are transitioning from one system to another. This ensures a smooth changeover without causing much disruption to the economy.

4.7 ADVANTAGES AND DISADVANTAGES OF FIXED AND FLEXIBLE EXCHANGE RATE

ADVANTAGES AND DISADVANTAGES OF FIXED EXCHANGE RATE

ADVANTAGES OF FIXED EXCHANGE RATE:

1. **Exchange rate stability**: Under fixed exchange rate system exchange rate do not change automatically. Exchange rate stability is necessary for orderly devel-opment of the international economy and rapid growth of world trade. If the exchange rate is un-stable or variable, the exporters will not be certain about the price they would receive for the goods to be exported by them; the importers will not be certain about the price and the payments they have to make for their imports.
2. **Creates Confidence:** Since there is no fear of currency fluctuations, fixed exchange rate creates confidence in the strength of the domestic currency and there is no fear of adverse effect of speculation on the exchange rate.
3. **Facilitate long term capital flow:** since uncertainty and risk of exchange rates volatility is rare in case of fixed exchange rate, hence it promote long-term capital flows.
4. **Impose discipline:** Fixed exchange rate serve as an anchor and imposes a discipline on monetary authorities to follow responsible financial policies within countries.
5. **Remove speculation:** Fixed exchange rate system eliminates speculative activities in foreign exchange transactions. In fixed exchange there is no possibility of panic flight of capital from one country to another.
6. **Good for developing nations:** Developing nations need economic stability for carrying out their planned development efforts. Flexible exchange rates disturb the process of economic development by disturbing inflow of foreign capital.
7. **Promotes economic integration of the world:** It has also been argued in favour of fixed exchange rate system that it is necessary for achieving economic integration of the world commu-nity. This is similar to a single common currency in a country which promotes economic integration of a nation in the sense that it facilitates communication, trade and free movement of finance be-tween different regions of a country.

DISADVANTAGES OF FIXED EXCHANGE RATE:

1. **Outdated System:** In today's economic situation fixed exchange rate system is not appropriate.Fixed exchange rate system was successful under favorable conditions of gold standard during 19th century.
2. **Speculation Encouraged:** Under a fixed rate system, if a country faces huge BOP deficit then the possibility of speculation increases. If the speculators can guess that such BOP deficit will persist in the days ahead and the authority may go for a cut in foreign exchange rate then these people will be more enthu-siastic to sell domestic currencies in the foreign exchange market. If such sale of home currencies continues for a longer period, the central bank will then be forced to reduce exchange rate, instead of keeping it at the old fixed rate. Under the circums-tance, speculators go on buying home currencies where exchange rates have been reduced. This will make these people to earn profit.
3. **Cost-price relationship not reflected:** The fixed exchange rate system does not reflect the true cost-price relationship between the currencies of different countries. Because, the exchange rate is not determine by the market forces i.e. demand and supply.
4. **International Competitive Environment By-passed:** The continuous changes in international competitive environment do not get reflected under the fixed exchange rate system. Thus, to make the home product more competitive in the foreign market, what is required is the change in domestic economic policies so that the country's export products get larger foothold in the foreign market. In other words, the fixed exchange rate system fails to gloss over the international competitive environment.
5. **Less flexibility**. In a fixed exchange rate, it is difficult to respond to temporary shocks. For example, if the price of oil increases, a country which is a net oil importer will see a deterioration in the current account balance of payments. But in a fixed exchange rate, there is no ability to devalue and reduce current account deficit.
6. **Burden on authority:** In fixed exchange rate system, country needs

to have significant foreign exchange reserves and this imposes heavy burden on the monetary authorities for managing foreign exchange reserves. Monetary authorities lose the independence of monetary policy formulation to maintain exchange rate stability.

ADVANTAGES AND DISADVANTAGES OF FLEXIBLE EXCHANGE RATE

ADVANTAGES OF FLEXIBLE EXCHANGE RATE:

Following are the main advantages of flexible exchange rates system:

1. **Autonomy:** The fundamental argument in favour floating exchange rate system is that it allows countries autonomy with respect to their use of monetary, fiscal and other policy instruments and at the same time external equilibrium is ensured because of flexible exchange rate.
2. **Flexibility:** Floating exchange rates gives the government and the monetary authorities' flexibility in determining interest rates. This is because interest rates do not have to be set to keep the value of the exchange rate within pre-determined bands.
3. **Maintain equilibrium:** Balance of Payments on current account disequilibrium can automatically be restored to equilibrium floating exchange rate regime and the scarcity or surplus of any currency is eliminated under floating exchange rate regime.
4. **Promote international trade:** Flexible exchange rate system does not permit exchange control and promote free trade. It removes restrictions on international trade and allows free movement of capital between countries.
5. **Reduce speculation:** In spite of strict exchange control currency speculation is encouraged under fixed exchange rate system. This destroys the stability in the exchange value of the home currency and makes devaluation of currency inevitable. This problem is minimized under flexible exchange rate system.
6. **Determine by Market forces:** Under the flexible exchange rate system, the foreign exchange rates are determined by the market forces of demand and supply. Market is cleared off automatically through changes in exchange rates and the possibility of scarcity or surplus of any currency does not exist.

DISADVANTAGES OF FLEXIBLE EXCHANGE RATE:

Following are the main drawbacks of the system of flexible exchange rates:

1. **Create instability and uncertainty:** Flexible exchange rates create conditions of instability and uncertainty which, in turn, tend to reduce the volume of international trade and foreign investment. Long-term foreign investments arc greatly reduced because of higher risks involved.
2. **Hampering Investment:** Flexible exchange rate often discourages foreign investment. As exchange rate under flexible exchange rate system becomes unpredictable investors feel insecure to invest in foreign market.
3. **Adverse Effect on Economic Structure:** The flexible exchange rate system has serious repercussion on the economic structure of the country. Fluctuating exchange rates cause changes in the price of imported and exported goods which, in turn, destabilize the economy of the country.
4. **Unnecessary Capital Movements:** The system of fluctuating exchange rates leads to unnecessary international capital movements. By encouraging speculative activities, such a system causes large-scale capital outflows and inflows, thus, seriously disturbing the economy of the country.
5. **Depression Effects of Capital Movements:** Speculative capital movements caused by fluctuating ex-change rates may lead to the problem of extremely high liquidity preference. In a situation of high liquidity preference, people tend to hoard currency, interest rates rise, investment falls and there is large-scale unemployment in the economy.
6. **Inflationary Effect:** Flexible exchange rate system involves greater possibility of inflationary effect of exchange depreciation on domestic price level of a country. Inflationary rise in prices leads to further depreciation of the external value of the currency.
7. **Factor Immobility:** The immobility of various factors of production deprives the flexible exchange rate system of its advantages arising

from the adoption of monetary and other policies for maintaining internal stability. Such policies produce desirable effects on production and employment only when supply of factors of production is elastic.



CHECK YOUR PROGRESS

Q 3: What is meant by exchange rate?

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4.8 EXCHANGE QUOTATIONS

Exchange rates can be quoted in either of the two ways;

(a) direct quotation (b) indirect quotation.

The quotation in which exchange rate is expressed as the price per unit of foreign currency in terms of the home currency is known as 'Home currency quotation' or 'Direct quotation'. It may be noted that under direct quotation the number of units of foreign currency is kept constant and any change in the exchange rate will be made by changing the value in term of rupees. For instance, US dollar quoted at Rs.48 may be quoted at Rs 46 or Rs.49 as may be warranted. The quotation in which the unit of home currency is kept constant and the exchange rate is expressed as so many unit of foreign currency is known as 'Foreign Currency quotation' or 'Indirect quotation' or simply 'Currency Quotation'. Under indirect quotation, any change in exchange rate will be effected by changing the number of units of foreign currency.

4.9 MERCHANT RATE

The foreign exchange dealing of a bank with its customer is known as 'merchant business' and the exchange rate at which the transaction takes place is the merchant rate. The merchant business in which the contract with the customer to buy or sell foreign exchange is agreed to and executed on the same day is known as ready transaction or cash transaction. As in the case of interbank transactions a value next day contract is deliverable

on the next business day and a 'spot contract' is deliverable on the second succeeding business day following the date of the contract. Most of the transactions with customers are on ready basis. In practice, the term 'ready' and 'spot' are used synonymously to refer to transactions concluded and executed on the same day.

4.9.1 Basis for Merchant Rates

When the bank buys foreign exchange from the customer, it expects to sell the same in the interbank market at a better rate and thus make a profit out of the deal. In the interbank market, the bank will accept the rate as dictated by the market. It can, therefore, sell foreign exchange in the market at the market buying rate for the currency concerned. Thus the interbank buying rate forms the basis for quotation of buying rate by the bank to its customer. Similarly, when the bank sells foreign exchange to the customer, it meets tele commitment by purchasing the required foreign exchange from the interbank market. It can acquire foreign exchange from the market at the market selling rate. Therefore the interbank selling rate forms the basis for quotation of selling rate to the customer by the bank. The interbank rate on the basis of which the bank quotes its merchant rate is known as the base rate.

4.10 TRANSACTIONS IN THE FOREIGN EXCHANGE MARKET

A very brief account of certain important types of transactions conducted in the foreign exchange market is given below:

Spot Market: The term spot exchange refers to the class of foreign exchange transaction which requires the immediate delivery or exchange of currencies on the spot. In practice the settlement takes place within two days in most markets. The rate of exchange effective for the spot transaction is known as the spot rate and the market for such transactions is known as the spot market.

Forward Market: The forward transactions is an agreement between two parties, requiring the delivery at some specified future date of a specified amount of foreign currency by one of the parties, against payment in domestic currency be the other party, at the price agreed upon in the contract. The rate of exchange applicable to the forward contract is called the forward exchange rate and the market for forward transactions is known as the forward market.

The foreign exchange regulations of various countries generally regulate the forward exchange transactions with a view to curb the speculation in the foreign exchanges market. In India, for example, commercial banks are permitted to offer forward cover only with respect to genuine export and import transactions. Forward exchange facilities, obviously, are of immense help to exporters and importers as they can cover the risks arising out of exchange rate fluctuations be entering into an appropriate forward exchange contract. With reference to its relationship with spot rate, the forward rate may be at par, discount or premium.

If the forward exchange rate quoted is exact equivalent to the spot rate at the time of making the contract the forward exchange rate is said to be at par.

The forward rate for a currency, say the dollar, is said to be at premium with respect to the spot rate when one dollar buys more units of another currency, say rupee, in the forward than in the spot rate on a per annum basis.

The forward rate for a currency, say the dollar, is said to be at discount with respect to the spot rate when one dollar buys fewer rupees in the forward than in the spot market. The discount is also usually expressed as a percentage deviation from the spot rate on a per annum basis.

The forward exchange rate is determined mostly based on the demand for and supply of forward exchange. Naturally when the demand for forward exchange exceeds its supply, the forward rate will be quoted at a premium and conversely, when the supply of forward exchange exceeds the demand for it, the rate will be quoted at discount. When the supply is equivalent to the demand for forward exchange, the forward rate will tend to be at par.

Futures

While a focus contract is similar to a forward contract, there are several differences between them. While a forward contract is tailor made for the client be his international bank, a future contract has standardized features the contract size and maturity dates are standardized. Futures cab are traded only on an organized exchange and they are traded competitively. Margins are not required in respect of a forward contract but margins are required of all participants in the futures market.An initial margin must be deposited into a collateral account to establish a futures position.

Options

While the forward or futures contract protects the purchaser of the contract from the adverse exchange rate movements, it eliminates the possibility of gaining a windfall profit from favorable exchange rate movement. An option is a contract or financial instrument that gives holder the right, but not the obligation, to sell or buy a given quantity of an asset as a specified price at a specified future date. An option to buy the underlying asset is known as a call option and an option to sell the underlying asset is known as a put option. Buying or selling the underlying asset via the option is known as exercising the option. The stated price paid (or received) is known as the exercise or striking price. The buyer of an option is known as the long and the seller of an option is known as the writer of the option, or the short. The price for the option is known as premium.

Swap operation

Commercial banks who conduct forward exchange business may resort to a swap operation to adjust their fund position. The term swap means simultaneous sale of spot currency for the forward purchase of the same currency or the purchase of spot for the forward sale of the same currency. The spot is swapped against forward. Operations consisting of a simultaneous sale or purchase of spot currency accompanies by a purchase or sale, respectively of the same currency for forward delivery are technically known as swaps or double deals as the spot currency is swapped against forward.

Arbitrage

Arbitrage is the simultaneous buying and selling of foreign currencies with intention of making profits from the difference between the exchange rate prevailing at the same time in different markets

Forward Contract

Forward contracts are typical OTC derivatives. As the name itself suggests, forward contracts are transactions involving delivery of an asset or a financial instrument at a future date.

Regulation of Foreign Exchange

Traditionally Indian foreign exchange market has been a highly regulated one. Till about 1992-93, government exercised absolute control on the foreign exchange market. In 1973 the government of India enacted Foreign Exchange Regulation Act (FERA) which strictly controlled any activities in any remote way related to foreign exchange. FERA was introduced during 1973 and came in to force from 1st January, 1974, when foreign exchange was a scarce commodity. FERA was a very rigid Act, It prescribed a policy – "nothing (foreign exchange transactions) is permitted unless specifically mentioned in the act". Post liberalization, the Government of India, felt the necessity to liberalize the foreign exchange policy. Hence, On June 1, 2000, the Foreign Exchange Management Act, 1999 (FEMA) was brought in force to replace the then existing FERA. FEMA expanded the list of activities in which a person/company can undertake foreign exchange transactions. Through FEMA, government liberalized the export-import policy, limits of FDI (Foreign Direct Investment) & FII (Foreign Institutional Investors) investments and repatriations, cross-border M&A and fund raising activities. Prior to 1992, Government of India strictly controlled the exchange rate. After 1992, Government of India slowly started relaxing the control and exchange rate became more and more market determined. The socialist pattern of governance and license raj system of Post independence made the Indian companies noncompetitive in the international market, leading to decline in export. Simultaneously India import bill was escalating because of capital goods, crude oil & petrol products increased the foreign exchange outgo leading to sever scarcity of foreign exchange.

FEMA had become the need of the hour to support the pro-liberalisation policies of the Government of India. The objective of the Act is to consolidate and amend the law relating to foreign exchange with the objective of facilitating external trade and payments for promoting the orderly development and maintenance of foreign exchange market in India.

Features of FEMA

Following are the some of the important features of FEMA

i. It is consistent with full current account convertibility and contains provisions for progressive liberalisation of capital account transactions.

ii. It is more transparent in its application as it lays down the areas requiring specific permissions of the Reserve Bank/Government of India on acquisition/holding of foreign exchange.

iii. It classified the foreign exchange transactions in two categories, viz. capital account and current account transactions.

iv. It provides power to the Reserve Bank for specifying, in , consultation with the central government, the classes of capital account transactions and limits to which exchange is admissible for such transactions.

v. It gives full freedom to a person resident in India, who was earlier resident outside India, to hold/own/transfer any foreign security/ immovable property situated outside India and acquired when s/he was resident.

vi. This act is a civil law and the contraventions of the Act provide for arrest only in exceptional cases.

vii. FEMA does not apply to Indian citizen's resident outside India.



CHECK YOUR PROGRESS

Q 4: In which year FEMA was brought in force?

.....

.....



4.11 LET US SUM UP

- Foreign exchange market is the market where the currency of one country is exchanged for the currency of another country.
- There are two foreign exchange markets. Viz. the retail market and the wholesale market.
- A fixed exchange rate, also known as the pegged exchange rate, is “pegged” or linked to another currency or asset (often gold) to derive its value.
- The foreign exchange dealing of a bank with its customer is known as ‘merchant business’ and the exchange rate at which the transaction takes place is the merchant rate.
- On June 1, 2000, the Foreign Exchange Management Act, 1999 (FEMA) brought in force to replace the then existing FERA.



4.12 FURTHER READING

1) Paul R.R. (1998). *Money, Banking and International Trade*. Kalyani Publishers, New Delhi.

2) Dewett K.K. (1998). *Modern Economic Theory*. S. Chand & Company Ltd., New Delhi.

4.13 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Two functions of foreign exchange market are transfer function and hedging function.

Ans to Q No 2: Two dealers of foreign exchange market are central band and brokers.

Ans to Q No 3: The rate of exchange is the price of one currency stated in

terms of another currency i.e. the rate at which one currency is exchanged for another.

Ans to Q No 4: FEMA was brought in force in the year 2000.



4.14 MODEL QUESTIONS

1. Write a note on Foreign Exchange Market
2. Name the dealers involved in Foreign Exchange Market
3. Write five points of advantages and disadvantages of Fixed Exchange Rate
4. Explain five advantages and disadvantages of Flexible Exchange Rate
5. What are the functions of Foreign Exchange Market
6. Write some features of FEMA
7. Define Merchant Rate. Explain its basis
8. Explain the transaction conducted in the Foreign Exchange Market

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UNIT 5: FUTURES, OPTIONS , SWAPS AND PARITY

UNIT STRUCTURE

5.1 Learning Objectives

5.2 Introduction

5.3 Concept of Fututre, Option and Swap

5.4 Currency Futures

- 5.4.1 Features of Currency Futures
- 5.4.2 Comparison Between Forward and Futures Contract

5.5 Currency Options

- 5.5.1 Important Terms relating to Options
- 5.5.2 Dealing in Currency Options
- 5.5.3 Put-Call Parity Relationship

5.6 Currency Swaps

5.7 Let Us Sum Up

5.8 Further Reading

5.9 Answers to Check Your Progress

5.10 Model Questions

5.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- explain how derivatives serve as financial instruments; and
- discuss the meaning and use of currency futures, currency options, and currency swaps.

5.2 INTRODUCTION

In the previous unit we discussed the cooncepts of Foregien Exchange market.In this unit we are going to discuss the various concepts like Currency Futures,Features of Currency Futures,Comparison Between Forward and Futures Contract, Currency Options,dealing in Currency Options and Put-Call Parity Relationship.

Derivative is an instrument that derives its value from another underlying

asset or rate. Without the underlying asset, a derivative would have no independent existence or value. Derivative product is created by the introduction of a new security having a relationship with the underlying cash or spot market. The common derivatives are Futures, Options and Swaps.

Let us discuss these concepts in the following sections.

5.3 CONCEPT OF FUTURES, OPTION AND SWAP

A Futures Contract is an agreement to make or take delivery of a specified quantity at an agreed price on a future date in the underlying market. Futures contracts exist in commodities, equities, equity indices, interest rates and currencies. We will discuss specifically currency futures.

An Option is a right but not an obligation to make or take delivery of a specified quantity of an underlying asset at an agreed price on a future date. Option contracts also exist, just like future contracts, on different underlying assets or rates such as equities, currencies and interest rates etc. We will discuss currency options in this unit.

A Swap contract represents an exchange of two streams of payments between two parties.

The three derivatives instruments are discussed in this module in sufficient detail.

It is worth noting here that derivative instruments are very important risk-management tools. However, they are widely used for speculative purposes as well.

And, if not used with caution, they can turn out to be very risky investments. It will suffice here to highlight this aspect through the story of what happened to Barings PLC, the oldest merchant bank of the UK. The bank was placed under “administration” by the Bank of England (the Central Bank of UK) in February 1995. This happened because of the losses that the Barings PLC accumulated through speculation on derivatives exceeded its entire equity capital of $860 million. One single rougue trader took positions on behalf of the bank in expectation of making huge profits. These positions, taken primarily on the Nikkei 225 stock index futures being traded on Singapore International Monetary Exchange (SIMEX), were more than $25

billion when the market moved against the trader's speculative expectation. As a result, Barings collapsed and was taken over by the Dutch banking and insurance company, ING Group. And, the trader was prosecuted for fraudulent trading.

There are other equally frightening stories associated with derivative trading. Nevertheless, if used with due care and caution, they serve a useful purpose of risk management and price discovery.

5.4 CURRENCY FUTURES

A Currency Futures Contract is a commitment to either take delivery or give delivery of a certain amount of a foreign currency on a future date at a specified exchange rate. Currency futures are conceptually similar to currency forward contracts. But they differ widely in terms of operational process. For example, A needs • 1000 on a date sometime in near future. So, instead of buying this amount now and keeping it idle, A buys a futures contract maturing around the date when he needs • 1000. Suppose this particular futures contract is quoting at Rs 56 per euro today. Once A enters into a contract to buy •1000 at Rs 56 per euro, he will have to pay neither more nor less than Rs 56 per euro irrespective of the actual spot rate on the date of delivery of the •1000.

The participants on currency futures market may be traders, brokers or brokers-traders. Traders are speculators who buy and sell to take positions on the market for their own account. Brokers do not trade but enable other clients to find buyers/sellers. They do so by charging a commission. Broker-traders operate for their own account as well as for their clients. Business enterprises, operating through their brokers, buy or sell currency futures in order to cover or hedge their currency exposures. They are called hedgers for this reason. On the other hand, speculators take positions in futures market to make profits.

5.4.1 Features of Currency Futures

As mentioned above, currency futures are conceptually

similar to currency forwards. Yet, they are different in terms of their dealing. Following are the characteristic features of the currency futures that distinguish them from forward contracts:

(i) Standardisation, (ii) Organised exchanges, (iii) Clearing house, (iv) Initial and maintenance margin, and (v) Marking-to-market process.

Currency futures are standardised in terms of ***contract size, maturity date*** and ***minimum variation*** in their value. Standardization of size means that a certain minimum amount would constitute one futures contract in a particular currency. For example, a pound sterling futures has a size of £62500 on Chicago Mercantile Exchange (CME). This means that one can buy or sell pound sterling futures only as multiples of £62500. If an enterprise needs to buy £300000, it has to enter into a futures contract either to buy £ 250000 (4 contracts of £62500 each) or buy £312500 (5 contracts). While buying or selling futures for hedging purpose an enterprise normally either underhedges or overheadges since the hedged amount is rarely an exact multiple of standard contract size. Table 7.1 gives standard sizes of some select currency futures as they are traded on CME.

Table 5.1: Standard sizes of Currency Futures on CME

S. No.	Currency	Contract Size	Minimum Variation (tick)
1.	Australian dollar	Aus$100000	US $0.0001/Aus$ (=U$$10)
2.	Canadian dollar	Can$100000	US $0.0001/Can$ (=US$ 10)
3.	Euro	125000	US$0.0001/ (US$12.50)
4:	Japanese yen	¥12500000	US$0.000001 N(=US$12.50)
5.	Pound sterling	£62500	US $0.0002/£ (=US$ 12.5 0)
6.	Swiss franc	SFr1.25000	US$0.0001/SFr (= US$12.50)

Source: CME

The other feature of standardization is maturity dates. On Chicago Mercantile Exchange (CME), most of the currency futures contracts mature on third Wednesdays of March, June, September and December. Normally, futures contracts carry a prefix by name

of the month of their maturity, For example, we say a March yen futures or a March euro futures or a June sterling futures etc. A March yen futures simply means that the futures contract on the currency, yen, will mature in the month of March and a June sterling futures will mature in the month of June.

Generally, futures contracts are closed through reverse operations. That is, sellers buy back or buyers sell back their contracts. In case, the contacts remain open upto the maturity date, they are closed on that day.

The third aspect of standardization relates to minimum variation, also called "tick". Variations in dollar prices of future contracts cannot be random; they are multiples of a certain minimum value. For example, this minimum variation for pound sterling is US$0.0002/£. In other words, the value of a pound sterling futures can vary only in terms of $12.50 (0.0002 x 62500). So the value of one tick is $ 12.50, Suppose, at any time, a pound sterling futures is quoting at US$ 1,7940/£.. This price can change to US$ I.7942/E or US $1.7938/£ or US$1.7944/£ etc but not to US$1,7941 or $1.7939. The variation has to be necessarily in multiples ofUS$0.0002/£. Thus, if a sterling futures passes from US $1,8070 to US$ 1.7868, the variation in the value of futures contract can be worked out as follows:

Price variation = US$(1.8070 - 1.7868) = US$0.0202

So, number of ticks = $\frac{\text{US\$0.0202}}{\text{US\$0.0002}} = 101$

Value of one tick = £62500 x $0.0002/£ = $12.50

Thus the variation in the price of the sterling contract = Number of ticks x Value of one tick

= $101 x 12.50=$1262.50

This is verified by using exchange rates directly. The contract value passes from

62500 x 1.8070 (or 112937.50) dollars to 62500 x 1.7868 (or 111675) dollars. The difference is $1262.50 (=$ 112937.50 - $111675).

The values of ticks for different currencies are given in Table 7.1.

Some currency futures exchange have daily price limits, that is, a limit as to how much the settlement price can increase or decrease from the settlement price of the previous day. In operational terms, this means that when the price limit is hit, trading will halt as a new market-clearing equilibrium price can not be obtained. If needed, an exchange may expand the daily limit until a market-clearing price can be established.

Thus, gain or loss of a trader operating on currency futures market can be calculated in two ways. Suppose a market operator has bought 60 Euro Futures Contracts when it was trading at $1.1695/•. These futures are being quoted at $1.1715/• when he closes his position. His gain is calculated in two ways:

(i) Number of contracts multiplied by the number of ticks multiplied by the value of one tick.

Here number of contracts: 60

Value of a tick: $12.50 (From Table 7.1)

Number of ticks

$$= \frac{(1.1715 - 1.1695)}{0.0001} = 20$$

So the gain = Number of futures contracts x Number of ticks x Value of one tick

= $60 x 20 x 12.50 = $15000

or

(ii) Number of contracts multiplied by contract size multiplied by the price change. Here number of contracts: 60

Size of one euro contract: 125000

Price change: $1.1715 - $1.1695 = $0.0020 per euro So the gain = $60 x 125000 x 0.0020 = $15000

Forward contracts are tailor-made or customized instruments. However, futures are traded on organised exchanges only. Some of these are Chicago Mercantile Exchange, Philadelphia Board of Trade, London International Financial Futures Exchange (LIFFE), Tokyo International Financial Futures Exchange (TIFFE),

Sydney Futures Exchange, and Singapore International Monetary Exchange (SIMEX). Volume traded on futures exchanges is smaller than that on forward market. Yet, trading in futures has been growing fast.

Buying and selling of futures takes place like other securities on an exchange. Once the orders and prices are confirmed, this information is sent to the Clearinghouse where accounts of buyers/ sellers are adjusted. The time taken on electronic system for confirmation of buy/sell order is just a couple of seconds. The base currency for prices is US dollar. The most traded futures are euro-dollar, yen-dollar and sterling-dollar contracts. Euro-dollar contract is going to become most dominant one in clays to come. For futures contracts, only one unified price is quoted unlike forward market where bid-ask prices with a spread are quoted. Quotations are published in financial journals such as Wall Street Journal.

There are two types of orders given by clients in the market known as limit order and market order. In case of limit order, the broker executes the order when market attains the price specified by the client or better than specified price. On the other hand, market order is executed at market price. Market operators pay commission to brokers for their services.

In case of futures contracts, buyers and sellers do not come face-to- face. They operate through the clearing house. Clearing house is an entity that acts as counterparty to each transaction on futures market. Clearing house has the responsibility of maintaining accounts, margin payments and settlement of deliveries. A clearinghouse serves as the third party to all transactions. That is, the buyer of a futures contract effectively buys from the clearinghouse and the seller of a futures contract sells to the clearinghouse. This ensures that the buyers and sellers of the futures contracts do not have to worry about the creditworthiness of the counterparty. As a result, an active and liquid secondary market develops. Clearing members constitute the clearinghouse. Individual brokers, not being

members of the clearinghouse deal through a clearing member to settle a customer's trade. If one party to the futures deal defaults, it is the clearing member who stands in for the defaulting party. Subsequently, he seeks restitution from the defaulter. The liability of the clearinghouse is limited because futures position is marked-to market daily. In order to be able to operate on futures exchange; it is necessary to make a deposit with the clearing house. This deposit is known as Initial or Guarantee Deposit/Margin. This guarantee margin varies from one currency to another depending on its volatility. Higher the volatility, larger is the margin. For example, it may be 2000 dollars for more volatile currency and 1500 dollars for another currency with lower volatility: The system of margin can be formula-based as well. For example, it can be equal to average daily volatility.

The other term associated with Initial Margin is known as Maintenance margin. This refers to the amount that has to be maintained all the time. The balance in the margin account is not allowed to fall below this level. Rise and fall in the margin account happens because of daily changes in the value of futures contract. The change is calculated on daily basis through the process of marking-to-market. The latest rate of the day is compared with the latest rate of the previous day. In case there is variation in favour of the operator, his account is credited On the other hand, if the variation is unfavourable, his account is debited. If the balance in the margin account falls below the maintenance margin the operator is called upon to pay up the variation margin. It must be noted that margin account maintained by the clearing house is never allowed to fall below maintenance margin. Maintenance margin is a figure lower than the initial margin. For example, an initial margin may be 2000 dollars while maintenance margin may be 1600 dollars. Or, an initial margin may be 1.500 dollars while maintenance margin may be 1200 dollars etc.

Trading on futures exchange is done through marking-to-market process. An operator buying or selling futures contracts

makes an initial margin deposit. As you have already learnt that this deposit may be a small percentage of the contracted amount of a currency. On the very first day, closing rate (settlement rate) is compared with the buying/selling rate and depending on the rate Movement, the margin account of the market operator is either credited or debited. Again on the next day (day 2), the closing rate of day 2 is compared with the closing rate of the previous day (day I). Yet again, the margin account is debited or credited depending on the rate movement. This process of comparing the closing rates every day with that of previous day and crediting/debiting margin accounts is what constitutes marking- to-market. In simple terms, it means that the futures contract is repriced every day at the closing price and the difference from the closing price of the previous day is settled by crediting/debiting the margin account.

Example 5.1 explains the trading process to enable the reader to understand the steps involved.



Example 5.1

Suppose, a trader buys a December euro futures on day I when it was quoting at $1.1602/euro. He made an initial margin deposit of 2000 dollars. The maintenance margin to be considered for this example is 1600 dollars. Table 5.2 contains all relevant data.

Table 5.2: Trading Process of a Futures Contract Bought on Day 1 (Currency: Euro) at $1.1602/• [Standard Size of a euro futures = •125000]

Day	Buying/Selling/ Settling Rate	Contract Price	Margin Adjustment	Margin Contributions (+) Withdrawal (-)	Balance in Margin Account
1 buy	$1.1602	$145025.0	0.00	+$2000	$2000.00
I settle	$1.1600	$145000.0	-$25.00	0.00	$1975.00
2 settle	$1.1597	$144962.5	-$37.50	0.00	$1937.50
3 settle	$1.1566	$144575.0	-$387.50	$450	$2000.00
4 settle	$1.1590	$144875.0	+$300.00	0.00	$2300.00
5 settle	$1.1605	$145062.5	+$187.50	0.00	$2487.50
6 sell +$100	$1.1610	$145125.0	+$62.50	0.00	$2550.00

The euro futures contract is bought at $1.1602/• on the day 1. The price drops from $1.1602/• to $1.1600/• and therefore the buyer is supposed to compensate this drop. As he is bound to buy at $.1.1602/•, any drop in the price is to be compensated by him and he is compensated for any increase above $ 1.1602/•. In other words, for a buyer of a futures contract, a drop in price results in a loss (debit in his margin account) and an increase in price results in a gain (credit in his margin account). On the day 1, the settlement price dropped to $ 1.1600/•. That is, the value of contract is reduced by $25. This is a loss to the buyer. So his margin account is debited, being brought down to $1975 from $2000. On the day 2 again, the settlement price goes down and the contract value falls to $144962.50. The margin account is debited again. On the day 3, the rate falls further such that the contract price is $144575. By now cumulative loss is $450. So the margin account comes down to $1550 (= $2000 - $450). But this can not be allowed since the maintenance margin is $ 1600. Therefore, the market operator is called upon to meet the margin variation and to bring the margin account back to $2000. Thus he pays $450 on the day 3. It is to be noted that once the margin account

falls below maintenance margin, it is to be brought back to the level of initial margin of $2000 and not simply to the level of maintenance margin of $1600.

On day 4 and 5, the settlement prices go up and therefore, the margin account of the market operator gets credited. The balance in the margin account stands at $2300 on day 4 and $2487.50 on day 5. The operator is free to withdraw the amounts of $300 and $187.50 on day 4 and day 5 respectively. If he were to do so, his margin account would show $2000 on these days.

The operator does not wait till the maturity and closes his futures contract on the day 6 by selling it at $1.1610/euro. He receives $62.50 on the last day. Now let us see what is the net gain or loss to this operator. He had bought the contract at a rate of $1.1602/• and sold it back at a rate of $1.1610/•. Net gain for him is the difference between the two prices or gain per contract is $125000x(1.1.610-1.1602)=$100.

From this example, it is clear that for the buyer of futures, there is a gain whenever rate goes up whereas he incurs loss when the rate comes down.

We take another example to explain the marking-to-market process where a market operator has sold a currency futures.



Example 5.2

A market operator sold a March sterling futures on day 1 at the rate of $1.8066/£. He deposited the initial margin amount of $2000. Let us consider $1500 to be the maintenance margin. The operator keeps the futures contract live for 10 trading days. On the tenth day, he closes it by a reverse operation. Marking-to-market process is shown through the data contained in Table 5.3.

Table 5.3: Trading Process of a Futures Contract sold on Day 1 (Currency: Pound sterling) at $1.8066/£ [standard size a pound futures: £62500]

Day (1)	Buying/Selling/ Settling Rate (2)	Contract Price (3)	Margin Adjustment (4)	Margin Contributions (+) Withdrawal (-) (5)	Balance in Margin Account (6)
1 sell	$1.8066	$112912.	$00	+$2000	$2000.00
1 settle	$1.8036	$112725.	$187.50	0.00	$2187.50
2 settle	$1.8010	$112562.	$162.50	0.00	$2350.00
3 settle	$1.7980	$112375.	$187.50	-537.50	$2000.00
4 settle	$1.7996	$112475.	-$100.00	0.00	$1900.00
5 settle	$1.8014	$112587.	-$112.50	0.00	$1787.50
6 settle	$1.8044	$112775.	-$187.50	0.00	$1600.00
7 settle	$ 1.8064	$112900.	-$125.00	+525.00	$2000.00
8 settle	$1.8072	$112950.	-$50.00	0.00	$1950.00
9 settle	$1.8076	$112975.	-$25.00	0.00	$1925.00
10 buy	$1.8080	$113000.	-$25.00	0.00	$1900.00
		-$87.50			

As pointed out earlier, for a seller of a futures contract, there is a loss when the price goes up and a gain when it comes down. On day 1, the settlement price was $1 .8036/ £, which was lower than the selling price of $1.8066/£ on day 1. So the difference of $187.50 is a gain for the operator. He could withdraw this amount. But he decides against it. Therefore, this amount got credited to his margin account, thus taking the balance to $2187.50. On the day 2 also, the settlement rate has come down. So, there is a further gain of $162.50. As a result, the balance in the margin account becomes $2350. On the third day, the settlement rate is $1.7980/£. The gain of 187.50 makes the total gains go up to $537.50. This time, the operator decides to withdraw the total sum of $537.50 and the margin account reduces to $2000. From the day 4 onwards, the rate is continuously going up as a result of which there are losses to the

operator. On the days 4, 5 and 6, he does not deposit margin variation and lets the balance reduce to $ 1600. However, by the day 7, the cumulative loss has become $525. This brings down the balance in the margin account to $1475. But this cannot be allowed since maintenance margin is $1500. So, the operator is called upon to deposit $525, thus taking the balance in the margin account back to $2000. On the days 8, 9 and 10, there are further losses and the margin account comes down to $1900. The net loss when the futures contract is closed is $87.50 as shown in the column (4) of Table 7.3. This can be readily verified from the initial selling rate on day 1 and closing rate on day 10. The loss works out to $87.50 or $62500 x (1.8066 - 1.8080).

5.4.2 Comparison Between Forward and Futures Contract

As mentioned earlier, forward and futures rates are conceptually similar. Both reflect the expectation of market as to what exchange rate is likely to obtain on or around maturity date. The differences between the two relate basically to the method of trading. Table 5.4 summarizes the major differences.

Table 5.4: Comparison Between Forward and Futures Contract

S. No.	Feature	Currency forward	Currency futures
1.	Size of Contract	Negotiated/Tailor made/customized	Standardized
2.	Quotation	Between two currencies	Generally US$/ currency unit
3.	Maturity	Negotiated/Tailor made/customized	Standardized
4.	Location of trading	Linkage by telephone /fax	Futures Exchange
5.	Rates	Normally with bid-ask spread	Unified rates quoted on the exchange

6.	Settlement	Generally delivery of currencies	In a large majority, compensations through a reverse operation
7.	Counterparties	Generally in contact with each other	Do not know each other. Clearing house is the counterparty to each side
8.	Negotiation hours	Round the clock	During market sessions
9.	Guarantee/ Margin deposit	None	Initial and variation margins
10.	Marking-to-market	No such thing	Gains/losses settled everyday



CHECK YOUR PROGRESS

Q1: Define Future

.....

Q2: Define Option

.....

.....

Q3: Define Swap

.....

.....

5.5 CURRENCY OPTIONS

A currency option, as the name suggests, gives its holder a right and not an obligation to buy or sell or not to buy or sell a currency at a predetermined rate on or before a specified maturity date. Options are traded on the Over-the-Counter (OTC) market as well as on organised exchanges. _There are different categories of market operators such as enterprisers (known as hedgers) who use options to cover their exposures, banks that profit by speculating and arbitrageurs who profit by taking advantage of price

distortions on different markets.

Earlier, all currency options were OTC options, written by international banks and investment banks. OTC options are tailor-made in terms of maturity length, exercise price and the amount of underlying currency. These contracts may be for as large amounts as more than one million dollar equivalent of underlying currency. They are available on all major international currencies such as British pound, Japanese yen, Canadian dollar, Swiss franc and euro; They are also available on some of the less traded currencies. OTC options are generally of European style.

Standardised currency option contracts started being traded for the first time in 1982 on Philadelphia Stock Exchange (PHLX). These options trade with March, June, September and December expiration cycle. They mature on the Friday before the third Wednesday of the expiration month. Table 7.5 contains the size of the underlying currency per contract. They are half the corresponding futures contract. The volume of OTC currency options trading is much larger than that of exchange option trading, the former being in the range of $100 billion per day while the latter may be just about $3 to $4 billion per day.

Table 5.5: Standard Size of the Option Contracts

Sr. No.	Currency	Standard Contract Size
1.	Australian dollar	Aus$50,000
2.	British pound	£31250
3.	Canadian dollar	Can$50,000
4.	Euro	62,500
5.	Japanese yen	¥6,250,000
6.	Swiss franc	SFr62,500

Source: PHLX, Standard Currency Options

5.5.1 Important Terms relating to Options

Call option: It is the type of option that gives its holder a right to buy a currency at a pre-specified rate on or before the maturity date.

Put option: It is the type of option that gives its holder a right

to sell a currency at a pre-specified rate on or before the maturity date.

Premium: It is the initial amount that the buyer (also called the option holder) of the option pays up-front to the seller (also called the option writer) of the option. By paying this premium, the holder acquires a right for himself and by receiving it, the writer takes an obligation upon himself to fulfil the right of the holder. Generally, it is a small percentage of the amount to be bought or sold under the option. We use notation, c, to denote premium on call option and notation, p, to denote premium on put option.

Exercise/Strike Price (Rate): It is the exchange rate at which the holder of a call option can buy and the holder of a put option can sell the currency under the deal, irrespective of the actual spot rate at the time of exercise of option. We use "X" to denote exercise price.

Maturity Date or Expiration Date: The date on or up to which an option can be exercised. After this date, it becomes defunct and loses its validity.

American option: When the option has the possibility of being exercised on any date up to matu'ity, it is called American type.

European option: When an option has the possibility of being exercised only on the maturity date, it is called European type.

Value of an option: An option (whether call or put) has either a positive value or zero value. This can be explained with examples. Suppose a European call option has an exercise price (X) of Rs 55/•. On the date of maturity, the spot rate (S_T) may be more than or equal to or less than Rs 55/•.

(a) Possibility I: S_T = Rs 56/•.

In this case; call option will be exercised by the holder of the option as he can obtain euros at Rs 55/• while spot price is higher. Here, the call option is said to have a positive value of Re 1 (Rs 56 - Rs 55) or (S,- X)

(b) Possibility II S_T. Rs 55/•:

In this scenario, the holder has no specific advantage in buying euro either from spot market or by exercising his call option; He is indifferent between the two choices. The value of the option is zero.

(c) Possibility III: S_T = Rs 53/.

In this case, the holder of the option will buy euro directly from the spot market by abandoning his call option. Here also, the call option has no value or zero value.

Similar scenarios can be developed to show the value of a put option.

Option-in-money: An option is said to be in-money if its immediate exercise will give a positive value. So a call option is in-money if $S_T > X$. The value of such a call option is $S_T - X$. Likewise, a put option is in- money if $S_T < X$. The value of such a put option is $X - S_T$. Here S_T means the spot rate at the time of the exercise of the option.

Option-at-money: When $S_T = X$, an option is said to be at-money

Option-out-of-money: An option is said to be out-of-money when it has no positive value (knowing that an option can have either a positive or a zero value). So a call option is out-of-money if $S_T<X$ and a put option is out-of-money if $S_T>X$.

Premium (or Price) of an option:

The market operator may use a thumb rule to decide the premium or price to be paid or charged for an option. It may be a small percentage of the amount of currency transacted. However, it should be noted that this price depends on a number of factors in a rather complex way. These factors are:

(a) Time to maturity: Longer is the time to maturity, higher is the price of an option (whether call or put). If the maturity is further in time, it means there is greater uncertainty and possibility of currency rates fluctuating in wider range is more. Hence the

probability of the option being exercised increases. So the writer would demand higher premium.

(b) Volatility of the exchange rate of underlying currency: Greater volatility increases the probability of the spot rate going above exercise price for call or going below exercise price for put. That is, the probability of exercise of option increases with higher volatility. Therefore, the price of an option - whether call or put - would be higher with greater volatility of exchange rate.

(c) Type of option: Typically an American type option will have greater price since it gives greater flexibility of exercise than European type.

(d) Forward premium or discount: When a currency is likely to harden (greater forward premium), call option on it will have higher price. Likewise, when a currency is likely to decline (greater forward discount), higher will be price of a put option on it.

(e) Interest rates on currencies: Higher interest rate of domestic currency means lower present value of exercise price. So lower exercise price of a call makes it dearer as the probability of its exercise increases. On the other hand, lower exercise price lowers the probability of a put being exercised. Thus higher domestic interest rate has the effect of increasing the price of call and lowering the price of put. Similarly, higher foreign interest rate will reduce the call premium and increase put premium.

(f) Exercise Price: The call price will decrease with higher exercise price since its probability of use will be less. On the contrary, put premium will decrease with higher exercise price since the probability of its use will increase.

Table 5.6 Summarizes the effect of various factors on option premium.

Table 5.6: Impact of Different Factors on Options Premium

S. No.	Increase in	Impact on call premium	Impact on put premium
1.	Time to maturity	Increase	Increase
2.	Volatility	Increase	Increase
3.	Forward Premium on foreign currency	Increase	Decrease
4.	Forward Discount on foreign currency	Decrease	Increase
5.	Domestic interest rate	Increase	Decrease
6.	Foreign interest rate	Decrease	Increase
7.	Exercise price	Decrease	Increase
5.	Spot rate	Increase	Decrease

5.5.2 Dealing in Currency options

In the previous section, you have learnt the basics of options. Now, we would like you to see how they could be used individually or in combined forms to generate gains. Different ways of using options to make gain are known as option strategies. Different strategies may be adopted depending on the anticipation of the market with regard to the evolution of exchange rate in future. Options are used either in simple form or in a complex combination. Simple profit strategy means that a single call or put is used. On the other hand, a complex profit strategy involves buying and selling of several options with different features simultaneously. Some of the option strategies are discussed here.

(A) Anticipation of appreciation of underlying currency:

If a market operator anticipates that the underlying currency is likely to appreciate, then he can buy a call option. Exercise of call option on the maturity date (European type) or upto the maturity date (American type) may result in a profit. Gain or profit resulting from a call option can be written as in equation (1).

Profit = Value - Premium

Profit = $(S_T\text{-}X)\text{-}c$ for $S_T > X$ (1.1)

= -c for S_T<X (1.2)

where S_T = Spot rate at the time of exercise of the option

X = Exercise or strike exchange rate

c = Premium paid to acquire call option.

Let us illustrate this with a numerical example 4.3.



Example 5.3

We take the following data:

X= $1.I6/•

c = 2.5 cents/•

We assume that this call option is of European type. That is, it could be exercised on the date of maturity. For different possible values of S_T, profits are calculated as given in Table 5.7.

Table 5.7: Profit Profile Resulting from the Exercise of the Call option

S. No.	ST	Profit for the buyer of call option
1.	1.10	-0.025
2.	1.12	-0.025
3.	1 14	-0 025
4.	1 15	-0 025
5.	1 16	0 025
6.	1.17	-0.015
7.	1 18	-0 005
8.	1 20	+0 015
9.	1.22	+0.035
10.	1.24	+0.055

It should be noted that as long as spot rate (S_T) on the day of exercise of option is less than $1.16/•, the option is not exercised and is allowed to lapse. Therefore, there is a constant loss (negative profit) of $ 0.025, the amount that is paid as the premium for buying the call option. Only when S_T is greater than $1.16/•, the option will be exercised. From the data table, we see the following results:

(i) For S_T < $1.16/•, the option is not exercised since euro can be

purchased at a lower rate than X. The resulting profit is negative which is equal to the premium paid i.e. \$0.025/•.

(ii) At S_T> \$1.16/•, the option will be exercised.

(iii) Between \$1.16/• < S_T < \$1.185, a part of loss is recouped.

(iv) At S_T> \$1.185, net profit is realized.

We can say, that the buyer of call option will have a maximum loss limited to the premium paid but he will have unlimited profit as long as S_T moves in his favour.

The graphical representation (profit profile) for the holder of call option is shown in Figure 5.1.

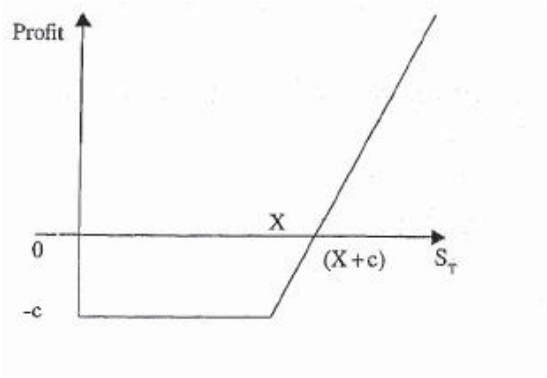


Figure 5.1: Profit Profile of the Holder of a Call Option

Note: Reverse is the profit profile of the writer (seller) of a call option. This simply means that the profit of the writer of a call option is limited to the amount of premium he received while his losses are unlimited. The profit profile of the seller (writer) of a call option is in Figure 5.2, which is nothing but a mirror image of the Figure 5.1.

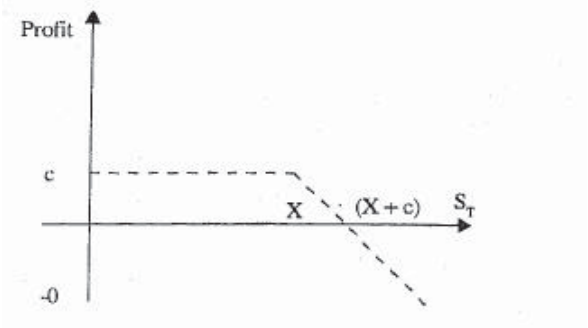


Figure 5.2: Profit Profile of the Writer of a Call Option

(B) Anticipation of Depreciation of Underlying Currency

If a market operator anticipates that underlying currency would depreciate, then he can buy a put option. Exercise of put option on or before the maturity date may result in a profit for the operator. The gain resulting from a put option can be as in equation (2).

Profit $= (X - S_T) - p$ for $S_T < X$ (2.1)

$= - p$ for $S_T > X$ (2.2)

where S_T = spot rate at the time of exercise of the option

X = Exercise or strike exchange rate

p = Premium paid to acquire the put option

Example 5.4 illustrates the use of put option:



Example 5.4

Prepare profit profile for the buyer of the put option with the data given below:

X=$1.75/£

p = 4 cents/£

Assuming this put option to be of European type, it would be exercised on its maturity. For different values of S_T, profits are calculated as given in Table 5.8.

Table 5.8: Profit Profile Resulting from the Exercise of Put Option

Sr. No.	S_T	Profit for the Buyer of Put option
1	1.65	0.06
2	1.67	0.04
3	1:69	0.02
4	1.71	0.00
5	1.72	- 0.01
6	1.75	- 0.04
7	1.78	- 0.04
8	1.80	- 0.04
9	1.82	- 0.04

From the profit figures of Table 5.8, it is clear that the put option is not exercised as long as the spot rate is greater than $1.75/£. In this situation, the option is allowed to lapse, which results into a

constant loss (negative profit) of $ 0.04/£. This loss equals to the premium paid. On the other hand, the option would be exercised when the spot rate is less than $1.75. The following conclusions can be stated:

(i) For S_T> $1.75/£, the put option is not exercised since pound sterling can be sold at a higher rate than the option exercise rate, X. The result is a net loss (negative profit), which is equal to the premium paid.

(ii) At S_T < $1.75/£, the put option would be exercised.

(iii) Between $1.75 > S_T> $1.71, a part of loss is recouped.

(iv) At S_T < $1.71/£, net profit is earned.

We can say that the buyer of put option will have a maximum loss limited to the premium paid but he will have unlimited profit so long as S_T moves in his favour. These profits are limited by the possibility of S_T becoming zero. The profit profile of the holder a put option is shown in Figure 5.3.

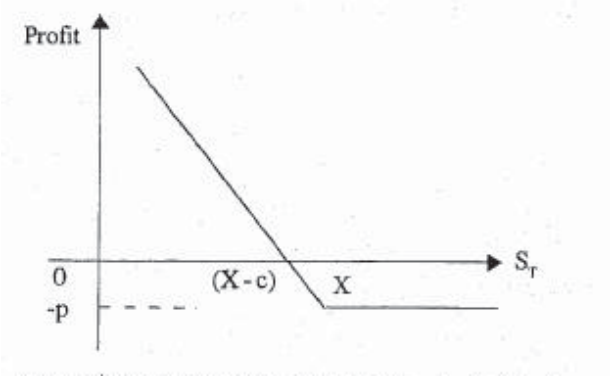


Figure 5.3: Profit Profile of the Holder of a Put Option

Note: Reverse is the profit profile of the writer (seller) of a put option. That is, the profit of the writer of a put option is limited to the amount of premium he received while his loss is unlimited. Figure 5.4 presents the profit profile of the writer of a put option which is a mirror image of the Figure 5.3.

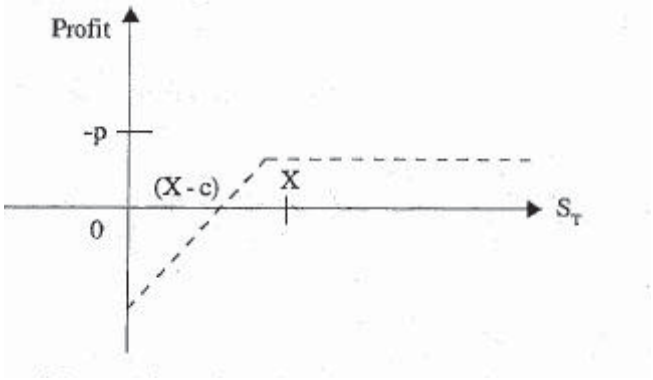


Figure 5.4: Profit Profile of the Writer of a Put Option

We have learnt how a market operator can use simple option strategies, using a single option, to make profits: However, the use of options to make gains can be done in much more complex way, by making different combinations. Some possible combinations can be as follows:

(i) Buying a call and a put simultaneously

(ii) Selling a call and a put simultaneously

(iii) Buying or selling two options of the same category (either call or put) but with different exercise prices

(iv) Buying two calls (puts) with middle exercise price and selling simultaneously one call (put) with lower and another call (put) with higher exercise price

Here, we will take an example of buying a call and put simultaneously. This strategy is known as straddle. Example 5.5 illustrates this complex strategy.

Example 5.5:

Draw the profit profile of a market operator who has bought a call and a put (straddle) with the following features:

$X_c = X_p = \$1.750/£$

$c = \$0.003/£$, $p = \$0.009/£$

Profit data for different values of S_T are given in Table 5.9 and profit profile is given in figure 5.5.

Table 5.9: Profit Profile with a Straddle

(in $/£)

ST	Gain/loss on Call	Gain/Loss on put	Net gain/loss
1.30	- 0.003	0.011	0.008
1.33	- 0.003	0.008	0.005
1.36	- 0.003	0.005	0.002
1.38	- 0.003	0.003	0.000
1.740	- 0.003	0.001	- 0.002
1.741	- 0.003	0.000	- 0.003
1.742	- 0.003	- 0.001	- 0.004
1.743	- 0.003	- 0.002	- 0.005
1.744	- 0.003	- 0.003	- 0.006
1.745	- 0.003	- 0.004	- 0.007
1.746	- 0.003	- 0.005	- 0.008
1.747	- 0.003	- 0.006	- 0.009
1.748	- 0.003	- 0.007	- 0.010
1.749	- 0.003	- 0.008	- 0.0 II
1.750	- 0.003	- 0.009	- 0.012
1.751	- 0.002	- 0.009	- 0.011
1.752	- 0.001	- 0.009	- 0.010
1.753	0.000	- 0.009	- 0.009
1.754	0.001	- 0.009	- 0.008
1.756	0.003	- 0.009	- 0.006
1.759	0.006	- 0.009	- 0.003
1.762	0.009	- 0.009	0.000
1.765	0.012	- 0.009	0.003

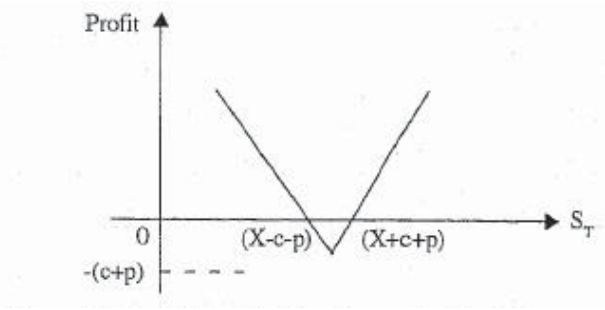


Figure 5.5: Profit Profile of the Buyer of a Straddle

5.5.3 Put-Call Parity Relationship

We have already seen how option premia are dependent on several factors, So far, we have not said anything regarding the relationship between the premia paid for call and put respectively. Are they independent of each other or does there exist a linkage between the two? The answer is that there exists a relationship between the two. Without going into the complexity of mathematical derivation, it would be worthwhile to know the equation making this linkage. The equation for a European type of a call or a put option having the same exercise price and the same maturity is given by equation (3).

$p = c+B_hX-B_f.S_0$ (3.1)

or

$p = c + B_h[X-S_t]$ (3.2)

Where $Bh = \frac{1}{1+t_h.T/360}$

$Bf = \frac{1}{1+t_f.T/360}$

S_0: spot rate on the day the option is bought/sold.

S_f, The forward rate corresponding to the maturity of the option.

$t_{h.}$ Domestic (home) currency interest rate

$t_{f:}$ Foreign currency interest rate

T: Maturity period in number of days p, c and X have their usual meaning.

To illustrate this relationship, we take a numerical example.



Example 5.6

With the data as given below, find the call option premium

p = \$0.039/£, X = \$1.74/£

3-m forward rate, S_f = \$1.76/£

3-m dollar rate t_h = 8 per cent p.a.

We use the parity equation to find the value of c. That is,

$P = c+B_h [X-S_f]$

$$0.039 = \frac{1}{c + 1 + 0.08 \times 90/360}[1.74 - 1.76]$$

c = 0.039+0.02/1.02

= 0.039 + 0.01.96 c = \$0.0586/£

5.6 CURRENCY SWAPS

Swaps are nothing but an exchange of two payment streams. Swaps can be ar^{r}anged either directly between two parties or through a third party like a bank or a financial institution. Swap market has been developing at a fast pace in the last two decades, A currency swap enables the substitution of one debt denominated in one currency at a fixed or floating rate to a debt denominated in another currency at a fixed or floating rate. It enables both parties to draw benefit from the differences of interest rates existing on segmented markets. Thus, currency swaps can be fixed-to-fixed type as well as fixed-to-floating type.

Financial institutions play very important role in swap deals. Through swaps, they enable their customers who are generally enterprises to get loans and make deposits in the currency of their (i.e. customers') choice. A financial institution (FI) may act as a broker or a counterparty or an intermediary. Figures 5.6, 5.7 and 5.8 respectively depict the three roles of an FI.

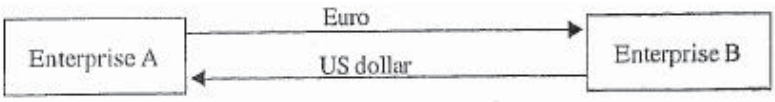


Figure 5.6: FI as a Broker



Figure 5.7: FI as a Counterparty

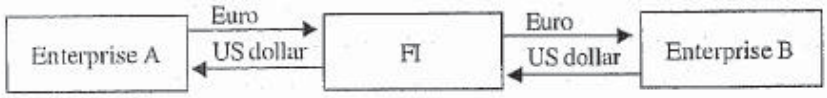


Figure 5.8: FI as an Intermediary

When an FI acts as a broker only, it is not a counterparty in the deal. It searches for counterparties and facilitates negotiations while preserving the anonymity of counterparties.

On the other hand, when an FI acts as a counterparty, it incurs various risks such as credit risk, market risk and default risk. In its role as a counterparty, Fl tries to arrange another swap having symmetrical features against another client so as to balance and reduce its own risk. For example, an FI having entered into euro -US dollar fixed-to-fixed swap with company A will try to find another company B that would like to enter into US dollar-euro fixed-to-fixed swap, involving the same amount and for the same duration.

While acting as an intermediary, the FI plays the role of a counterparty as well as a broker at the same time. In a swap deal, an FI may gain about 0.05 to 0.15 per cent or 5 to 15 basis points.

Two enterprises having requirements of capital in two different currencies can enter into a swap deal. We, try to understand the process of swap deals through two examples, one fixed-to-fixed and the other fixed-to-floating type swap respectively.

(A) Fixed-to-fixed rate Currency Swaps:

In a fixed-to-fixed swap, the two parties want to borrow at a fixed rate of interest. The swap deal enables them to get the desired currency at

a favourable rate. Example 5.7 illustrates a fixed-to-fixed swap deal.



Example 5.7

A European company, EEE, needs US dollar loan but it is not rated very favourably on dollar loan market. Likewise another company, AAA, needs euro loan while it does not have good rating on euro loan market. The market rates available for the two companies are as follows:

	EEE	**AAA**	**Difference**
Dollar rate	7 per cent	6 per cent	1 per cent
Euro rate	8.5 per cent	9 per cent	(0.5) per cent
			Net difference: 1.5 per cent

From the rates as listed above, it is clear that the company EEE has relative advantage of 0.5 per cent on euro market whereas company AAA has relative advantage of 1 per cent on dollar market. The net difference is 1.5 (= 1 - (-0.5)) per cent. The two companies can borrow in the currencies of their respective advantages and share the difference of 1.5 per cent between them through a swap deal. How is it done?

Company EEE, which actually needs dollar financing borrows in euro market at 8.5 per cent. Company AAA, which actually needs euro loan borrows in dollar market at 6 per cent. After borrowing, they exchange their principals. What it means is that company EEE gives to the company AAA the sum borrowed in euros while AAA gives to EEE the equivalent dollars. In order to effect this swap, an exchange rate is defined. The rate can be the average of buying and selling rates or some other realistic rate around this average.

The two companies also negotiate and decide the interest that each will pay to the other. Let us say it is decided that EEE will pay 6.25 per cent on dollar amount to AAA and will receive 8.5 per cent from AAA on euro amount as shown in Figure 5.9.

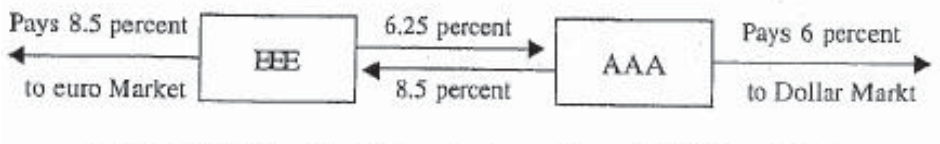


Figure 5.9: Fixed-to-Fixed Swap between Companies EEE and AAA

Thus, the respective rates of the two companies will work out as follows:

Net rate to be paid by EEE = 8.5 per cent paid to the market + 6.25 per cent paid to AAA - 8.5 per cent received from AAA.

= 6.25 per cent

Net rate to be paid by AAA = 6 per cent paid to the market + 8.5 per cent paid to EEE - 6.25 per cent received from EEE

= 8.25 per cent.

This swap deal has ensured two things (i) both companies have got the loans in their desired currencies and (ii) both companies are paying lower interest rates than they would have paid on borrowing directly from the market in the desired currency. EEE is paying a net interest of 6.25 per cent instead of 7 per cent, thus saving % per cent Likewise, AAA is paying a net rate of 8.25 per cent instead of 9 per cent, while saving ^{3}/a per cent. The two companies have shared equally the net difference of 1.5 per cent between themselves. It is not always necessary that the savings be shared in equal proportion. For example, if the net interest were 6.50 per cent for EEE and 8 per cent for AAA, then the savings would be shared in a ratio of 1:2. There can be any other ratio as well, depending on how the two companies negotiate the deal.

It is to be noted here that this swap deal did not have any intermediary. In case there. had been an intermediary, the gains made in terms of interest rate reduction would have been less for each party simply because a small part of the gains would be shared by the intermediary also.

In the end, the principals between the two companies are re-exchanged who, in turn, pay back to the market.

This example illustrates that a swap deal has enabled one company to exchange a debt denominated in euros at a fixed rate into another debt, denominated in dollars, at a fixed rate and the reverse operation for the

other company. It may be noted that a swap deal offers a good deal of flexibility in terms of interest rate and maturity date etc.

(B) Fixed-to-floating currency swap

The steps to be followed in the fixed-to-floating rate swap are the same as in fixedto-fixed swap. Here the only difference is that one currency has fixed rate while the other has floating rate. In the case of fixed-to-fixed swap discussed above, we did not bring in any intermediary. It was possible for the two companies to go through an intermediary to make the deal. Now, in the case of fixed-to-floating swap, let us assume that the deal is done through an intermediary financial institution. The problem with the swap deal done directly between two enterprises as illustrated above is that it is very time-consuming and expensive to establish. Both parties have to spend time in searching for a counterparty which needs financial resources exactly matched by the needs of the other. The search may be fruitless in the end. So the deal can be done quickly through an intermediary financial institution. Example 5.8 illustrates this point.

Example 5.8



The European company, EEE, can raise loan at fixed rate in European market but prefers to obtain dollar funding at floating rate. It can do so by entering into a swap deal with another company, AAA, which is better placed on floating rate market but prefers a fixed rate euro loan. The rates available to the two companies are:

	Company EEE	Company AAA	Difference
Floating rate on dollar	Libor + 0.8 per cent	Libor + 0.1 per cent	0.7 per cent
Fixed rate on euros	8.5 per cent	9 per cent	(0.5) per cent
		Net difference :	1.2 per cent

From the rates, it is obvious that company EEE has relative advantage of 0.5 per cent on fixed rate market whereas company AAA has a relative advantage of 0.7 per cent on floating rate market. The net difference of 1.2 (0.7 - (-0.5)) per cent is available to be shared between the two companies and intermediary bank.

Company EEE which actually needs floating dollar rate financing, borrows euros at a fixed rate of 8.5 per cent. Company AAA which actually needs fixed rate euro financing borrows dollars at LIBOR + 0.1 per cent. Then, the two companies enter into swap deal with an intermediary bank. The swap contracts stipulate that company

EEE will pay floating rate of LIBOR + 0.1 to the bank and receive from it 8.3 per cent fixed rate whereas company AAA will pay a fixed ate of 8.4 per cent to the bank and receive LIBOR from it. The net rate paid by each company and profit received by the bank can be, worked out as given below. The swap deal is depicted by Figure 7.10.

Net rate to be paid by EEE = 8.5 per cent paid to market - 8.3 received from intermediary bank + (LIBOR + 0.1) per cent paid to intermediary bank

= (LIBOR + 0.3)

Net rate to be paid by AAA = (LIBOR + 0.1) per cent paid to market - LIBOR per cent received from intermediary bank + 8.4 per cent paid to intermediary bank

= 8.5 per cent

Net gain of the bank = 8.4 per cent received from AAA - 8.3 per cent paid to EEE + (LIBOR + 0.1) per cent received from EEE - LIBOR per cent paid to AAA

= 0.2 per cent

We see the savings of 1,2 per cent have been shared by the three entities: 0.5 per cent each by company EEE and company AAA respectively, and 0.2 per cent by the intermediary. EEE is paying floating rate of LIBOR + 0.3 instead of LIBOR + 0.8 which it would have had to pay without swap deal. Likewise, AAA is paying a fixed rate of 8.5 per cent rather than 9 per cent that it would have been required to pay if it were to borrow euros at fixed rate on its own. The bank has earned 0.2 per cent for its services in the deal.



CHECK YOUR PROGRESS

Q4: Write any three points of deifference between currency forward and currency futures

.....

.....

Q5: Define Put Option

.....

.....



5.7 LET US SUM UP

Derivative is an instrument that derives its value from an underlying asset or rate. Common derivatives are Futures, Options and Swaps: A futures contract is an agreement to make or take delivery of a specified quantity of an underlying asset at an agreed price on a future date. For currency futures, the underlying asset is an amount of foreign currency. An option is a right but not an obligation to make or take delivery of a specified quantity of an underlying asset (for example, an amount of foreign currency) at an agreed price on a future date. A Swap contract represents an exchange of two streams of payments between two parties. The specific features of futures contract consist of (a) Standardisation in terms of size, maturity and variation in the value, (b) Trading on organised exchanges, (c) Clearing house, acting as a counterparty (d) Initial and maintenance margin and (f) Marking-to-market process. Futures contracts have standard sizes and well-defined maturity dates. A large majority of market participants close their positions on futures through reverse operations before their maturity date arrives, thus avoiding physical delivery of assets. Tick is the minimum variation in the price of the underlying asset. Larger variations can be only as multiples of ticks. For futures contracts, only one unique price is quoted unlike forwards where price is quoted with buy-sell spread. Clearing house acts as counterparty to each transaction on futures exchange. Clearing house has the responsibility of maintaining accounts, margin payments and settlement

of deliveries. Every operator buying or selling futures has to deposit an initial margin, also known as guarantee deposit. Trading on futures exchange is done through the process of marking-to-market which means that a futures contract is repriced every day at its closing price. Options are of two types, known as call and put option respectively. Call option gives its holder a right to buy an asset (currency) at a prespecified rate on or before the maturity date. Put option gives its holder a right to sell an asset (currency) at a prespecified rate on or before the maturity date. Premium is the amount that the buyer (holder) of an option pays upfront to the seller (writer) of the option. The terms exercise price and strike price are used synonymously. Exercise price is the exchange rate at which the holder of a call option can buy and the holder of a put option can sell the currency under the deal. Maturity date is the date up to which or on which an option can be exercised. An American type option can he exercised on any date up to the maturity date. A European type option can be exercised only on the maturity date. An option is in-money if its immediate exercise will give a positive value. An option is out-of- money if it has no positive value. An option is at-money when spot price is equal to strike price.

Profit resulting from a call option is given by the following equation:

Profit $= S_T - X - c$ for $S_T > X$

$= -c$ for $S_T < X$

Profit resulting from a put option is given by the following equation:

Profit $= X - S_T - p$ for $S_T < X$

$= -p$ for $S_T > X$

Put-call parity relationship is given below:

$p = c + B_{h,}.X - B_{11}.S_{))}$

$= c + B_h [X - S_f.]$

A Swap is an exchange of two payment streams. A Swap deal can be either fixedto-fixed or fixed-to-floating type.



5.8 FURTHER READING

1) Apte, P. G. (1995), *"International Financial Management"*, Tata McGraw-Hill Publishing Company Ltd, New Delhi,

2) Bhalla, V. K., *"International Financial Management"*, Sultan Chand & Co., New Delhi.

3) Jain, P. K., Josette Peyrard and Surendra S. Yadav (1998), *International Financial Management,* Macmillan India Ltd., New Delhi.

4) Maurice D. Levi (1996), "*International Finance*", McGraw-Hill Inc.

5) Shapiro, Alan C. (1999), "*Multinational Financial Management*", John Wiley & Sons, Inc, New York.

6) Yadav, Surendra S., P. K. Jain and Max Peyrard (2001), Foreign Exchange Markets: Understanding Derivatives and Other Instruments, Macmillan India Ltd., New Delhi.

5.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1: A Futures Contract is an agreement to make or take delivery of a specified quantity at an agreed price on a future date in the underlying market.

Ans to Q2: An Option is a right but not an obligation to make or take delivery of a specified quantity of an underlying asset at an agreed price on a future date.

Ans to Q3: A Swap contract represents an exchange of two streams of payments between two parties.

Ans to Q4: Comparison Between Forward and Futures Contract are as follows:

S. No.	Feature	Currency forward	Currency futures
1.	Size of Contract	Negotiated/Tailor made/customized	Standardized
2.	Quotation	Between two currencies	Generally US$/ currency unit
3.	Maturity	Negotiated/Tailor made/customized	Standardized

Ans to Q5: Put option is the type of option that gives its holder a right to sell a currency at a pre-specified rate on or before the maturity date.



5.10 MODEL QUESTIONS

1) Explain the meaning of a derivative.
2) Explain with an example marking-to-market process in case of futures trading.
3) Write the relationship between premia charged for a call and a put option respectively.
4) Describe a swap deal with an illustration.
5) A December yen futures is bought when it was quoting at $0.008900/ yen. The settling rates on day 1, day 2, day 3, day 4, and day 5 were $0.0088, $0.0087, $0.00865, $0.0085 and $0.00845 respectively. On the day 6, the futures contract was closed through a reverse operation when it was quoting at $0.0084/yen. Write the variation in the contract price and find the net loss or gain when the futures contract was closed on the day 6. Consider the standard size of the yen futures to bed ¥12.5 million.
6) Prepare a table and a graph of the profit profile of the buyer of a call option with following features:
   Current spot rate: Rs 43/$
   Exercise price: Rs 43.50/$
   Call premium: Rs 1.20/$
7) Develop a swap strategy for two companies ICO and USCO with the

knowledge that ICO wants a floating rate dollar debt while USCO wants a fixed rate rupee debt. Assume your own data.

An intermediary bank wants to make a gain of 0.2 per cent for itself to work out a swap deal. Find the net rates the two companies would pay for their desired borrowings, if they were to benefit equally in terms of lower interest rates.

*** ***** ***

UNIT 6: CURRENCY & INTEREST FUTURES

UNIT STRUCTURE

6.1 Learning Objectives

6.2 Introduction

6.3 Basic Concepts

6.4 Spot Exchange Market

6.5 Participants in the Exchange Market

6.6 Exchange Rate Quotations

- 6.6.1 Direct and Indirect Quotation
- 6.6.2 Reciprocal Rates
- 6.6.3 Cross Rates

6.7 Arbitrage

6.8 Forward Rate and Forward Market

- 6.8.1 Features of Forward Contract
- 6.8.2 Quotation in Forward Market
- 6.8.3 Forward Premium or Discount
- 6.8.4 Arbitrage in Forward Market
- 6.8.5 Use of Forward Rates in deciding Prices of Exports

6.9 Let Us Sum Up

6.10 Further Reading

6.11 Answers to Check Your Progress

6.12 Model Questions

6.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- describe spot exchange market and exchange rate
- define the meaning of reciprocal and cross rate
- describe forward exchange market and forward rate; and
- calculate arbitrage in spot as well as forward market.

6.2 INTRODUCTION

In this unit we will discuss about Spot Exchange Market, Participants

in the Spot Market, Exchange Rate Quotations, Arbitrage and the detailed concepts about Forward Rate and Forward Market

6.3 BASIC CONCEPTS

A market is the place where assets are sold and bought. Assets may be in form of a product, a commodity or even a currency. Thus, we may come across a grain market, a cloth market, a furniture market and so on. A foreign exchange market is the one where one currency (foreign currency) is bought and sold against another currency (domestic or home currency). The genesis of foreign currency market is traced to the need for foreign currencies to facilitate international trade, foreign investment and borrowing from or/lending to foreigners. We all know that most of the sovereign nations have their own currency. For example, India's currency is called rupee while that of USA is called dollar and that of Japan is yen and so on. So, for India, all currencies are foreign currencies, except rupee.

Every country needs to deal with several foreign countries for trading, investment and other business activities. In fact, this trend is becoming more and more visible with the globalisation gaining momentum. Now, in order to be able to pay for imports or receive payments for exports, companies/individuals residing. in one country have to acquire or dispose off the currency of another country.

Foreign exchange markets provide the facility of exchanging different currencies. The price of one currency in terms of another is known as exchange rate. Exchange dealers do the job of the exchange of currencies. The demand and supply in the foreign exchange markets permits the establishment of the rate of one currency in terms of another. The transaction in the foreign exchange market can be either to exchange cash or to buy/ sell some other instruments. The major instruments are currency forward, currency futures, currency options and currency swaps.

The market for foreign exchange is the largest financial market in the world. It is open somewhere or the other in the world all the time such that it is said to be a 24 hours-a- day and 356 days-a -year market. The worldwide trading is more than a collosal amount of US $1.5 trillion per day. While London is the world's largest foreign exchange trading centre, New

York is the largest trading centre in the USA. Other trading centres in the world where trading volumes are significant are Tokyo, Singapore, Frankfurt, Paris, Hongkong and Zurich etc.

In broad sense, foreign exchange market enables the conversion of purchasing power from one currency into another, bank deposits of foreign currency, the extension of credit denominated in a foreign currency, foreign trade financing, and trading in foreign currency options, futures and swaps.

Spot transactions refer to the transactions involving sale and purchase of currencies for immediate delivery.

Currency forward contracts are settled on a future date even though the forward rates are quoted at present moment (or today). They are quoted just like spot rate but actual delivery of currencies takes place much later.

Currency futures are conceptually similar to currency forward. Yet, they are distinctly different from the latter in terms of their quotations and dealing.

Currency options are the instruments that give choice to their holder to buy or sell a foreign currency on or up to a date (also called maturity date) at a specified exchange rate (also called strike rate).

Swaps are the instruments that enable two parties to exchange the stream of cashflows in two different currencies,

6.4 SPOT EXCHANGE MARKET

Spot market is the market where transactions of buying and selling are done for immediate delivery. In real practice, cash settlement is made after two working (business) days, excluding holidays. In some cases, it takes less than two days also. For example, the trades between US dollar and Canadian dollar or Mexican peso are settled in one day.

Spot transactions are increasing in volume. London market is the first market not only in terms of volume but also in terms of the number of currencies traded there. The most significant currencies in terms of volume of their trade are dollar, yen, euro, UK pound and Swiss franc.

The spot exchange market is an over- the-counter (OTC) market. This means that trading does not take place in a central market place at any identified geographical location where buyers and sellers gather to transact.

Instead, this market is a worldwide linkage of currency traders, non-bank dealers, foreign exchange brokers who are connected to one another via a network of telephones, computer terminals and automated dealing systems. The largest vendors of quote screen monitors used in the currency trading are Reuters, Telerate and Bloomberg. The communication system of exchange market is rather sophisticated and functions well twenty-four-hours-a day. The market can be divided into three major market segments: Australasia, Europe and North America. Australasia includes Sydney, Tokyo, Hongkong, Singapore and Bahrain. Europe includes Zurich, Frankfurt, Paris, Brussels, Amsterdam and London. North America includes New York, Montreal, Toronto, Chicago, San Francisco and Los Angeles.

Though some trading rooms may be functioning over three eight - hour shifts in order to trade around the clock, jet most operate over a 9 - to 12 - hour working day. Maximum trading takes place when trading hours of the Australasia centres overlap with that of European centres and when the trading hours of European centres overlap with the American centres. More than half of trading in US centres occurs between 1300 hours and 1700 hours GMT when the European markets are still open.

6.5 PARTICIPANTS IN THE EXCHANGE MARKET

The major participants in the exchange market are Central Banks, commercial banks, brokers, arbitrators, and speculators.

Central Banks participate in foreign exchange markets, essentially to contain the volatility of exchange rate. If the domestic currency fluctuates too violently, it causes uncertainty, in the business transactions. Therefore, central banks buy (or sell) foreign currency from the exchange market in order to avoid sudden and large appreciation (or depreciation) of domestic currency. The objective of Central Bank intervention is not to make profit out of these transactions but to maintain a smooth change in exchange rate in keeping with requirements of national economy. For example, if rupee is witnessing a continuous decline vis-a-vis US dollar, the Central bank (Reserve Bank of India) may release (or sell) dollars to increase their supply in the exchange market. This operation will have effect of halting the slide in the value of rupee vis-a-vis dollar. Or, it can intervene by buying dollars from

the market in case it wants to prevent the domestic currency from hardening against dollar.

Commercial banks participate in the foreign exchange market either for their own account or for their clients. When they are dealing for their clients, they act as intermediary between seekers and suppliers of foreign currency. For their own account, banks may operate either as speculators or arbitraguer/or both. Big commercial banks act as market makers, by quoting two- way prices, one for buying and the other for selling a foreign currency. A bank may buy more foreign currency than it sells. For example, a bank has bought euro 1 million and sold euro 0.8 million. So it is holding a net amount of euro 0.2 million. Thus, it is said to have taken a risk by holding a net position. In case, the rate of euro goes down after the bank has taken a net position, it will incur a loss. On the other hand, it will make a gain in case euro goes up while the bank is holding a net position in euro. Thus banks take positions which expose them to exchange risk. When they take risks deliberately, they are said to be acting as speculators.

In a way, foreign exchange market is an extension of one of the primary functions of a commercial bank, that is, to assist the clients who are doing international transactions. For example, a corporate client importing material from abroad would need a source of foreign exchange if the import price is invoiced in the exporter's home currency. On the other hand, an exporter might have to dispose off foreign exchange if the payment for the export was received in the importer's home currency. Commercial banks assist clients in foreign exchange transactions of this type.

Inter-bank foreign exchange market is network of correspondent banking relationship. In this network, large commercial banks maintain demand deposit accounts with one another, called correspondent banking accounts. An example would clarify how the system operates. Consider a US importer purchasing goods from an European exporter invoiced in euros, at a cost of •800000. The US importer will contact his US Bank and ask it to transfer this euro amount to the European exporter. Say, US Bank offers a price of •0.80/$ which the US importer accepts. Then US Bank will debit the Importer's account by $1000000 (or $ 1 million) for the purchase of euros. US Bank will instruct its correspondent bank in Europe to debit its

correspondent bank account by •800000 and to credit the amount to the European exporter's bank account. Thus there will be a reduction of •800000 in the US Bank's correspondent account held with the European Bank. Of course, there will be reduction of $l million in the US importer's account held with the US Bank.

Foreign exchange brokers participate in the market as intermediaries between different dealers or banks. They do not take a position on their own. Their role is simply to find a buyer and a seller for the same amount for given currencies. For their services, they charge a brokerage fee. Certain brokers may specialize in specific currencies. Their fee is small when dealing in highly liquid currencies whereas they are likely to charge higher amounts for relatively illiquid currencies.

Arbitraguers profit by discovering price differences between pairs of currencies at different dealers or banks. Their operations are risk free as they buy cheap and sell dear. For example, a market operator found out that there is a difference between the rates of two dealers. While the dealer A is quoting a rate of Rs 45 per dollar, the dealer B is quoting Rs 45.10 per dollar. The market operator will, without loosing time, buy dollar cheap from the dealer A and sell the same to the dealer B. In the process, he will make a gain of Re 0.10 per dollar. Arbitrage opportunity basically arises from imperfections in the market, giving rise to price differentials. As the markets get more and more integrated, the scope for arbitrage becomes less.

Speculators are deliberate risk-takers. They participate in the market to make a gain which results from an unanticipated change in exchange rate. An open position in a foreign currency is speculation. Speculators can be either bulls or bears, Bulls expect that a currency is going to appreciate in near future. So they buy now or, in other words, they take a long position. They sell it when its value rises, thus making a gain. On the other hand, bears expect that a particular currency is going to become cheaper in future. So they sell it now, or in other words, they take a short position. They buy it back when it depreciates, thus making a gain.

It should be noted that unlike arbitraguer, speculators may suffer loss if the currency of their choice moves in the direction opposite to their expectation. Often, questions are raised as to whether speculation is

desirable or whether it should be discouraged. Of course, when some market participants do it to destabilize a market, it becomes an evil. Otherwise, a certain amount of speculation is considered desirable so as to increase the liquidity in the market.

Other participants in the exchange market are individuals who need to buy small quantities for travelling abroad or sell when returning from foreign trips. But their role in terms of volume of transactions is insignificant.



CHECK YOUR PROGRESS

Q1: Define foreign exchange market

.....

Q2: What is Spot transactions

.....

Q3: Define Currency options

.....

Q4: What is Spot market

.....

Q5: What are the major participants in the exchange market.

.....

6.6 EXCHANGE RATE QUOTATIONS

Exchange rate means the price of one unit of a currency in terms of some units of another currency. For example, Rs 45/US$ means that an amount of Rs 45 is needed to buy one US dollar or Rs 45 will be received for selling one US dollar. When there is no difference between buying and selling rate, the rate is unique or unified. But, in practice, it is rarely so. A dealer, who is willing to buy and sell the same currency against another, does not quote an identical price for buying as well as selling. Buying rate is also called bid rate while selling rate is also known as offer rate or ask rate.

The dealer keeps a difference between buying and selling price. This difference is x 100 per cent known as spread and constitutes his profit. Look at the examples given in the Table 6.1.

Table 6.1: Quotations of Exchange Rates

Currency pair	Buying (Bid) rate	Selling (Ask) rate
Rupee/US $	44.5000	44.6500
Rupee/·	56.0000	56.1250
Rupee/UK £	79.1000	79.3000
Rupee/SFr	31.0000	31.1500

Now consider the rupee/dollar rate. From the figures, it is clear that the bank (dealer) will buy a dollar for Rs 44.5000 and sell a dollar for Rs 44.6500. The difference between the buying and selling rate (or the spread) is Re 0.1500. This is the profit of the dealer. The quotations are always with respect to the dealer. So, if an individual or an enterprise wants to sell a dollar, the dealer will apply his buying rate and give the seller Rs 44.5000 for one dollar. Similarly, the dealer will charge Rs 44.6500 when an individual or an enterprise wants to buy a dollar. The prices are normally quoted upto four decimal points when large transactions are involved. They can be quoted upto two decimal points for small transactions. Likewise, the spreads vary depending on the volume of transactions. For small value., spreads tend to be larger and vice-versa.

Spread can be expressed either as an absolute figure or in terms of percentage.

Thus

Spread (in absolute figures) = Selling rate - Buying rate

Spread in percentage can be expressed either with reference to buying rate or with reference to selling rate. When buying rate is taken as reference, the denominator is buying rate. Thus,

$$\text{Spread (in percentage)} = \frac{\text{Selling rate} - \text{Buying rate}}{\text{Buying rate}} \times 100 \text{ percent}$$

In case, selling rate is taken as reference, then the denominator is going to be selling rate. That is,

$$\text{Spread (in percentage)} = \frac{\text{Selling rate} - \text{Buying rate}}{\text{Selling rate}} \times 100 \text{ percent}$$

Now, we can calculate spreads for different currency pairs.

Example 6.1:



Let us calculate the spread for rupee/euro pair.

Absolute spread = Rs 56.1250/• – Rs 56.0000/•

= Rs 0.1250/•

$$\text{Spread (in percentage), based on buying rate} = \frac{\text{Rs.}56.1250 - \text{Rs.}56.0000}{100 \times \text{Rs.}56.0000}$$

$$= 0.2232\%$$

$$\text{Spread (in percentage) based on selling rate} = \frac{\text{Rs.}56.1250 - \text{Rs.}56.0000}{\text{Rs.}56.0000} \times 100$$

$$= 0.2227\%$$

Similarly, spread on rupee/pound currency pair can be worked out as follows:

$$\text{Spread (based on buying rate)} = \frac{\text{Rs.}79.3000 - \text{Rs.}79.1000}{100 \times \text{Rs.}79.1000}$$

$$= 0.2528\%$$

$$\text{Spread (based on selling rate)} = \frac{\text{Rs.}79.3000 - \text{Rs.}79.1000}{100 \times \text{Rs.}79.3000}$$

$$= 0.2522\%$$

For the remaining two pairs of currencies, you work out spreads on your own.

Sometimes buying and selling rates may be written in condensed form rather than full out-right figures. For example, rupee-dollar rate in the Table 5.1 may be shown as 44.5000/6500. This simply means that last four digits of buying rate are to be replaced by 6500 to find outright selling rate. Likewise, rupee-euro rate written as 56.0000/1250 would mean that buying rate is Rs 56.0000/• and selling rate is Rs 56.1250/•. This is found by replacing the last four digits of buying rate by the four digits shown after the slash (/) sign.

It should be noted that the retail bid-ask spread is wider than the inter-bank spread. This means that lower bid and higher ask prices apply to the smaller sums traded at the retail level. The spread is likely to be bigger when the volatility is higher in the exchange market since the trader would like to charge for the increased uncertainty (risk) that comes with higher volatility. On the other hand, the spread decreases with the increase in dealer

competition. Empirical studies have revealed that bid-ask spread decreases when the percentage of large dealers in the market place increases. Dealer competition is a fundamental determinant of the bid-ask spread.

6.6.1 Direct and Indirect Quotation

We all know that prices of commodities or products are quoted as Rupees ***n*** per kg or Rupees ***n*** per meter or Rupees ***n*** per piece. They are rarely, if ever, quoted as ***m*** kg per rupee or ***m*** meter per rupee or ***m*** pieces per rupee. But in case of exchange rate, it is quite possible to quote one way or the other. For example, the quotation can be either Rs 45 per dollar or $0.0222 per rupee. Both quotations have the same meaning and are perfectly all right.

But these two quotations have been given a name. If the quotation in India is Rs 45/$, then it is called direct form of quotations. The meaning is that one unit of a foreign currency (i.e. dollar) is quoted in terms of some number of rupees. But if the same quotation in India is presented as $0.0222 per rupee, then it is termed as indirect form. The meaning is that one unit of domestic (local) currency is quoted in terms of some units of foreign currency. The direct form of quotation is also called European whereas indirect form is known as American.

Having understood the above illustration, we can easily identify which of the following is direct or indirect quotation:

(a) Rs 56/• (in India)

(b) •0.82/$ (in USA)

(c) $1.80/£ (in UK)

(d) •1.44/£ (in eurozone)

We see that quotation (a) and (d) are direct (European), whereas quotations (b) and (c) are indirect (American).

Most countries have adopted one form or the other as a convention for quoting exchange rates for foreign currencies. India and a very large number of other countries follow direct form. Very few countries such as UK and Ireland use indirect form of quotation:

6.6.2 Reciprocal Rates

A quotation in direct form can easily be converted into a quotation in indirect form and vice-versa. This is done by making the reciprocal of the given rate. For example a unique rate of Rs 56/• is in direct form if quoted in India. Its reciprocal •(1/56)/Re (or •0.01786/Re) is the indirect quote in India. In general, the reciprocal rate between two currencies A and B is found as follows:

$(A/B)_{bid} = (B/A)_{ask}$ (1)

and

$(A/B)_{ask} = (B/A)bid$ (2)

Example 6.2:



•/$ rate in direct form in Europe is given as follows:

•0.80/$ – •0.81 /$

To find reciprocal of these, we apply the equations (1) and (2). Thus,

$(\$/•)_{bid} = (•/\$)_{ask}$

= (1/0.81) = 1.2345

Likewise,

$(\$/•)_{ask} = (•/\$)_{bid}$

=1.2500

So the reciprocal or indirect form of quotation in Europe becomes

$1.2345/• – $1.2500/•

Note that selling (or ask) rate is greater than buying (or bid) rate, as is expected.

6.6.3 Cross Rates

There may be two pairs of currencies with one currency being common between the two pairs. For instance, exchange rates may be given between a pair, A and B and another pair, A and C. Then the rate between B and C derived from the given rates of the two pairs (A and B, and, A and C) is called cross rate. This can be easily done by using the equations (3) and (4).

$(B/C)_{bid} = (B/A)_{bid} \times (A/C)_{bid}$ (3)

$(B/C)_{ask} = (B/A)_{ask} \times (A/C)_{ask}$ (4)

It should be kept in mind that these equations make use of the reciprocal equations, such as given below:

$(B/A)_{bid} = (A/B)_{ask}$ and $(B/A)_{ask} = (A/B)_{bid}$

Now, we take a simple example to illustrate cross rate.

Example 6.3



The following rates are known:

Re/UK£: 79.00 - 79.70

Re/US$: 44.25 - 44.85

Here, between the two pairs, rupee is the common currency. We are required to find the cross rate between US$ and UK£. So

$(US\$/UK£)_{bid} = (US\$/Re)_{bid} \times (Re/UK£)_{bid}$

and

$(US\$/UK£)_{ask} = (US\$/Re)_{.ask} \times (Re/UK£)_{ask}$

Therefore,

$(US\$/UK£)_{bid} = (1/44.85) \times 79.00 = 1.7614$

$(US\$/UK£)_{ask} = (1/44.25) \times 79.70 = 1.8011$

That is, US $/UK£ rate is 1.7614 - 1.8011. Again, we notice that the selling rate is greater than the buying rate, as expected.

You may be wondering what is the meaning of the cross rate in practice. It is simple to understand. The above rate tells us that by selling one unit of UK£, I will get $1.7614. In other words, the dealer will buy from me one unit of UK£ by giving me $1.7614 units of US dollar. But since this rate is not given right away, I have to pass through the common currency i.e. rupee. So, first, I sell one unit of UK£ to get 79.00 units of rupees and then sell this sum of Rs 79.00 to get 79.00/44.85 (or 1.7614) units of US$. So we say, the dealer's buying rate is US$1.7614/UK£.

The same logic will explain the selling rate US$1.8011/UK£. That is, for selling one unit of UK£, the dealer will charge from me US$1.8011, Since this rate is not given directly, I have to pass through the common currency, i.e. rupee. Therefore, first, I buy rupees with

dollars. The dealer will give me Rs 44.25 per dollar. With these rupees, I buy UK£. The dealer will charge Rs 79.70 for each unit of UK£. Thus for the dealer, selling rate works out to be US$ 1/44.25 x 79.70 per UK£ or US$1.8011 / UK£.

Please bear in mind that cross rates are not limited to only two pairs of currencies. They can be used to derive a rate from three or more pairs as well. For instance, rates are known in three pairs A and B, A and C, and, B and D. But rate between the pair C and D is not known. This can be found by using equations (5) and (6). That is,

$$(CID)_{bid} = (C/A)_{bid} \times (A/B)_{bid} \times (B/D)_{bid} \quad (5)$$

$$(C/D)_{ask} = (C/A)_{ask} \times (A/B)_{ask} \times (B/D)_{ask} \quad (6)$$

Use of these equations is illustrated by example 5.4.

Example 6.4



Three pairs are given below:

Re/$: 44.00 - 44.50

Re/•: 56.00 - 56.60

$/£ : 1.79 - 1.80

From these three pairs, we can find •/£ rate.

So So $(•/£)_{bid} = (•/Re)_{bid} \times (Re/\$)_{bid} \times (\$/£)_{bid}$

$= (1/56.60) \times 44.00 \times 1.79 = 1.3915$

$(•/£)_{ask} = (•/Re)_{ask} \times (Re/\$)_{ask} \times (\$/£)_{ask}$

$= (1/56.00) \times 44.50 \times 1.80 = 1.4303$

Hence •/£ exchange rate is 1.3915 - 1.4303.

6.7 ARBITRAGE

As pointed out earlier, arbitrageurs are those operators on the foreign exchange market who search for price discrepancies and make profit by buying cheap from one dealer and selling dear to another. We can define arbitrage as the process of making risk-less profits by intelligently exploiting price differences of an asset at different dealing places. This can be understood with a simple example.

Suppose dealer A and B have unified rates of •0.7915/$ and •0.7935/

$ respectively. Now a vigilant arbitraguer will buy US dollars from dealer A and sell them to the dealer B. He will make a gain of •0.002 per dollar. Though this gain seems to be a very small in percentage, yet, in absolute terms, the gains are substantial if the operator is dealing in hundreds of millions or billions of dollars. Normally arbitrage operations are carried out by institutions or individuals who possess large amounts.

The above example used unified rate between euro and dollar. But, in real life, the rates are rarely unified; they are quoted with a buy-sell spread. So let us take another example with the currency pair of euro and Swiss franc (SFr).



Example 6.5

The rates at dealers, A and B, are given below:

	Dealer A	***Dealer B***
SFr/•:	1.7550 - 1.7600	1.7620 -1.7665

By observing these figures, it is quite clear that an arbitrageur stands to gain if he buys euros from Dealer A by paying a sum of SFr1.7600 and sells euros to the Dealer B to receive SFr1.7620. Thus he makes a gain of SFr0.0020 per euro.

Just to appreciate the magnitude of gain, let us suppose that this arbitrageur starts with 100 million Swiss francs. He can buy 56.8182 (100/1.7600) million euros. Then he sells these euros to get 100.1136 (56.8182 x 1.7620) million Swiss francs. In the process his gain is 0.1136 million or 113600 Swiss francs which is a substantial amount in absolute terms.

6.8 FORWARD RATE AND FORWARD MARKET

If the exchange of currencies takes place after some period from the date of the deal, it is a deal in forward market. In other words, forward rate is the price of one currency against another to be settled on a future date. Though the rate is contracted today, settlement would take place on a future date. The forward rate, once contracted, will be valid for settlement irrespective of the actual spot rate on the maturity date of the forward: For example, on 30 June, the three-month forward rate is Rs. 44.50 per US dollar. Two parties A and B enter into a 3 month forward contract to exchange

rupees and dollars. Now after 3 months, on 30 September, actual spot rate is Rs. 45 per dollar. Irrespective of this difference in the forward rate maturing on 30 September and spot rate of 30 September, the contracting parties A and B are bound to exchange currencies at a rate of Rs. 44.50 per dollar.

The currencies of only the major developed countries are normally traded in the forward market. Examples of these are US dollar, euro, Japanese yen, UK pound, Canadian dollar, Australian dollar, Swiss franc etc. The currencies of developing countries are yet to gain importance on forward market. Major participants in the forward market are commercial banks, brokers, arbitrageurs, speculators and hedgers.

Commercial banks operate in this market either to carry out the orders of their clients or place their own cash in different currencies. Brokers do match making between seekers and suppliers of currencies just as they do on spot market.

Arbitrageurs on the forward market look for the mismatch between forward premia or discount and interest rate differentials between different currency pairs. They make risk-less profit from these mismatches. Speculators take risk to make profit. If they anticipate that a currency would depreciate, they sell it forward. If their anticipation turns out to be right, they make a gain on the maturity date by buying on the spot the currency that they had sold forward.

Unlike arbitrageurs and speculators, hedgers participate in the forward market to cover their exposures in foreign currencies that result from their trade or financial transactions such as exports, imports, borrowing and lending etc.

Forward market is also an OTC (over-the-counter) market like spot market and therefore trading mechanics (market microstructure) is much like the spot market as described earlier.

6.8.1 Features of Forward Contract

Significant features of a currency forward contract are listed in Table 6.2.

Table 6.2: Features of Forward Contract

S. No.	Feature	Description
1.	Kind of contract	A contract between two parties, a customer and a dealer
2.	Currencies in the deal	Forward contracts are made in all major currencies of the world. To some extent, they are made in the currencies of developing world as well.
3.	Cashflows	Cashflows between contracting parties take place at the time of maturity.
4.	Quotations	Rates are quoted by dealers with bid-ask spread. The rates are locked in for the entire period of contract.
5.	Risk	There is a risk of default on either side
6.	Dealers' commission	It is inbuilt in the bid-ask spread.
7.	Regulation	Forward market is self-regulated

6.8.2 Quotation in Forward Market

Like spot market quotations, the rates can be either unified or with bid-ask spreads. Usually, they are quoted for maturity of one month, two months, three months, six months, nine months and twelve months. Conceptually, it is possible to have forward rates for any number of months or fraction of months. Yet, normally, they are not quoted for periods such as 4 months, 5 months, 7 months or 1 month 10 days etc. The periods other than normally quoted ones are referred to as odd periods.

The rates may be shown in full outright form or in swap form. Table 6.3 contains examples of outright forward rates, along with bid-ask spreads.

Table 6.3: $/• Forward Quotations

	Buying rate	Selling rate	Spread
Spot	1.2000	1.2050	50 points
One-month forward	1.2030	1.2090	60 points
Two-month forward	1.2060	1.2135	75 points
Three-month forward	1.2100	1.2190	90 points

The same rates can be written with swap points as given below:

	Spot	1-month forward	2-month forward	3-month forward
$/•	1.2000/50	30/40	60/85	100/140

It may be noted that spreads increase as the maturity period of forward rates increases. This is expected since with longer maturity, uncertainty/risk increases and hence the dealer would like to keep a bigger difference between the buying and selling rates.

The interpretation of swap points is as follows. Here the spot rate is 1,2000/50 which means spot buying rate is $1.2000 per euro and spot selling rate is $1.2050 per euro since the last two digits of buying rate are replaced by 50. For the forward rates, if the first figure (before the slash) is smaller than the second figure (after the slash), then these points are to be added to the respective figures of spot buying and selling rates. So one -month forward buying rate becomes 1.2030 (1.2000 + 0.0030) and one-month selling rate becomes 1.2090 (= 1.2050 + 0.0040). Likewise, two-month forward rates become 1.2060 (= 1.2000 + 0.0060) and 1.2135 (=1.2050 + 0.0085) while three-month forward rates turn out to be 1.2100 (=1.2000 + 0.0100) and 1.2.190 (=1.2050+ 0.0140). It should be noted that one point is equal to 0.0001 in case the rates are written upto 4 decimal points.

Here the forward rate figures are greater than the spot rate figures since the forward swap points have been added to spot rate figures, It is clear that forward rate is at premium vis-a-vis spot rate.

The other possibility is that forward rate may be at discount vis-a-vis spot rate. In that case, normally, the swap points would be such that first figure (before the slash) is greater than the second

figure (after the slash). In such a situation, swap points are subtracted from the respective spot rate figures. Let us take an example to illustrate this point.



Example 6.6

Find the outright rates from the following:

Spot	one-month forward	two-month forward	three-month forward
Can$/•1.710/250	50/40	100/85	155/125

Using the method described above, we find the outright rate to be as given in Table 6.4.

Table 6.4: Can$/• Rates Quotations

	Buying rate	Selling rate	Spread
Spot	1.7100	1.7250	150
One-month forward	1.7050	1.7210	160
Two-month forward	1.7000	1.7165	165
Three-month forward	1.6945	1.7125	180

From the Tables 6.3 and 6.4, it may be noted that spread of forward rate is equal to the spread of spot rate plus spread of forward swap.

From the above discussion, we have understood that forward rate is at premium when first figure (before slash) of swap points is smaller than the second figure and the forward rate is at discount when first figure of swap points (before slash) is greater than the second figure. But what about the two figures being equal? This has to be inferred from the context. For instance, the swap points of one -month and three-months forward show a premium (first figure being smaller than the second) while those of two-month forward are equal. Since the trend shows forward premia, we will take it that two-month forward is also at premium and therefore add the swap points to the respective spot rate figures. The same logic applies in case of forward discount. That is, if the swap points for a particular forward period are given as equal in the context of forward discount, they will be subtracted from the corresponding figures of spot rates.

Cross rates of forward rates are worked out exactly in the same

way as is done for spot rates. For example, two pairs •/US$ and Re/ US$ are known. We can easily calculate Re/• rate as shown in example 6.7 that follows.



Example 6.7

Calculate Re/• rates from the following data:

	Spot	one-month forward	Three-month forward
US$/•	1.2000/25	30/25	80/70
Re/US$	44.5000/550	100/125	320/500

First we write all the rates in outright form. From the swap point trends, we discover that US$/• rates show forward discount while Re/US$ rates show forward premium.

Outright rates are:

	Spot	one-month forward	Three-month forward
US $/•	1.2000/1.2025	1.1970/1.2000	1.1920/1.1955
Re/US$:	44.5000/44.5550	44.5100/44.5675	44.5320/44.6050

Now, cross rates are to be found as follows:

$(Re!\ •)_{bid} = (Re/US\$)_{bid} \times (^{US\$/•})_{bid}$

$(Re/\ •)_{ask} = (Re/US\$)_{ask} \times (US\$/\ •)_{ask}$

For ***Spot rate***:

$(Re/•)_{bid} = 44.5000 \times 1.2000 = 53.4000$

$(Re/•)_{ask} = 44.5550 \times 1.2025 = 53.5774$

For ***One-month forward*** rate:

$(Re/•)_{bid} = 44.5100 \times 1.1970 = 53.2785$

$(Re/•)_{ask} = 44.5675 \times 1.2000 = 53.4810$

For ***Three-month forward*** rate

$(Re/•)_{bid} = 44.5320 \times 1.1920 = 53.0821$

$(Re/•)_{ask} = 44.6050 \times 1.1955 = 53.3253$

Thus, Re/euro rates can be summarized as follows:

	Spot	one-month forward	Three-month forward
Re/•:	53.4000/53.5774	53.2785/53.4810	53.0821/53.3253

6.8.3 Forward Premium or Discount

If forward rate of a currency is greater than its spot rate, it is said to be at a forward premium. On the other hand, if its forward rate is smaller than spot rate, it is at forward discount. For example Re/• spot rate is Rs 55.50/• and three-month forward rate is Rs. 56/•. This shows that euro is at a forward premium. When one currency of the pair is at forward premium, the other is automatically at discount. But normally, premium or discount is calculated in respect of the currency whose price is quoted. Here, in our example, the price of euro is quoted in terms of rupees. So we talk of premium of euro rather than discount of rupee. The premium or discount is calculated with equation (7) and (8). That is,

$$\text{Premium or Discount} = \frac{\text{Forward rate} - \text{Spot rate}}{\text{Spot rate}} \times \frac{12}{N} \times 100 \text{ percent}$$

$$\text{Premium or Discount} = \frac{\text{Forward rate} - \text{Spot rate}}{\text{Spot rate}} \times \frac{360}{D} \times 100 \text{ percent}$$

Where N is the number of months forward and D is the number of days forward. This formula gives premium or discount in terms of annualized percentage. Calculations can be illustrated with an example:



Example 6.8

From the data given below calculate forward premium or discount as the case may be.

	Spot	**3-month forward**
Re/US$	44.5000/7050	44.7000/9990

From the rates, it is clear that US dollar is at forward premium vis-a-vis rupee.

$$(\text{Forward Premium})_{bid} = \frac{44.7000 - 44.5000}{44.5000} \times \frac{12}{3} \times 100$$

= 1.80 per cent pr annum

$(\text{Forward Premium})_{ask}$ =

= 2.63 per cent pr annum

6.8.4 Arbitrage in Forward Market

Interest rates of different currencies affect exchange rates and vice-versa. Theoretically, both interest and exchange rates should move in tandem such that interest rate differential of two currencies approximately equals forward premium or discount on their exchange rates. But in practice, this rarely happens. Arbitrageurs make use of this market discrepancy and make profits. This kind of arbitrage process is also known as covered interest arbitrage. The example that follows illustrates covered interest arbitrage.



Example 6.9

Calculate arbitrage gain using the data given below:

Spot exchange rate : Rs 55.00/•

3-month forward rate : Rs 54.85/•

3-month **interest rates**:

Re: 6% p.a.

Euro: 8% p.a.

As is evident from the above data, euro is at forward discount.

Discount rate = $\frac{39.85 - 40.00}{40.00} \times \frac{12}{3} \times 100$ = 1.09 per cent per annum

Interest rate differential = 8.0 - 6.0 = 2.0 per cent per annum

Since interest differential and exchange discount do not match exactly, there is a scope for covered interest arbitrage. An arbitrageur can take the following steps:

(i) Borrow Rs 1,000 at 6% p.a., for 3 months and sell this amount in spot market to get euros. The amount would be • 18.1818 (= 1000/55.00)

(ii) Place •18.1818 in the money market at a rate of 8.0% p.a. for 3 months. This would result in •18.1818 [1 + 0.08 x 3/12] = •18.5454

(iii) Sell • 18.5454 forward. At the end of three months, the amount in rupees would be Rs 18.5454 x 54.85 (= Rs 1017.22)

(iv) Refund loan of Rs 1,000 with interest on it. Refunded amount

would be Rs 1,000 [1 + 0.06 x 3/12] or Rs 1,015

Net gain = Rs 1017.22 - Rs 1,015 = Rs 2.22

This is very small on an initial sum of Rs 1,000. But if the initial sum be in large amounts such as Rs 100 million etc., the absolute gain is substantial. For a sum of Rs 100 million, the gain is going to be (Rs 100 million x 2.22) / 1000 or Rs 222000.

Now, you may wonder why we started with an initial borrowing in rupees. Had we started with an euro borrowing, would we still make a gain? No, there would not be a gain in that case. So how does an arbitrageur decide as to which currency to start with. The simple rule to be followed in this respect is: In case interest rate differential is higher than premium or discount, then borrow that currency which has lower interest rate and place that currency in money market which has higher interest rate. Conversely, in case, interest rate differential is smaller than premium or discount, then borrow that currency which has higher interest rate and place that currency in money market which has lower interest rate. In the example above, interest rate differential (=2% p.a.) is higher than the discount (= 1.09% p.a.). So, the arbitrageur borrowed rupees on which the interest rate is lower and placed euro in money market.

6.8.5 Use of Forward Rates in deciding Prices of Exports

One of the important uses of forward rates can be in deciding what prices to quote for exports. The exporting party can get a risk-free definite sum for its product by carefully negotiating its price, taking into account the prevalent forward rates between its operational (domestic) currency and the currency of receivables (foreign currency). Let us look at an example. An American wishes to receive risk-free price of $100000 from a European buyer who will pay in euros after 3 months. Three-month forward rate is $1.22/•. So, what the American exporter will do is that he would negotiate a euro price of •81967 (= 100000/1.22). Immediately after the sales contract, he will sell his receivables of ·81967 in a

three-month forward market and, as a result, he will receive $100000 risk-free after three months.

Example 6.10 is a more elaborate illustration of the use of forward rates.



Example 6.10

A company operating in Euro zone is negotiating to sell its product to an American buyer. The American buyer will pay in three equal dollar installments, first being immediately while second and third will come at the end of three and six months respectively. The European company wants to receive a risk-free sum of • l million for this export. What dollar price should it negotiate for? The exchange rates are given as follows:

	Spot	**3-month forward**	**6-month forward**
•/US$	0.810/0.812	0.805/0.808	0.802/0.806

The European company is to receive the three installment in equal dollar amounts. Let us say the total price be ***D*** dollars. Then each instalment would be ***D/3*** dollars. The exporter should sell these ***D/3*** dollars in exchange markets right away - first installments in spot and the remaining two in forward market.

Thus, total amount in euros will be

D/3 [0.810 + 0.805 + 0.802] = 1 million

or D = $3/2.417 million = $1.241208 million or $ 1241208

So if the exporter quotes a price of $1241208, he will receive a desired risk-free sum of •1 million.

Note: You may notice that here the exchange rate that has been used to calculate the receipt in euros is the bid rate and not ask rate. Why? It is so because the European exporter will sell US$ and hence the relevant rate will be buying rate on the part of the bank.



CHECK YOUR PROGRESS

Q6: Who are arbitrageurs

.....

Q7: Define exchange rate

.....

Q8: Define Forward Rate

.....



6.9 LET US SUM UP

Foreign exchange market is a market where different currencies are bought and sold. The price of one currency in terms of another is known as exchange rate. Currency may be bought and sold either in spot or in forward market. Spot market is the one where exchange of currencies takes place within one or two days whereas in forward market exchange of currencies occurs on a future date, though the rate is fixed today. Major participants in exchange market are central banks, commercial banks, business enterprises and individuals. Foreign exchange market operators may act as brokers, speculators, hedgers or arbitrageurs. Brokers do not buy or sell themselves but enable buyers and sellers to come in contact with each other. For their services, brokers charge commission. Speculators are risk-takers who take positions in the market, expecting that rates would move in their favour. Hedgers are generally business enterprises that like to cover their exposures. Arbitrageurs make risk less profits by exploiting price differences in the market. Normally rates are quoted with a buy-sell spread. The spread is defined as given below:

Spread (in absolute terms) = Selling rate - Buying rate

Spread (in percentage) =

When the price of one unit of foreign currency is quoted in terms of home currency units, the quote is called direct quote. Likewise, when price of one unit of home currency is quoted in terms of foreign currency units,

the quote is called indirect quote. Reciprocal of direct quote gives indirect quote. Cross rate refers to the rate between two currencies whose rate is known in terms of a third common currency. Reciprocal and cross rates in relation to forward market are calculated in the same manner as in spot rate. Forward rate is normally either at premium or at discount with respect to spot rate. Premium/discount can be calculated with the formula given below:

$$\text{Premium or Discount} = \frac{\text{Forward rate} - \text{Spot rate})}{\text{Spot rate}} \times \frac{12}{N} \times 100\%$$

or

$$\frac{\text{Forward rate} - \text{Spot rate}}{\text{Spot rate}} \times \frac{360}{D} \times 100\%$$

Where 'N' is the number of months forward and 'D' is the number of days forward.

If the forward rate is not in equilibrium with interest rates of the two underlying currencies, then there is a possibility of covered interest arbitrage. Forward rates can be used in quoting prices of exports and in hedging receivables/payables.



6.10 FURTHER READING

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6.11 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q1:A foreign exchange market is the one where one currency (foreign currency) is bought and sold against another currency (domestic or home currency).

Ans to Q2:Spot transactions refer to the transactions involving sale and purchase of currencies for immediate delivery.

Ans to Q3:Currency options are the instruments that give choice to their holder to buy or sell a foreign currency on or up to a date (also called maturity date) at a specified exchange rate (also called strike rate).

Ans to Q4:Spot market is the market where transactions of buying and selling are done for immediate delivery.

Ans to Q5:The major participants in the exchange market are Central Banks, commercial banks, brokers, arbitrators, and speculators.

Ans to Q6:Arbitrageurs are those operators on the foreign exchange market who search for price discrepancies and make profit by buying cheap from one dealer and selling dear to another.

Ans to Q7:Exchange rate means the price of one unit of a currency in terms of some units of another currency.

Ans to Q8:Forward rate is the price of one currency against another to be settled on a future date.



6.12 MODEL QUESTIONS

1) Describe in brief who the major participants in a foreign exchange market are.
2) List important features of forward market.
3) What purpose do foreign exchange markets serve?
4) From the following rates, calculate US$/• rate:

   Rs 56.50 = •1

   Rs 44.60 = US$1

5) Calculate the arbitrage gain possible from the following £/US$ quotations: 0.5625 - 0.5630 (Dealer A)
   0.5632 - 0.5635 (Dealer B)

6) Writing all the steps involved, work out the arbitrage from the following data:
   Exchange rate: $1.79 If (spot)
   $1.81 If (6-rn forward)
   6-m Interest rate: US$: 5% p.a.
   £ : 4% p.a.

*** ***** ***

UNIT 7: EXCHANGE RATE DETERMINATION

UNIT STRUCTURE

7.1 Learning Objectives

7.2 Introduction

7.3 Exchage Rate System:An Introduction

7.4 Purchasing Power Parity Relationship

- 7.4.1 Level of Appreciation/Depreciation
- 7.4.2 Deviations from PPP Relationship
- 7.4.3 PPP and Real Appreciation/Depreciation

7.5 Interest Rate Parity Relationship

- 7.5.1 IRP and Arbitrage Opportunities
- 7.5.2 Deviations from IRP Relationship

7.6 Exchange Rate and Foreign Exchange Reserves

7.7 Exchange- Rate and Balance of Payments (BOP)

7.8 Exchange Rate and Technical Analysis

7.9 Let Us Sum Up

7.10 Further Reading

7.11 Answers To Check Your Progress

7.12 Model Questions

7.1 LEARNING OBJECTIVES

After going through this unit, you will able to:

- learn about purchasing power parity relationship
- describe interest rate parity relationship
- discuss the impact of foreign exchange reserves on exchange rate
- discuss the impact of balance of payments on exchange rate; and
- describe technical charts for predicting exchange rate.

7.2 INTRODUCTION

In this unit we are going to discuss about exchage rate system, Purchasing Power Parity Relationship,Interest Rate Parity Relationship, Exchange Rate and Foreign Exchange Reserves,Exchange- Rate and

Balance of Payments (BOP)and Exchange Rate and Technical Analysis

7.3 EXCHANGE RATE SYSTEM: AN INTRODUCTION

Over a long period of time, the exchange rate system has been evolving. Historically, the Indian currency, rupee, was pegged to pound sterling. Rupee depreciated continuously against major currencies. In September 1975, the Government of India abandoned the rupee-pound peg and introduced a basket peg. The basket consisted of a number of major international currencies. This step was taken to stabilize the value of rupee. Again, in 1991, there was a major decision to devalue rupee substantially and gradually allow it to float free. In 1994, India attained the Article VIII status of Bretton Wood Conference. This status stipulates the following: the country (i) should not have restrictions on current account payments, even though capital account restrictions may continue; and (ii) should avoid discriminatory currency practices such as multiple exchange rates. Now the rate fluctuates as per the market demand and supply, with the least intervention of the state authorities.

The future exchange rate of free floating currencies is influenced by several economic parameters. Analysis of these factors and their influence is referred to as fundamental analysis. The major factors that have an effect on exchange rate are:

(i) rate of inflation, (ii) interest rates, (iii) balance of payment (BOP), and (vi) foreign exchange reserves.

Let us examine these one by one.

7.4 PURCHASING POWER PARITY RELATIONSHIP

A Swedish economist, Gustav Cassel, stated in 1918 that purchasing power of a currency is determined by the amount of goods and services that can be purchased with one unit of that currency. If there are two currencies, it would be fair to say that the exchange rate between these two currencies would be such that it reflects their respective purchasing power. This principle is referred to as Purchasing Power Parity (PPP). If the current exchange rate is such that it does not reflect purchasing power parity, it is a situation of disequilibrium. It is expected that, eventually, the exchange rate

between the two currencies will move in such a manner as to reflect purchasing power parity.

Let us illustrate this concept with the help of an example. Suppose, at the period zero, a basket of goods and services is costing £100 in the UK and $ 180 in USA. There is no restriction of buying this basket of goods and services either from the UK or from the SUA. Then, it would be correct to conclude that the two amounts paid in respective currencies are equivalent. In other words,

£100 = $180

or £I = $1.80

Or, we can simply say that the exchange rate at the time zero is $1.80/£. If we use the symbol S_0 to designate this exchange rate, then we write:

S_0 = $1.80/£

Say after one year (period 1), the same basket of goods and services costs £103 in the UK market while it costs $186 in the USA market. Again, it is reasonable to say that these twos sums are equal. That is,

£103=$186

or £1 =$1.8058

or the exchange rate, S_1, at the period 1 is: $1.8050/£.

By looking at the two exchange rates S_0 and S_I, it is clear that pound sterling has slightly appreciated vis-a-vis US dollar over the period of past one year. And, what can we say about the price changes?

In the UK, the prices went up from £100 to £103 and in the USA, they went up from $180 to $186. This price change is known as inflation and the rates of inflation can be calculated as follows:

Rate of inflation in the UK, r_{UK} = (103 - 100)/100 = 0.03 or 3%

Rate of inflation in the USA, r_{USA} = (186 - 180)/180 = 0.0333 OR 3.33%

This shows that the rate of inflation is higher in the USA than in the UK.

It is inferred, then, that the currency of the country where inflation rate is higher is likely to depreciate vis-a-vis the currency of the country with lower rate of inflation.

Now this illustration can be generalized by taking any two countries, A and B. At the reference point of time (time zero), the price of the given

basket is P_{A0} in the country A and P_{B0} in the country B. Therefore,

$P_{A0} = S_0 \times P_{B0}$ (Equation 1)

At a later period (time 1), the price changes to P_{A1} and P_{B1} respectively. Therefore,

$P_{A1} = S_1 \times P_{B1}$ (Equation 2)

The relation between prices at different points of time is linked through the inflation rate. That is,

$P_{A1} = P_{A0} (1 + r_A)$ (Equation 3)

and

$P_{B1} = P_{B0} (1 + r_B)$ (Equation 4)

Where r_A and r_B are the rates of inflation in the Country A and Country B respectively.

From Equation 1 and Equation 2,

$S_0 = (P_{A0} / P_{B0})$

$S_1 = (P_{A1} / P_{B1})$

Using Equation 3 and Equation 4, we can write:

$$S = \frac{P_{A0}(1+r_A)}{1P_{B0}(1+r_B)}$$

or $$S_1 = \frac{P_{A0}}{P_{B0}} \quad \frac{1+r_A}{1+r_B}$$

or $$S_1 = S_0 \frac{1+r_A}{1+r_B}$$ (Equation 5)

The Equation 5 is known as purchasing power parity relationship. This equation links the exchange rates inflation rates in two countries.

It should be noted that, often inflation rates are calculated by using price indices rather than taking prices of individual goods or services. Generally, all countries have developed some price index series which are readily available from economic databases and can be used to calculate inflation rates.

Solved examples that follow illustrate the use of purchasing parity relationship to predict the future exchange rate.



Example 7.1

In India, prices changed from Rs 4500 to Rs 5500 over a period of three years for the same basket of goods whereas they changed from $100 to $110 over the same period in the USA. What was initial exchange rate (S_0)? What is expected exchange rate after 3 years (S_3)?

From the data, at the beginning

Rs 4500 = $ 100

or Rs 45 = $1

or exchange rate, S_0 = Rs 45/$

After three years,

Rs 5500 = $ 100

or Rs 50 = $ 1

or exchange rate, S_3 = Rs 50/$

Thus, rupee has depreciated whereas dollar has appreciated.

In example 9.2, inflation rate data is given instead of the prices in currency units.

Therefore, we would use the equation involving inflation rates.



Example 7.2

Inflation rates in the UK and India are respectively 3 per cent and 6 per cent per annum. What is the expected exchange rate after one year, if it was Rs 78/£ at the beginning?

Here, r_{UK} = 0.03

r_{IND} = 0.06

S_0 = Rs 78/£

Therefore, $S_1 = S_0 \frac{1+R_{IND}}{1+r_{UK}}$

$= 78 \times \frac{1.06}{1.03}$

= 80.27

Or, the exchange rate after one year is Rs 80.27/£.



Example 9.3

Price indices in the UK and USA are 125 and 200 respectively at the reference period (time zero). These indices change to 129 and 205 after one year. Calculate the exchange rate after one year, given the reference exchange rate of $1.80/£.

$(1+r_{UK})$ = 129/ 125

or r_{UK} = 0.032 or 3.2% p.a.

Similarly,

$(1+r_{US})$ = 205/ 200

or r_{US} = 0.025 or 2.5% p.a.

$$S_1 = S_0 \frac{1+R_{USA}}{1+r_{UK}}$$

$$= 1.80 \times \frac{1.025}{1.032}$$

= 1.7878

Or, the exchange rate after one year is \$10.7878/£ . It is observed here that the US currency, that is dollar, has appreciated whereas the UK currency, that is pound sterling, has depreciated. This is in conformity with the purchasing power parity relationship as the inflation rate in UK (3.2%) is higher that that in USA (2.5%).

7.4.1 Level of Appreciation/Depreciation

It has been seen above that higher rate of inflation leads to depreciation of a currency vis-a-vis another where inflation is lower. A relationship can be established between appreciation/depreciation and inflation rates.

Appreciation (a) or depreciation (d) is given as

$$\frac{S_1 - S_0}{S_0}$$

$$= \frac{S_0 \frac{1+r_A}{1+r_B} - S_0}{S_0}$$

or a(d)

or $$a(d) = \frac{r_A - r_B}{1+r_B}$$ (Equation 6)

Equation 6 can be simplified further if r_B is assumed to be too small in comparison to 1. Then,

$a(d) \approx (r_A - r_B)$ (Equation 7)

Thus, Equation 7 indicates that appreciation or depreciation between the two currencies is approximately equal to the difference of inflation rates between two countries.

However, if the inflation rates are high (say more than 10 per cent), then it is better to use the original equation (that is, Equation 6) to avoid the distortion in calculations.

Some examples given below show how appreciation/ depreciation is calculated, using inflation rate and price indices data.



Example 7.4

The inflation rates in India and the UK are 2.5 per cent and 5.5 per cent respectively. If the exchange rate at time zero is Rs 79/£, calculate expected exchange rate a year later and appreciation/depreciation.

Since the inflation is higher in India than in the UK, the Indian currency would depreciate and the UK currency would appreciate. The expected exchange rate after one year is going to be

= 81.3122 or Rs 81.3122 /£

Appreciation of pound sterling is calculated, using Equation 6:

$$a = \frac{r - r}{IND \quad UK}$$

$$= \frac{0.055 - 0.025}{1 + 0.025}$$

= 0.02926 or 2.926%

Since the r_{UK} is reasonably low, it can be ignored in the denominator. Using Equation 7, appreciation of pound sterling is

a = 0.055 - 0.025

= 0.03 or 3%, which is very close to the exact value of 2.926%.

Note: Here, we have done calculations for appreciation of pound sterling since it is being priced in terms of rupees. But we can use this calculation as depreciation of rupee as well. We use the appreciation of one currency and the depreciation of the other currency interchangeably, though, strictly in mathematical sense, they are slightly different from each other.



Example 7.5

Price indices at the reference point were 200 and 250 respectively in the countries A and B. These changed over to 210 and 260 over a period of one year. Which of the two currencies has depreciated and by how much? Do exact calculations.

To know the changes in exchange rate, we calculate inflation rates first.

Inflation rate in the Country A:

$(1 + r_A) = 210/200$

or $r_A = (210/200) - 1$

$= 1.05 - 1$

$= 0.05$ or 5%

Inflation rate in the Country B: $(1 + r_B) = 260/250$

or $r_B = (260/250) – 1$

$= 1.04- - 1$

$= 0.04$ or 4%

Since the inflation rate in the country A is higher, the currency of A (say CA) will depreciate and that of the country B (say CB) will appreciate.

Level of depreciation of CA:

$$= \frac{r_A - r_B}{1 + r_B}$$

$$= \frac{0.05 - 0.04}{1 + 0.04}$$

= 0.0096 *or* 0.96%

If we ignore the value of r_B in the denominator, then the level of depreciation is just 1 per cent (that is, the difference between the two inflation rates), which is close to the exact value of 0.96 per cent.

7.4.2 Deviations from Purchasing Power Parity Relationship

Though this relationship has a sound theoretical base, in practice, it does not always give satisfactory results. In other words, there are differences between the exchange rate predicted by the PPP and the actual future rate obtaining in the market. Several factors could be responsible for the deviation.

One factor could be the inflation rates themselves that are

used for calculating future exchange rates. Each country has its own standard basket with certain weights of goods and services to make its price index. These standard baskets are not identical across countries and are not constituted by the items actually traded across borders. So if the price indices included only the items traded between countries, the exchange rate predictions might improve.

Another reason for deviation is that the PPP takes into account only movement of goods and services. It does not factor in the capital flows. In other words, it is concerned with only the current account part of the balance of payment, leaving out the capital account part totally.

Still, another reason causing deviation may have to do with the government intervention in the exchange market directly or through trade restrictions etc. The latter is becoming less and less significant in view of the constant endeavour through the bodies like WTO to liberalize the movement of goods and services across borders.

Speculative activity in the exchange market also affects the. exchange rates since such buying/selling of currencies has no underlying commercial transaction in the real economy.

It has been seen that, despite its limitations the PPP has good predictive power over relatively longer periods and in conditions of higher inflation rates.

7.4.3 PPP and Real Appreciation/Depreciation

As per the PPP, exchange rate between two currencies will fluctuate if and only if the inflation rates are different between two countries. For example, current exchange rate is Rs 79/£. If the inflation rate is 5 per cent in India as well as UK, then exchange rate, after one year, will be the same as the current one, that is, Rs 79/£. But in practice, the exchange rate variations do not always reflect the inflation rates as dictated by the PPP. Let us understand this deviation with the help of an example.

The exchange rate at the reference period is Rs 79/£ and it

is observed to be Rs 81/£ after one year. The inflation rates in India and the UK are 6 per cent and 3 per cent respectively. As per the PPP, the real exchange rate after one year should be

Rs 79 x (1.06/1.03) per pound sterling or Rs 81.30/£.

Since normal rate at Rs 81/ £ (as actually observed in the market) is less than the real rate, the Indian currency is said to be overvalued while the UK currency is undervalued. In other words, rupee has appreciated in real terms while pound sterling has depreciated in real terms since the rate is Rs 81/£ while it should have been Rs 81.30/£.

Real appreciation of rupee or real depreciation of pound sterling is Re 0.30/£. In terms of percentage, it can be expressed as:

81.30 – 81

×100 per cent or 0.36 per cent



Example 7.6

Annual inflation rates are 3 per cent and 2 per cent respectively in the US and the eurozone. The exchange rate moved from $ 1.20/• to $1.21/• over a year. Which currency is overvalued and what is the level of overvaluation?

The real exchange rate as per the PPP after one year should have been as calculated below:

$$1.20 \times \frac{1.03}{1.02} \quad \text{or} \quad \$1.2118/-$$

However, the actual rate in the market is $1.21. It is obvious that dollar is overvalued. The level of overvaluation is $0.0018. In percentage terms, the overvaluation is 0.14 per cent.



CHECK YOUR PROGRESS

Q1: What are the major factors that have an effect on exchange rate

.....

Q2: How is purchasing power of a currency is determined?

.....

Q3: State any one factor responsible for the deviation from purchasing

power Parity relationship

.....

7.5 INTEREST RATE PARITY RELATIONSHIP

This relationship links interest rates of two countries With spot and future exchange rates. It was made popular in 1920s by economists such as John M. Keynes. The theory underlying this relationship says that premium or discount of one currency against another should reflect interest rate differential between the two countries. In perfect market conditions, where there are no restrictions on the flow of money and there are no transaction costs, it should be possible to gain the same real value of one's monetary assets irrespective of the country (or currency) in which they are invested.

For example, an investor has one unit of pound sterling. He can invest it in the UK money market and earn an interest of i_t on it. The resulting value after one year will be:

£1 $(1 + i_£)$

Alternatively, he can buy S_o dollars (the current exchange rate being S_o dollars = 1 pound sterling) and invest this dollar amount in US money market. The end value after one year will be:

$\$S_o (1 + i_\$)$

The equilibrium condition demands that these two sums be equal. If the two sums were not equal, then the investor would invest in that currency where the end value of their monetary assets is going to be more. But once this action is generalized by the similar expectations of all investors, equilibrium is going to be reestablished. Thus, in equilibrium situation,

$\$S_0 (1 + i_\$) = £1(1 + i_£)$

$$S\frac{1+i_\$}{_0 1+i£} = £1$$

This expression on the left side of the above equation is future exchange rate. We can write

$$S_1 = S_0 \frac{1+i_\$}{1+i£} \qquad \text{(Equation 8)}$$

This expression can be written for any two currencies, A and B, by replacing dollar and euro. Thus,

$$S_1 = S_0 \frac{1+i_A}{1+i_B} \qquad \text{(Equation 9)}$$

Equation 8 is known as interest rate parity (IRP) relationship which is very similar to PPP relationship.

In fact, arbitrage opportunities arise in currency markets because of deviations from this relationship. In the situation of perfect equilibrium, S_1 should be equal to forward rate (S_f). Conversely, S_f should be an unbiased predictor of future exchange rate (S_1). That is,

$$S_f = S_1 = S_0 \frac{1+i_A}{1+i_B}$$

Examples that follow illustrate the application of IRP. It should be kept in mind that if the future period to be considered is less than a year, then interest rates, which are normally expressed on the annual basis, have to be adjusted accordingly.

Example 7.7

If the current exchange rate between US dollar and euro is $1.20/• and, the interest rates are 4% p.a. on dollar and 3% p.a. on euro, respectively, what is expected exchange rate after one year?

S_0 = $1.20/•

$$S_1 = S_0 \frac{1+i_{\$}}{1+i_{\text{.}}}$$

$$1.20\frac{1+0.04}{1+1.03}$$

= 1.2116

Expected exchange rate after one year is $1.2116/•.

Example 7.8

Six-month interest rates on Indian rupee and pound sterling are'8% p.a. and 5% p.a. respectively. The current exchange rate is Rs 79/£. Estimate the exchange rate of 6 'month later.

Here, the interest rate is given on annual basis whereas the exchange rate is to be determined for the period 6 months hence. Therefore, the IRP equation is modified accordingly:

or $$S_{6-m} = 79 = \frac{1 + 0.08 \times \frac{6}{12}}{1 + 0.05 \times \frac{6}{12}}$$

$$= 80.1561$$

So exchange rate after 6 months is likely to be Rs 80.1561/£.



Example 7.9

Exchange rate between rupee and Swiss franc is Rs 33/SFr at the reference period and is found to be Rs 33.40/SFr after 9 months, Nine- month interest rate on rupee is 8% p.a. What should have been corresponding interest rate on Swiss franc?

Applying IRP relationship,

$$S_{9-m} = S_0 = \frac{1 + i_{rupee} \times \frac{9}{12}}{1 + i_{SFr} \times \frac{9}{12}}$$

$$33.40 = 33 = \frac{1 + 0.08 \times \frac{9}{12}}{1 + i_{SFr} \times \frac{9}{12}}$$

or, i_{SFr} = 0.630 or 6.30% p.a.

7.5.1 IRP and Arbitrage Opportunities

IRP relationship can be arrived at by constructing an arbitrage portfolio. This portfolio is based on two considerations: it is riskless portfolio and involves no initial investment. Such a portfolio will not generate any net cashflow in the state of equilibrium. The steps in the construction of this portfolio are:

(a) Borrow S_0 dollars at the prevailing interest rate of $i_{\$}$ and buy £1 with these dollars.

(b) Invest £1 at the prevailing interest rate of $i_{£}$.

(c) Sell forward the maturity value of pound investment.

The cashflows resulting from these steps at time zero (C_0) and at maturity (C_1) are shown in Table 6.1.

Table 9.1: Cashflows of the Arbitrage Portfolio

Sr. No.	Transaction	C_0	C_1
1.	Borrow dollars	$\$S_0$	$-\$ S_0 (1+i_\$)$
2.	Buy pound sterling in the spot market	$-\$S_0 + £1$	0
3.	Invest pound sterling	-£1	$£1(1+i_£)$
4.	Sell pound forward	0	$\$ (1 + S_£) . S_f -$
$£(1+i_£)$			
	Net	0	$\$ S_f (1 + i_£) -$

$S_0(1+i_\$)$

From Table 6.1, it is clear that the net cashflow is zero at the time of investment. The maturity value of investment is known with certainty since none of the variables, that is, $i_\$$, i_f, S_0 and S_f, is uncertain. Market equilibrium requires that there be no profit with such a certain portfolio of zero investment, the maturity value should also be zero.

Therefore,

$S_f(1+i_£) - S_0(1+i_\$) = 0$

or $S_f = S_0 \frac{1+i_\$}{1+i_£}$ (Equation 10)

Equation 10 is the same as equation 8. From this relationship, premium or discount can be written as follows:

$$\frac{S_{fo} - S}{S_0} = \frac{i_\$ + i_£}{1+i_£}$$ (Equation 11)

This linkage establishes that if dollar is at forward discount vis-a-vis pound sterling, then interest rates in the US must be higher than those in the UK and via-versa.

When IRP holds, an investor will be indifferent between investing his money in the US and in the UK. But if IRP does not hold, he will prefer one to the other. He will be better off by investing in the US if $(1 + i_\$)$ is greater than $(S_f/S_0) (1 + i_£)$ and vice-versa.

When IRP does not hold, the situation gives rise to arbitrage profits.

7.5.2 Deviations from IRP Relationship

Two major reasons why IRP does not hold fully in practice are: (i) capital controls and (ii) transaction costs.

The governments the world over impose capital controls in varying degrees. To bring certain desired outcomes at macroeconomic level, governments restrict capital flows. At times, these restrictions are only for outbound flows but they can be for both inbound as well as outbound flows. These restrictions on capital flows do not permit the arbitrage activity and thereby prevent the equilibrium from being established.

If IRP holds, the following equations is satisfied, as seen above

$$S_{\backslash f} = S_0 \frac{1+i_A}{1+i_B}$$

or $$\frac{S_0}{S_f}\frac{1+i_A}{1+i_B} - 1 = 0 \qquad \text{(Equation 12)}$$

The capital controls or any other distortsions will not allow the right hand side of Equation 12 to become zero. Empirically, it has been seen that in Japan, when capital controls were in place during 1970s, there were measurable deviations from the IRP. Normally, deviations should hover around zero such that their expected value is zero. However, that was not the case. The deviations from IRP could be attributed *interalia* to restrictions imposed by the Japanese government on inbound capital flows in order to stop or halt the appreciation of the Japanese yen. Once these restrictions were removed in December 1980, the deviations from IRP hovered around zero in first couple of months of 1981.

The other important reason for deviations from IRP is the existence of transaction costs. The interest rate at which an arbitrageur borrows (i^b) is generally higher than the rate at which he can lend i^l his money. Similarly, there is a spread in the exchange rates, meaning thereby, that there exists a difference between bid

and ask rate. The arbitrageur buys foreign exchange at the higher rate and sells it at the lower rate. Generally, while explaining theory, we consider the mid points of all variables: i_A, i_B, S_0 and S_f. But in practice, they are actual numbers, different from mid points.

Let us see how this happens. An arbitrageur borrows one rupee at i. and sells this rupee to buy dollar. He gets $1/S_0$ dollar and then places this dollar amount for the period corresponding to forward period of, say, 3 months. At the same time, he sells [1]Otani and S. Tiwari, "Capital Controls and Interest Rate Parity: The Japanese Experince, 1978-81", IMF Staff Papers 28 (1981), pp. 793-815. forward the maturity value of his dollar investment. He will get after three months

rupees.

He refiinds his rupee borrowing, which is
$1(1+ i_{rup})$
Net profit is

$S_f \frac{1}{S_0}(1+i_{\$})$

$$S_f \frac{1}{S_0}(1+i_{\$}) - (1+i_{rup}) > 0 \qquad \text{(Equation 13)}$$

In real life, the right side of Equation 13 may be negative. Why? S_0 will be ask rate (S^a_0) and S_f will be bid rate (S^b_f). Likewise i_{rup} will be borrowing rate ($i_{rup}{}^b$) and $i_{\$}$ will be lending rate ($i_{\$}^l$). From the discussion above, we can write the following relationships.

$$\frac{S^b_f}{S^a_0} < \frac{S_f}{S_0}$$

$(1+ i_{\$}^{l}) > (1+ i_{\$})$
$(1+ i^{b}_{rup}) > (1+ i_{rup})$

Thus, if the arbitrage profits turn out to be negative because of transaction costs, the deviation from IRP does not indicate an arbitrage opportunity.

Besides the above two reasons, deviations from IRP can be also due to market structure and ease/difficulty of placement in a particular market. Speculation is an equally important factor. This

becomes very significant during the crisis of confidence in the future of a currency. In such a situation, premium or discount on a currency becomes much larger than what the IRP can explain.



Example 7.10

The exchange rates at the reference period and after 3 months are Rs 79/£ and Rs 79.5/£ respectively. Three-month interest rates on rupee and pound sterling are 8% p.a. and 5% p.a. respectively. Are the exchange rate and the interest rates moving in tandem? If not, what could be the reason(s)?

As per the IRP, the expected exchange rate after three months is

$$S_{3-m} = S\frac{1+i_{rup}\times\frac{3}{12}}{1+i_{£}\times\frac{3}{12}}$$

$$= 79\times\frac{1+0.08\times\frac{3}{12}}{1+0.05\times\frac{3}{12}}$$

= 79.5852

The expected exchange rate of Rs 79.5852 is marginally different from the actual market rate of Rs 79.5/£. This shows that the exchange rate and interest rates are not moving in tandem. That is, markets are not in perfect equilibrium.

The slight deviation in IRP may be due to capital controls or transaction costs or some other distortions.

7.6 EXCHANGE RATE AND FOREIGN EXCHANGE RESERVES

Foreign Exchange Reserves is the total amount assets that a country holds in foreign currencies including gold reserves.Foreign Exchange reserves have an impact on exchange rate. Though there is no direct mathematical relationship between the level of reserves and exchange rate, yet there is a logic that links the two. First, let us see what the reserves are meant for. Why does any country maintain foreign exchange reserves? A

country has to meet its financial obligations to the outside world. These obligations are broadly in the form of debt service requirements and payments to be made for imports. Debt service includes both interest and installments of the principal falling due for payment. In case, the reserves are able to meet these obligations comfortably, the level of reserves going up or down slightly does not have nay visible impact on exchange rate.

Empirically, it has been shown that if the level of reserves is such that a country can meet easily its needs for 3-4 months, then there is no cause for worry. Let us say, the annual need for foreign exchange is I and the level of reserves is R, then the number of months for which the reserves will suffice is

$N = (R/I) \times 12$ (Equation 14)

For I = Rs 100 billion and R = Rs 30 billion, N works out to be 3.6 months. The reserve levels are sufficient to meet the needs of more than 3 months. These are just about adequate. There is a need to take requisite action that they do not go down further and are built up further, if possible.

Financial variables, particularly exchange rate and equity indices, are extremely sensitive to public perception.

A depletion in the level of reserves below the “comfort zone” is perceived to be a sign of some ensuring problem. This perception will tell upon the exchange rate and sooner than later exchange rate will start sliding. Likewise, an increase in the reserves will generate a positive perception and is likely to harden the currency.

Is the effect of decrease and increase in the level of reserves symmetrical? It is unlikely to be symmetrical. To understand it better, let us assume that comfortable level of reserves for a country is 100 units of foreign exchange. If the reserves fall to a level of 90 units, there is likely depreciation of the currency by d_1. On the other hand, if the reserves go up to the level of 110 units, there is likely appreciation of the currency by a_1 . The question is: is $d_1 > a_l$ or $d_1 = a_l$ or $d_1 < a_l$? Intuitively, the answer would be that d_1 is greater than a_1. This means that the negative impact of falling level of reserves on the value of the currency is more pronounced than the positive impact of increasing level of reserves.

To extend the argument further, let us suppose the reserves fall further

to the level of 80 units and, as a result, there is depreciation of d_2. On the other side, the reserves rise to the level of 120 units, causing a further appreciation of a_2. The question is: is $a_2 < a_1$ or $a_2 = a_1$ or $a_2 > a_1$ and $d_2 < d_1$ or $d_2 = d_1$ or $d_2 > d_1$? The intuitive answer is $a_2 > a_1$ and $d_2 < d_1$. The meaning is that the currency would loose value at accelerated pace if the reserves are getting depleted while the currency would gain strength at decelerated pace if the reserves are increasing. This is the reason why every country is expected to remain alert about reduction in the reserves below the comfort level.

It may be worthwhile to recall that India faced a crisis in 1991 when its foreign exchange reserves came down to a very low level. It was feared that the country might not be able to pays its foreign currency obligation beyond a couple of weeks. This led to a number of measures, including a drastic depreciation of currency.

Much worse was the situation of some of the south east Asian countries in 1997 when their short-term obligations to foreigners exceeded their foreign exchange reserves. In such a scenario, a country does not have any means to pay and crisis develops. Many of these countries such as Thailand, Indonesia, Malaysia, Philippines and South Korea saw their currencies weakening by unprecedented pace to very low levels.

However, building up reserves beyond a certain level does not serve much useful purpose since these assets do not earn high returns. So prudent management of reserves is the key.

7.7 EXCHANGE RATE AND BALANCE OF PAYMENTS

It has been established through observation and empirical studies that a deficit in Balance of Payment (BOP) causes depreciation of the domestic currency. Balance of Payments is a statements of total inflows and outflows of foreign exchange during a specified period, usually a year. When a country is importing more than its exports, the demand for foreign currencies increases. This increasing demand can be met by increasing capital inflows. As a result, the trade deficit may not have very significant

impact on the exchange rate. However, if the demand for foreign currency is met by drawing down the existing foreign exchange resources, then the adverse impact on exchange rate will be more pronounced. The foreign currency due to its increased demand will harden while the domestic currency will depreciate.

This aspect can be easily appreciated and understood if we look at what has been happening to rupee- dollar exchange rate from October 2005 onwards. In a single month, rupee fell by about 2 per cent against dollar. This fall is largely attributable to increased imbalance on trade account. Since April 2005 onwards, there has been a large trade deficit of more than $3 billion per month. This happened because the imports grew more than 35 per cent on an annual basis whereas the exports grew at much lower rate. A large current account deficit created excess demand for dollars.

This excess demand could be met through capital inflows but they have been dwindling of late.

The reason for slowing down of capital inflows is the increase in the dollar interest rates. Federal Reserve of the USA has slowly increased interest rates from 1 per cent to 3.75 per cent now. As a result, dollar flows are reversing because the investment in US treasuries has become more attractive than in Indian securities.

In brief, the BOP deficit, in general, and trade deficit, in particular, has an adverse effect on currency.

7.8 EXCHANGE RATE AND TECHNICAL ANALYSIS

Technical analysis refers to the process of estimating exchange rate by extrapolating the past data. The technical analysts (or chartists as they are also called) use daily, weekly or monthly data to generate charts and then try to discern certain definite patterns. They believe that these patterns are likely to repeat for some time in future, enabling the chartists to predict exchange rates.

A chart (or graph) can be made by plotting the daily closing exchange rate on vertical axis against the time on horizontal axis. It may result into a curve as shown in Figure 7.1.

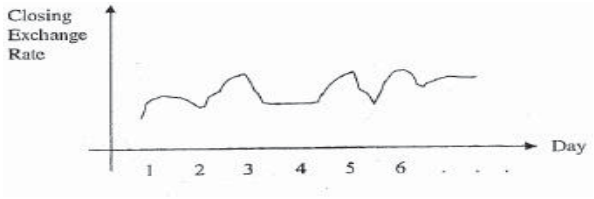


Fig 7.1: Closing Rate-Time Chart

Charts are also made in the form of bars, known as bar charts. A bar may have three points. First, the daily highest and lowest rates are joined by a vertical line. On that line, a small horizontal cut is made showing the closing rate. This chart is shown in Figure 7.2.

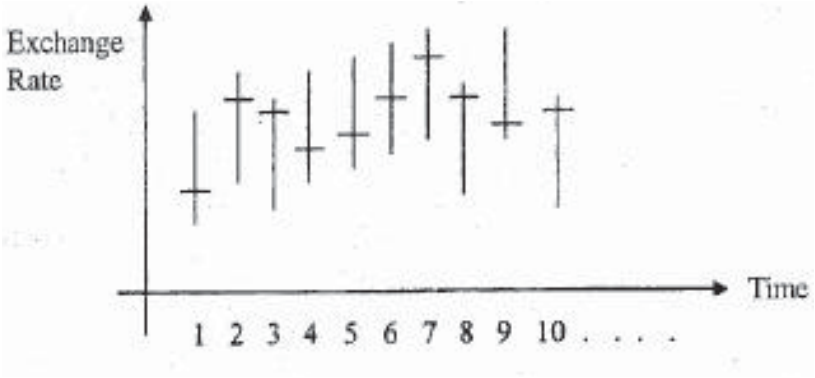


Fig 7.2: Bar Chart with High, Low and Closng Rate

Other forms of graphs are made by joining all high or all low points. The line resulting from joining the high points is known as the line of resistance whereas the line joining low points is called the line of support. These are shown in Figure 7.3 and Figure 7.4 respectively.

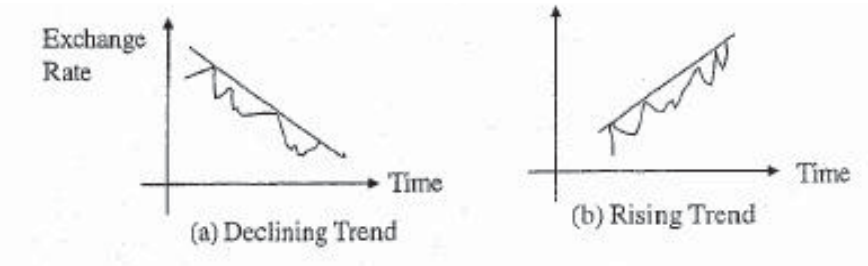


Fig 7.3: Line of Resistance

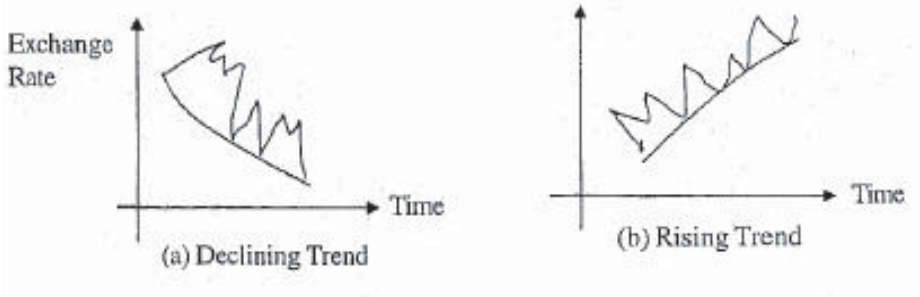


Fig 7.4: Line of Support

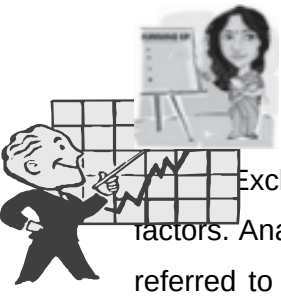
CHECK YOUR PROGRESS

Q4: Define Foreign Exchange Reserves

.....

Q5: Define Balance of Payments

.....



7.9 LET US SUM UP

Exchange rate between two currencies is influenced by several factors. Analysis of these factors and their influence on exchange rate is referred to as fundamental analysis. Some of the important factors that have an impact on exchange rate are inflation, interest rates, level of foreign exchange reserves, and balance of payments etc. Linkage between exchange rates and inflation rates is referred to as purchasing power parity (PPP) relationship. The relationship can be written as follows:

$S_1 = S_0 \frac{1+r_A}{1+r_B}$ where the symbols have their usual meaning.

The appreciation (a) or depreciation (d) can be linked with inflation rates as follows:

a (or d) = $\frac{r_A - r_B}{1+r_B}$

There are several reasons why exchange rates predicted by using inflation rates do not match with the actual rates prevailing in the market. These include (a) inappropriate price indices to calculate inflation rates, (b) capital flows, (c) government intervention in the currency market and (d) speculative activity in the foreign exchange market etc. The difference between the actual market rates and those based on PPP is referred to as

real appreciation or depreciation. Linkage between exchange rates and interest rates is referred to as interest rate parity (IRP) relationship. Deviations from IRP relationship give rise to arbitrage opportunities. Level of foreign exchange reserves can have an impact on the value of currency. It has been generally seen that the reserves are at comfortable (optimum) level if a country can meet easily the foreign exchange needs of 3-4 months. Reduction in the reserves from the optimum level is likely to causes greater depreciation than the appreciation that an identical increase in the reserves would cause. A president in BOP of a. country can have an adverse impact on the value of the currency. Technical analysis can also be used for estimating future exchange rate. Technical analyst (or chartist) uses the past data to make patterns and extends them to future, believing that these patterns are likely to repeat themselves.



7.10 FURTHER READING

1) Apte, P. G. (1995), "*International Financial Management*", Tata McGraw-Hill Publishing Company Ltd, New Delhi.
2) Bhalla, V. K., "*International Financial Management*", Sultan Chand & Co., New Delhi.
3) Jain, P. K., Josette Peyrard and Surendra S. Yadav (1998), *International Financial Management*, Macmillan India Ltd., New Delhi.
4) Maurice D. Levi (1996), "*International Finance*", McGraw-Hill Inc.
5) Shapiro, Alan C. (1999), "*Multinational Financial Management*", John Wiley & Sons, Inc, New York.
6) Yadav, Surendra S., P. K. Jain and Max Peyrard (2001), *Foreign Exchange Markets: Understanding Derivatives and Other Instruments,* Macmillan India Ltd., New Delhi.

7.11 ANSWERS TO CHECK YOUR PROGRESS

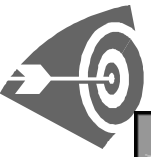
Ans to Q1: The major factors that have an effect on exchange rate are: (i) rate of inflation, (ii) interest rates, (iii) balance of payment (BOP), and (vi) foreign exchange reserves.

Ans to Q2: Purchasing power of a currency is determined by the amount of goods and services that can be purchased with one unit of that currency.

Ans to Q3: One factor responsible for the deviation from purchasing power Parity relationship is the inflation rates themselves that are used for calculating future exchange rates.

Ans to Q4: Foreign Exchange Reserves is the total amount assets that a country holds in foreign currencies including gold reserves.

Ans to Q5: Balance of Payments is a statements of total inflows and outflows of foreign exchange during a specified period, usually a year.





7.12 MODEL QUESTIONS

1) What do you understand by Purchasing Power Parity (PPP)? Explain with examples.
2) Does PPP predict the exchange rates accurately? If not, why not?
3) Explain interest rate parity and reasons for deviations.
4) How does an arbitrage opportunity arise in forward exchange market?
5) Discuss the influence of foreign exchange reserves on exchange rate.
6) How does BOP situation affect exchange rate?
7) Calculate exchange rate after one year if the inflation rates are 6 per cent and 3 per cent respectively in India and the UK. The reference rate is Rs 80/£.
8) Calculate real appreciation/depreciation if actual market rate after one year happens to be Rs 81/£, other data are as in Q.7 above.

9) Price index changed over a year from 100 to 107 in India while it changed from 200 to 208 in the USA. The reference rate was Rs 45/$. What is expected exchange rate after a year?

10) Consider 6-tn interest rates to be 7 per cent per annum in India and 4 per cent per annum in Switzerland. Calculate the exchange rate after 6 months from the initial rate of Rs 33/SFr. Also calculate the degree of appreciation/depreciation.

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