# UNIT 1: GLOBAL FINANCIAL ENVIRONMENT

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## 1.0 AIMS AND OBJECTIVES

At the end of the unit the student will have learned:

- the distinguishing features of international finance.
- the essential concepts of Balance of Payments and their interpretation.
- what are global financial markets? What are 'offshore' markets?
- evolution and present status of the international monetary arrangements including the TMF, EMS and EMU, SDKs and international reserves.

## 1.1 INTRODUCTION

This unit sets the backdrop for exploring multinational business finance. Its main purpose is to provide a perspective on global financial markets and the international monetary system, which is supposed to define and enforce the rules of the game in the arena of international finance. Here, our focus will be on the substantive conceptual issues rather than facts and figures which arc of transient importance. The first part of this unit discusses about the challenge of international finance, and then moves to global finance function, which is quite different from normal domestic finance function in an organization. While the latter part discusses about the global financial markets and the international monetary system and the different types of exchange rate regimes.

## 1.2 THE CHALLENGE OF INTERNATIONAL FINANCE

The decade of 1990's can be characterized as the 'Globalization Decade'. Around the world, the process of dismantling the barriers to international trade and capital flows, which had begun in the early 1980's, accelerated in the 1990's and reached its culmination during the closing years of the last decade of this century. Even economies like that of India, which "had isolated themselves from the rest of the world behind impenetrable walls of trade barriers and draconian restrictions on capital flows including direct investment, began opening up during the 1980's. Indian liberalization and reform process started in 1991 with gradual elimination of quota restrictions on imports, reduction in import duties on many capital goods and intermediates, rationalization of the export incentives system and a move toward market determined exchange rate. The current account of the balance of payments was almost totally freed of

exchange restrictions in 1994 and some steps were initiated toward capital account convertibility.

Freedom from controls has meant enormous widening of opportunities. For the finance manager, it means a much wider menu of funding options, investment vehicles, cost reduction and return enhancement through innovative structured financing and investment vehicles, and many other exciting prospects to exercise his or her ingenuity. However, freedom and maturity also imply loss of innocence and simplicity. There was a time when most finance managers in India did not have to worry about gyrations in exchange rates, ups and downs in interest rates, twists and shifts of the yield curve, whether bulls or bears were on the rampage on Wall Street, whether Russia was being buried under a mountain of debt and what the Standard & Poor's thought of the Indian economy. Today, such complacency would be a sure recipe for disaster.

As we will discover in the rest of the book, almost every firm today, is exposed to fluctuations in the financial markets not only at home but also abroad. For some firms, the exposure is direct and obvious; for others, it is indirect via effects on their customers, suppliers and competitors. Integration of financial markets and mind-boggling advances in communications and information technology means no economy is an island unto itself.

Economic events, government actions and investor sentiments in any part of the world spread throughout the global financial markets extremely rapidly. The fallout of the Asian crisis and the upheavals following the Russian collapse has brought home this lesson. In fact it has led many experts and policy makers to question the desirability of a laissez faire global financial system.

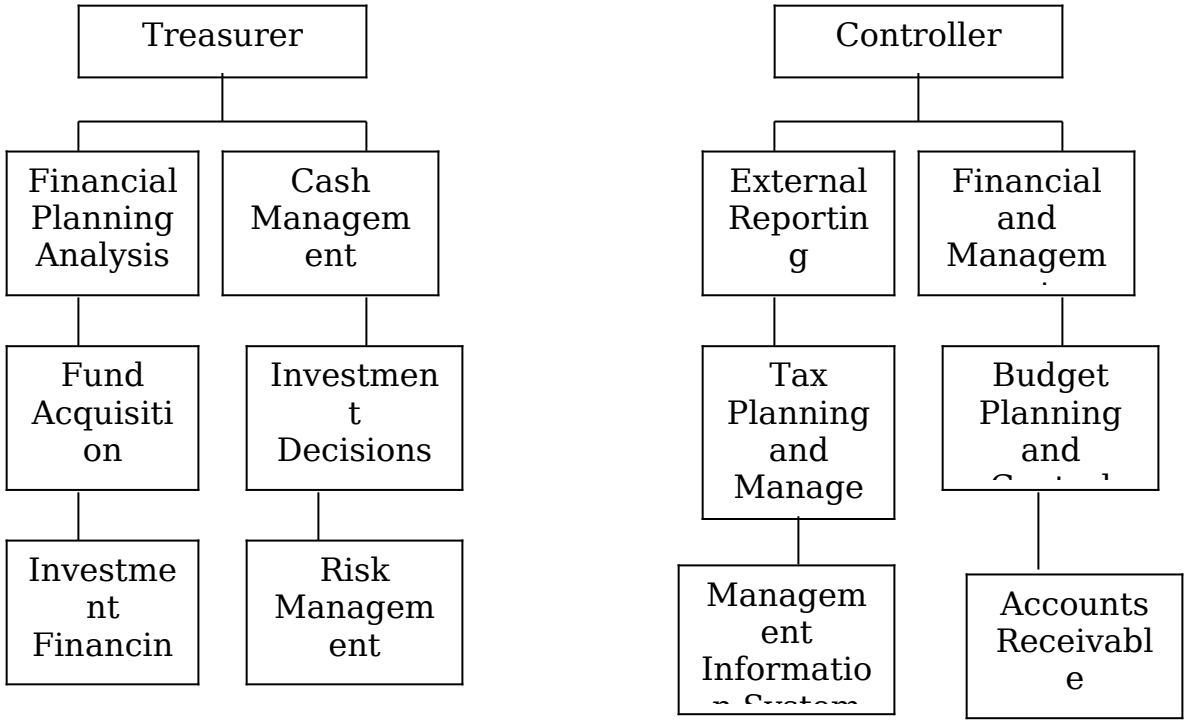
Thus, increasing opportunities have resulted in a quantum leap in financial risks. The purpose of this book is to equip you with the

conceptual tools and a basic familiarity with markets and institutions which will enable you to analyze the opportunities offered by the global financial markets and their associated risks. Every finance manager today must acquire this basic toolkit to successfully perform his or her function and add shareholder value.

## 1.3 THE FINANCE FUNCTION IN A GLOBAL CONTEXT

The finance function in a typical non-financial firm consists of two main tasks, viz. treasury on the one hand and accounting and control on the other (Exhibit 1.1). The treasurer and the controller do not function in watertight compartments. There is a continuous exchange of information and mutual consultations. In many firms, both the tasks may in fact be headed by a single person without any formal separation of the two responsibilities.

### Exhibit 1.1The Finance Function



How is the finance function different in a multinational context? The basic tasks of both the treasurer and the controller remain the same as in the case of a purely domestic firm; the difference is in terms of available choices and the attendant risks. The following can be enlisted as the key differences:

- The firm must deal with multiple currencies. It must make or receive payments for goods and services in currencies other than its 1 'home currency', raise financing in foreign currencies, carry financial assets and liabilities denominated in foreign currencies and so forth. Thus, it must acquire the expertise to deal in the forex market and learn to manage the uncertainty created by fluctuations in exchange rates.
- A treasurer looking for long or short-term funding has a much richer menu of options to choose from when he or she is operating in a multinational context. He/she has different markets—national or offshore—different instruments, different currencies and a much wider base of investors to tap. The funding decision acquires additional dimensions—which market, which currency, which form of funding—that are absent when the orientation is purely domestic.
- Similarly, a treasurer looking for outlets to park surplus funds has a wider menu of options in terms of markets, instruments and currencies.
- Each cross-border funding and investment decision exposes the firm to two new risks, viz. exchange rate risk and political risk. ; The latter denotes the unforeseen impact on the firm, of events such as changes in foreign tax laws, laws pertaining to interest, dividend and other payments to non-residents, risks of nationalization and expropriation. Over and above, there are other

risks —-associated with these decisions also like-interest rate risks and credit risks.

- Cross-border financing and investment also obliges a firm to acquire relevant expertise pertaining to accounting practices, standards and tax laws applicable in foreign jurisdictions.

To summarize, managing the finance function in a multinational context involves wider opportunities, more varied risks, multiplicity of regulatory environments and consequently, an increased complexity in decision making.

### Check Your Progress – 1

1. What are the functions of finance mance manager?

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2. How the finance function is different in a multinational context?

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## 1.4 GLOBAL FINANCIAL MARKETS

### 1.4.1 Are Financial Markets Globally Integrated?

It is often said that around the mid-1980's, there began a process of integration of world's major financial markets so that by now there is a single, vast 'global' financial market. How much element of truth do we have in this statement and how much journalistic hype?

The question of whether financial markets across the world are integrated or segmented can be looked at from at least three different perspectives:

(a) The presence of legal barriers which prevent the borrowers in one country from accessing markets in another and investors in one country from acquiring foreign assets. Non-resident entities may he

totally denied access to a country's financial markets or may be permitted controlled access. Similarly, a country may totally or partially prevent its residents from borrowing in foreign markets and investing in foreign assets. Also, there may be restrictions which keep foreign banks and financial institutions out of some or all segments of the domestic financial markets. Lastly, local tax law may discriminate between domestic and foreign investors, such as withholding taxes on interest paid to non-residents.

A second less obvious factor causing segmentation even in the absence of any formal restrictions on cross-border capital flows is:

(b) Differences that prevail in generally accepted accounting principles, disclosure norms, etc. which create informational assume tries between resident and non-resident investors. Thus, non-resident investors may find it difficult to acquire and interpret information about potential issuers in a country even though the local government places no restrictions on foreign investors.

Finally, an even more subtle consideration involves the exchange risk factor. As we will see in Chapter 3, exchange rate movements do not compensate for differences in inflation rates across countries. In a globally integrated market, two investors who have identical expectations should put identical value on a given asset, e.g. stock of General Motors. However in the presence of real exchange rate risk, this will not hold. Consider the following hypothetical case. Three investors, an American, a German and a Britisher are valuing the stock of ABC Inc. an American firm currently priced at say USD 100. All the three agree that in US dollar terms, the stock will fetch a return of 10% p.a. (ignoring dividends). The expected inflation rates are 5%, 3% and 7% p.a. in the US, Germany and UK respectively. The exchange rates are DEM 2.00/USD and USD 2.00/GBP at the start of the year. The German investor expects the exchange rate to be DEM 1.9/USD and the British investor expects the

rate to go to USD 1.8/GBP by the year-end. What are their expected real, i.e. inflation-adjusted returns measured in their respective home currencies? You can easily work out that these would be 4.76%, 1.46% and 14.23% respectively for the American, the German and the British investor. You can also convince yourself that the expected returns would have been identical if the expected movements in exchange rates had exactly compensated for the differences in expected inflation rates, i.e. if the DEM was expected to appreciate to DEM [2.00(1.03/1.05)] = DEM 1.9619 per USD and the GBP to depreciate to USD [2.00(1.057 1.07)] = USD 1.9626 per GBP. In Chapter 3, we will discuss the concept of real exchange rate. For now, it is sufficient to know that real exchange rate changes consist of changes in exchange rates corrected for inflation differences. When exchange rate changes do not reflect inflation differences, real exchange rates vary over time. Thus in addition to (a) and (b) above, we have

(c) There is ample empirical evidence to assert that except over very long horizons, exchange rate movements do not reflect changes in purchasing powers of various currencies. Hence, different investors would value a given asset differently depending upon their currency habitat. This makes for the third factor which prevents complete integration of national financial markets.

Looked at from these three angles, one can state the following. Restrictions on cross-border capital flows are being progressively removed in most major financial markets. Similarly, there is a significant increase in the presence of non-resident financial institutions in the markets of the OECD countries and to some extent even in the developing countries. Informational disadvantages faced by the non-resident investors are easily overcome with the passage of time. However, significant differences still remain across countries in accounting and reporting practices as well as regulatory policies. Finally, valuation

divergences caused by real exchange rate uncertainties will probably continue to segment the world's financial markets for a long time to come.

### 1.4.2 Euromarkets: What are they?

Prior to 1980, Eurocurrencies market was the only truly international financial market of any significance. It is mainly an interbank market trading in time deposits and various debt instruments. A 'Eurocurrency Deposit' is a deposit in the relevant currency with a bank outside the home country of that currency. Thus, a US dollar deposit with a bank in London is a Eurodollar deposit, and a Deutschemark deposit with a bank in Luxembourg is a Euromark deposit. Note that, what matters is the location of the bank—neither the ownership of the bank nor ownership of the deposit. Thus a dollar deposit belonging to an American company held with the Paris branch of an American bank is still a Eurodollar deposit. Similarly a Eurodollar Loan is a dollar loan made by a bank outside the US to a customer or another bank. The prefix 'Euro' is now outdated since such deposits and loans are regularly traded outside Europe, e.g. in Singapore and Hong Kong. These are sometimes called Asian dollar markets. This is the reason why we have "used the more inclusive designation 'Offshore markets'. While London continues to be the main Euromarket centre, for tax reasons, loans negotiated in London are often booked in tax-haven centers such as Cayman and Nassau [See Stigum (1990)].

It must be clearly understood that every Eurodeposit has its counterpart in a deposit in the home country of the relevant currency. This can be understood by examining a typical sequence of transactions which leads to the creation of Eurodeposit. Suppose Microsoft wishes to place USD 25 million in a 91 day deposit. It obtains rate quotations from various banks in the US and in London and finds the rate offered by Barclays Bank London, 8% p.a., most attractive. So it instructs CIT bank, New York, to

transfer USD 25 million to Barclays. CITT reforms Barclays London and asks where the funds should be credited. Barclays London maintains an account with Chase New York. CITI debits Microsoft's account and credits Barclays account with Chase. This transfer would take place via an interbank clearing system such as CHIPS in the USA. Barclays creates a deposit account in the name of Microsoft in London and credits it with USD 25 million. A Eurodollar deposit has been created but 'physically' the dollars have not left the maturity, 91 days later, Barclays will calculate the interest payable as:

$ [25000000 x 0.08 x (91/360)] = $505555.56

and credit it to Microsoft's deposit account. In Euromarkets, the day count convention for interest calculations is actual number of fraction of an year is calculated by taking the actual number of days in the deposit or loan and assuming that an year has 360 days. Suppose Microsoft wishes to invest the money for a further period of 91 days. This time it finds that Commerzbank Frankfurt is offering the best rate. Consequently it Instructs Barclays London to transfer the money to commerzebank. Commerzbank maintains an account with Chemical bank, New York. Barclays instructs Chase to debit its account and transfer the funds to the account of Commerzbank with Chemical. So the process goes on.

Of course Barclays is not going to let the funds lie idle in its Chase account for 91 days. It might keep some level of reserves and try and find an eligible borrower. Suppose on the same day that Microsoft makes its initial deposit, a French firm wish to obtain a 90-day loan of USD 20 million and finds that Barclays rate is the cheapest. It draws the loan and instructs Barclays to transfer the funds to its bank, Banque Nationale de Paris (BNP), Paris. BNP has an account with the Bank of America in Los Angeles. Barclays instructs Chase to transfer the funds to BNP's account with the Bank of America. BNP creates an Eurodollar deposit in the name of the French firm. Thus, another Euro deposit is created.

You can then see that BNP can and probably would repeat the process which will lead to creation of further Eurodollar deposits. Just as in the case of a fractional reserve domestic banking system, Eurobanks can create multiple deposits based on an initial injection of funds into the system, but the funds never leave the home country of the currency in question. Over the years, these markets have evolved a variety of instruments other than time deposits and short-term loans, e.g. Certificates of Deposit (CDs), Euro Commercial Paper (ECP), medium to long-term floating rate loans, Eurobonds, Floating Rate Notes (FRNs) and Euro Medium Term Notes (EMTNs). We will study these instruments later in this book.

As mentioned above, the key difference between Euromarkets and their domestic counterparts is one of regulation. For instance, Eurobanks are free from regulatory provisions such as cash reserve ratio, deposit insurance, etc. which effectively reduces their cost of funds. Further, Eurobonds are also free from rating and disclosure requirements applicable to many domestic issues as well as registration with securities exchange authorities. This feature makes it an attractive source of funding for many borrowers and a preferred investment vehicle for some investors compared to a bond issue in the respective domestic markets.

### 1.4.3 Evolution of Euro-markets

The Eurocurrency market, specifically the Eurodollar market, is said to have originated with the Russian authorities wishing to have dollar-denominated deposits outside the jurisdiction of the US government. Banks in Britain and France obliged and the Eurodollar market was born. The subsequent enormous growth of the Eurodollar market can be attributed to the following factors:

- Throughout the 1960's and 1970's, American banks and other depository institutions had to observe ceilings on the rate of interest

they could pay on deposits. These restrictions did not apply to banks outside the US, and a number of American banks began accepting dollar deposits in their foreign branches. The dollars so obtained were often reinvested in the US. By mid 1970's most of these restrictions were lifted.

- As mentioned above, reserve requirements and deposit insurance implied higher effective cost of funds for US domestic deposits. Since branches of the US banks outside the US did not have to observe these restrictions, they could offer slightly higher rates to depositors and slightly lower rates to borrowers. Hence it was attractive to accept dollar deposits in foreign branches, rather than at home.
- Due to the importance of the dollar as a vehicle currency in international trade and finance, many European corporations have cash flows in dollars and hence temporary dollar surpluses. The need to make payments in dollars enhanced their desire to have deposits denominated in dollars. Convenience of the same time zone as well as their greater familiarity with European banks inclined these companies to prefer European banks—a choice made more attractive by the-higher rates offered by Eurobanks.
- These factors were reinforced by demand for Eurodollar loans by non-US entities and by US multinationals to finance their foreign operations. During the 1960's, as the US balance of payments deteriorated and the government imposed a series of restrictions which made it difficult and/or more expensive for foreign entities to borrow in the US. The voluntary foreign credit restraints of 1963, followed by mandatory controls on foreign lending and the interest equalization tax (a tax on interest earned by US residents from foreigners) induced channeling of funds through the Eurodollar markets where these regulations did not apply.

To summarize, the reasons behind the emergence and strong growth of the Eurodollar markets can be captured in the single word, 'regulations'. For both borrowers and lenders, the various restrictions imposed by the US government induced them to evolve Eurodollar deposits and loans. Added to this are the considerations mentioned above, viz. the ability of Eurobanks to offer better rates both to depositors and borrowers (which again can be attributed to existence of regulations) and the convenience of dealing with a bank closer to home who is familiar with the business culture and practices in Europe.

Another contributing factor was the restrictions imposed by UK authorities in the 1950's which prevented UK banks from providing trade finance in sterling.

The emergence of Euromarkets in currencies other than the dollar can also be attributed to similar considerations though in these cases, better rates and familiarity perhaps played a more important role. As exchange controls were eased and offshore banking was encouraged by authorities, offshore markets developed in many other centers including the Far East. It is difficult to obtain precise estimates of the size of the Euromarkets, particularly net figures, i.e. excluding interbank placement of funds. Exhibit 1.2 provides some recent data on the outstanding volume of external loans and deposits of reporting banks taken from BIS. These data include loans made to and deposits taken from all non-residents by banks in BIS reporting countries and thus include the so-called Euroloans and deposits.

**Exhibit 1.2 External Loans and Deposits of Reporting Banks (Billions of US Dollars)**

| | **Loans** | **Deposits** |
|---|---|---|
| 1996 December | 7204.8 | 7673.2 |
| 1997 December | 7708.7 | 8251.5 |

| | | |
|---|---|---|
| 1998 September | 7931.0 | 8747.6 |

Source: Quarterly Review: International Banking and Financial Market Developments Bank for International Settlements March, 1999.

## Check Your Progress – 2

1. List three reasons for integration of financial markets globally?

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2. What are the euro markets?

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## 1.5 THE INTERNATIONAL MONETARY SYSTEM

The purpose of this section is to provide a succinct overview of the organization and the functioning of the international monetary system. The discussion will be structured around the following aspects of the system which we consider to be the key areas any finance manager must be acquainted with:

1. Exchange rate regimes, current and past.
2. International liquidity, i.e. the volume and composition of reserves, adequacy of reserves, etc.
3. The International Monetary Fund, its evolution, role and functioning.
4. The adjustment process, i.e. how does the system facilitate the process of coping with payment imbalances between trading nations?
5. Currency blocks such as the European Monetary System (EMS) and the proposed Economic and Monetary Union (EMU) in Europe.

We will discuss only the basic essentials of these topics. Details can be found in some of the specialized works on international monetary economics cited in the bibliography.

### 1.5.1 Exchange Rate Regimes

An exchange rate is just the value of one currency in terms of another. The term *exchange rate regime* refers to the mechanism, procedures and institutional framework for determining the exchange rates at a point in time and also the changes in them over time, including factors with induce the changes. At one end of the spectrum we have *rigid or fixed* exchange rates and at the other end, perfectly *flexible* or *floating* exchange rates. Spanning them are hybrids with varying degrees of *limited flexibility*. We will discuss the main prototypes that have characterized the international monetary system in this century and a few others which have been proposed as a part of the reform of the system.

### 1.5.2 Fixed and Quasi-Fixed Systems

***(a) The Gold Standard.*** This is the oldest system which was in operation until the beginning of the First World War and for a few years after that. It has three different versions. The essence of all the three versions is that the currency in circulation is convertible into gold at a fixed rate. Consequently the exchange rate between any two currencies is determined by their respective values in terms of gold. If a given quantity of gold is convertible into two dollars or one pound, the mint parity exchange rate between dollars and pounds should be 2.00 dollars per pound.

The gold standard regime imposes very rigid discipline on the policy makers. Often, domestic considerations such as full employment have to be sacrificed in order to continue operating the standard, and the political cost of doing so can be quite high. For this reason, the system was rarely allowed to work in its pristine version.

***(b) The Bretton Woods System*** A series of events during the late 1920's and 1930's, including the breakdown of the gold standard plunged the world monetary system in a state of chaos and the volume of international trade fell substantially. The exchange rate regime that was put in place after the Second World War by the victorious allies can be characterized as the Gold Exchange Standard. It had the following features:

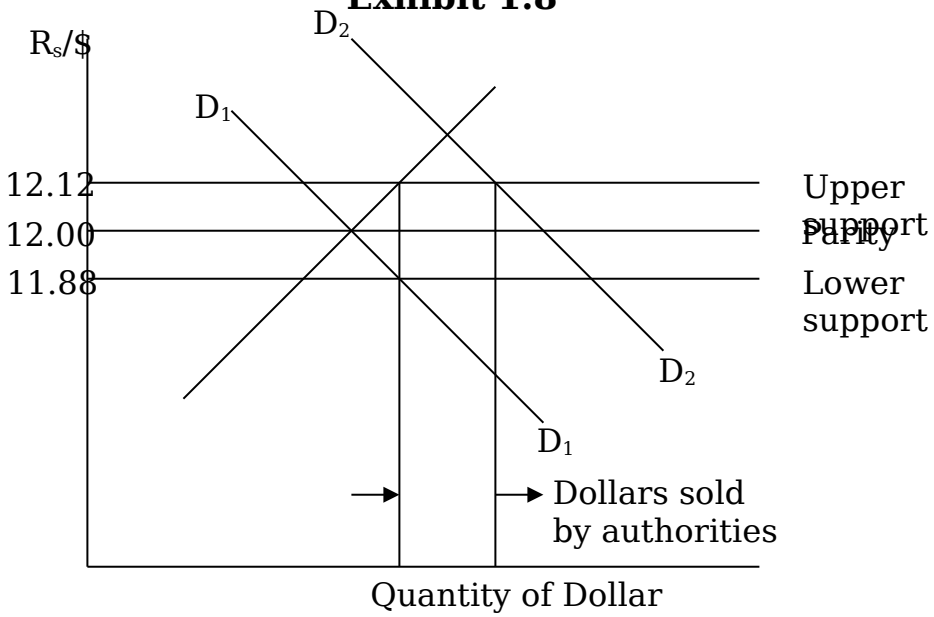
- The US government undertook to convert the US dollar freely into gold at a fixed parity of $35 per ounce. International Monetary Fund was created to act as a sort of central bank to member countries' central banks.
- Other member countries of the IMF agreed to fix the parities of their currencies vis-à-vis the dollar with variation within 1% on either side of the central parity being permissible. If the exchange rate hit either of the limits, the monetary authorities of the country were obliged to 'defend' it by standing ready to buy or sell dollars against their domestic currency to any extent required to keep the exchange rate within the limits. This is called 'intervention'.

In return for undertaking this obligation, the member countries were entitled to borrow from the IMF to carry out their intervention in the currency markets. They could borrow currencies of other member countries subject to certain limitations and conditions. The novel feature of the regime which makes it an *adjustable peg* system rater than a fixed rate system like the gold standard was that the parity of a currency against the dollar could be changed in the face of a *fundamental disequilibrium*. Changes of up to 10% in either direction could be made without the consent of the Fund while larger changes could be effected after consulting the Fund and obtaining their approval.

Let us see how the Bretton Woods system worked. In Exhibit 1.8, we have drawn a supply curve S-S and a demand curve $D_1D_1$ for dollars.

On the vertical axis we have plotted the price of dollars in terms of rupees, i.e. the exchange rate between rupees and dollars. On the horizontal axis, we have shown the quantity of dollars demanded and supplies. For the present, you can imagine that the demand for dollars arises from Indian residents wanting to import American goods and services while the supply of dollars arises from Americans wishing to import goods and services from India (and therefore wishing to exchange their dollars for rupees). Suppose the parity exchange rate is INR 12.00 per dollar. The ± 1% limits are therefore INR 12.12 and INR 11.88. These limits are called *support points* for reasons that will become clear shortly.

**Exhibit 1.8**




As long as the demand and supply curves intersect within the permissible band, the Indian authorities need to do nothing; the exchange rate resulting from autonomous demand and supply factors falls within the permissible band. However, suppose the demand curve shifts upward t the right due to a change in preferences of Indians in favor of American goods. This is shown by the curve $D_2D_2$. Now the 'market determined' exchange rate would fall outside the band. The Indian authorities are obliged t prevent this by supplying dollars from their reserves and buying

rupees so that the exchange rate does not rise above the upper support point of INR 12.12 per dollar. The authorities are *supporting* the value of the rupee by *intervening* in the market for foreign exchange.

In the reverse case, if the supply curve of dollars shifts downward to the right so that the exchange rate tends to cross the lower support point of INR 11.88, the Indian authorities must stand ready to buy dollars and supply rupees to prevent the fall. At this point, two questions arise. First, in supporting the value of the rupee, how can the Indian authorities supply dollars beyond a limit? After exhausting their own reserves, they can borrow dollars from the IMF or perhaps the US government. If the pressure on the rupee is temporary, this would permit them to ride out the period of rupee weakness. What if the rupee comes under pressure repeatedly? Then in this case, the authorities must devalue the rupee as happened for instance, in 1966. Second, what is the impact of these interventions on the domestic money supply, interest rates etc.? this will be clarified below.

The Bretton Woods system lasted from 1944 to 1971. Problems began to emerge during the 1960's as US BOP deficits started mounting. A series of events finally led to the US abdicating its role as the anchor of the world monetary system. The dollar-gold link was abandoned in August, 1971. After an abortive attempt t salvage the system by means of a series of parity realignments, dollar devaluations (in terms of gold) and widening the bands of permissible variation around the central parities, the system was finally laid to rest, unofficially, in 1973 and officially in 1978. The era of floating exchange rates had begun.

### 1.5.3 Floating Exchange Rate System and its Variants

In a **pure float**, the exchange rate is purely determined by forces of demand and supply. Authorities have no exchange rate target and do not intervene to influence the exchange rate in any way. Demand for a

currency arises from traders wishing to import goods and services from the country of that currency, from investors wishing to acquire assets denominated in that currency and from borrowers who have borrowed in that currency and from wish to liquidate the liabilities or pay interest on the borrowings. Supply of the currency arises from similar transactions undertaken by residents of the country – import goods and services from the rest of the world, acquire foreign assets, liquidate their foreign currency liabilities or pay interest on the foreign loans. The spot exchange rate would be determined by the relative strengths of demand and supply forces and change continually in response to changes in them. The essential point is that *no effort is made by the authorities to influence the current value and future evolution of the exchange rate*.

Truly free floating rates have been a theoretical ideal. In practice however, authorities have intervened more or less intensely in the foreign exchange markets. The resulting 'system' in which there are no officially declared parities but there is official intervention has come to be known as *managed or dirty float*. The degree and motives for intervention can range from 'smoothing out short-term fluctuations' to 'forcing the rate towards a particular target value'. In the former case, the system is close to a free float while in the latter case, it is close to an adjustable peg. Between the two extremes of fixed and floating rates, a number of other alternatives have been suggested (and some have been tried) which try to combine the 'good' features of both.

The *crawling peg* system replaces the abrupt parity changes of the adjustable peg system with gradual modifications with permissible variations around the parity which is restricted to a narrow band (usually ± 1%). The change in parity per unit period (say a year) is subject to a ceiling with an additional short-term constraint, e.g. parity change in a month cannot be more than $1/12^{th}$ of the yearly ceiling.

In a system of *Wider Bands*, the idea is to introduce more flexibility by permitting wider bands of variation around the central parity. The parity itself may be gradually shifted as in the crawling peg (*gliding bands*) or there may be discrete jumps like in adjustable peg.

In *multiple exchange rate* systems, different exchange rates apply to different exchange rates apply to different transactions. For instance, in 1992, India had an 'official' exchange rate applicable to certain imports and a market determined' exchange rate for other transactions.

Is there an optimal or ideal exchange rate regime? As of now, there is no consensus either among academic economists or among policy makers or among businessmen and bankers as to whether the regime is there or as to what it is. The debate is extremely complicated and made more so by eth fact that it is very difficult if not impossible to sort out the effects of exchange rate fluctuations on the world economy from those of other shocks, real and monetary, such as oil price gyrations, Mid-East wars, political developments in East Europe, disagreements over trade liberalization, and developments in East Europe, disagreements over present exchange rate system is characterized by many as a 'non system' reflecting the virtual absence of any shared ground rules other than the rather vague injunction against 'manipulating the exchange rate to the detriment of the international trading system'. Each country is free t choose its own method of exchange rate management as long as it keeps the IMF informed about it if it is a member. But even then the disclosure need not be 'full'.

The major OECD currencies are characterized as 'independently floating'. Since March 1993, India also belongs to this group. Some countries have tied their currencies to one of the major currencies (e.g. Argentina to the US dollar, Chad to the French franc), some are tied to known baskets of currencies such as SDR, while some are characterized as 'other managed

float’. The IMF publishes an annual report on exchange arrangements and exchange restrictions in member countries which provides all the details. [See for instance Exchange Arrangements and Exchange Restrictions. Annual Report 1997, IMF]

### Check Your Progress – 3

1. Write a short notes on fixed and quasi fixed exchange rate system?

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2. Write a short notes on floating exchange rate system?

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## 1.6 SUMMARY

Freedom from controls has meant enormous widening of opportunities. For the finance manager, it means a much wider menu of funding options, investment vehicles, cost reduction and return enhancement through innovative structured financing and investment vehicles, and many other exciting prospects to exercise his or her ingenuity. Integration of financial markets and mind-boggling advances in communications and information technology means no economy is an island unto itself.

Thus, increasing opportunities have resulted in a quantum leap in financial risks.

The finance function in a typical non-financial firm consists of two main tasks, viz. treasury on the one hand and accounting and control on the other the treasurer In many firms, both the tasks may in fact be headed by a single person without any formal separation of the two responsibili-ties.

The basic tasks of both the treasurer and the controller remain the same as in the case of a purely domestic firm; the difference is in terms of available choices and the attendant risks.
Managing the finance function in a multinational context involves wider opportunities, more varied risks, multiplicity of regulatory environments and consequently, an increased complexity in decision-making.

Restrictions on cross-border capital flows are being progressively removed in most major financial markets. Similarly, there is a significant increase in the presence of non-resident financial institutions in the markets of the OECD countries and to some extent even in the developing countries.

Informational disadvantages faced by the non-resident investors are easily overcome with the passage of time. However, significant differences still remain across countries in accounting and reporting practices as well as regulatory policies.

Valuation divergences caused by real exchange rate uncertainties will probably continue to segment the world's financial markets for a long time to come.
A 'Eurocurrency Deposit' is a deposit in the relevant currency with a bank outside the home country of that currency. Note that, what matters is the location of the bank—neither the ownership of the bank nor ownership of the deposit.

The reasons behind the emergence and strong growth of the Eurodollar markets can be captured in the single word, 'regulations'.

An exchange rate is just the value of one currency in terms of another. The term *exchange rate regime* refers to the mechanism, procedures and institutional framework for determining the exchange rates at a point in

time and also the changes in them over time, including factors with induce the changes.

The essential point is that *no effort is made by the authorities to influence the current value and future evolution of the exchange rate*.

The *crawling peg* system replaces the abrupt parity changes of the adjustable peg system with gradual modifications with permissible variations around the parity which is restricted to a narrow band (usually ± 1%).

In a system of *Wider Bands*, the idea is to introduce more flexibility by permitting wider bands of variation around the central parity. The parity itself may be gradually shifted as in the crawling peg (*gliding bands*) or there may be discrete jumps like in adjustable peg.

In *multiple exchange rate* systems, different exchange rates apply to different exchange rates apply to different transactions.

## 1.7 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

**CYP – 1**

1. The finance function in a typical non-financial firm consists of two main tasks, viz. treasury on the one hand and accounting and control on the other

   The functions of the treasurer include:

   - Financial planning analysis
   - Cash management
   - Fund acquisition
   - Investment decisions
   - Investment financing
   - Risk management

Whereas the controller will do the following functions.

a. External reporting

b. Financial and management accounting
c. Tax planning and management
d. Budget planning and control
e. Management information system
f. Accounts receivable

3. The basic tasks of both the treasurer and the controller remain the same as in the case of a purely domestic firm; the difference is in terms of available choices and the attendant risks. The following can be enlisted as the key differences:
   - The firm must deal with multiple currencies.
   - A treasurer looking for long or short-term funding has a much richer menu of options to choose from when he or she is operating in a multinational context..
   - Similarly, a treasurer looking for outlets to park surplus funds has a wider menu of options in terms of markets, instruments and currencies.
   - Each cross-border funding and investment decision exposes the firm to two new risks, viz. exchange rate risk and political risk. ;
   - Cross-border financing and investment also obliges a firm to acquire relevant expertise pertaining to accounting practices, standards and tax laws applicable in foreign jurisdictions.

To summarize, managing the finance function in a multinational context involves wider opportunities, more varied risks, multiplicity of regulatory environments and consequently, an increased complexity in decision making.

## CYP - 2

1. The question of whether financial markets across the world are integrated or segmented can be looked at from at least three different perspectives:

(d) The presence of legal barriers which prevent the borrowers in one country from accessing markets in another and investors in one country from acquiring foreign assets.

(e) Differences that prevail in generally accepted accounting principles, disclosure norms, etc. which create informational assume tries between resident and non-resident investors. Thus, non-resident investors may find it difficult to acquire and interpret information about potential issuers in a country even though the local government places no restrictions on foreign investors.

(f) There is ample empirical evidence to assert that except over very long horizons, exchange rate movements do not reflect changes in purchasing powers of various currencies. Hence, different investors would value a given asset differently depending upon their currency habitat. This makes for the third factor which prevents complete integration of national financial markets.

2. Eurocurrencies market was the only truly international financial market of any significance. It is mainly an interbank market trading in time deposits and various debt instruments. A 'Eurocurrency Deposit' is a deposit in the relevant currency with a bank outside the home country of that currency. Similarly a Eurodollar Loan is a dollar loan made by a bank outside the US to a customer or another bank. The prefix 'Euro' is now outdated since such deposits and loans are regularly traded outside Europe, e.g. in Singapore and Hong Kong. These are sometimes called Asian dollar markets.

**CYP - 3**

1. Refer to subsection 1.5.2
2. Refer to subsection 1.5.3

## 1.8 MODEL EXAMINATION QUESTIONS

1. What is the linkage between national financial markets and the Euromarkets? How do they influence one another?
2. Explain clearly the concept of Eurocurrencies. A dollar deposit, belonging to a French firm, held with the New York branch of a Banque Nationale de Paris (A French Bank) is not a Eurodollar deposit. True or False?
3. In 1984 the US current account deficit was estimated at greater than $100 billion. Simultaneously, there was estimated to be no growth in the Eurodollar market. Are these facts mutually contradictory?
4. Other things being equal, what effect do you expect each of the following will have on the size of the Eurodollar market:
   (a) The US Federal Reserve reduces the US monetary base by an open market operation.
   (b) The public's demand for currency decreases.
   (c) Central banks decide to impose ceilings on interest paid on Euro deposits
   (d) The Federal increases the reserve requirements on demand liabilities of US banks.
5. What are the factors obstructing the complete integration of global financial markets? In recent rimes many economists have advocated taxes on short-term capital flows. What effect would such taxes have on the interest rate linkages between domestic and offshore markets?
6. A US bank faces the following market conditions: three-month CD rate is 9.0%, three-month Eurodollar bid rate is 11.0%, the FDIC insurance premium is 0.037%, CD reserve requirements are 6%.
   (a) Determine whether an outward or inward arbitrage incentive exists.
   (b) How much profit can the bank make from arbitrage? Outward arbitrage is borrowing funds in the domestic

market and invests in the offshore market; inward arbitrage is the reverse of this.

## 1.9 REFERENCES


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2. Giddy, lan (1994): Global Financial Markets, D.C. Heath & Co.
3. Stigum, M. (1990): The Money Market, Irwin Professional Publishing, New York.


## 1.10 GLOSSARY

### *1.1 The Balance of Payments*

A precise definition of the Balance of Payments (BOP) of a country can be stated as follows:

> ***The balance of payments is an accounting record of all economic transactions between the residents of a country and residents of foreign countries.***

The phrase 'residents of foreign countries' may often be replaced by 'nonresidents', 'foreigners' or 'Rest of the World (ROW)'. There are two simple rules of BOP accounting:

(a) A transaction that leads to an actual or potential payment from residents of a country to ROW is to be recorded as debit in that country's BOP; a transaction that leads to a payment from ROW to residents is a credit entry.

(b) A transaction that increases the availability or reduces demand for foreign exchange is a credit entry; a transaction that uses up foreign exchange is a debit entry.

### *1.2 Components of the Balance of Payments*

The BOP is a collection of accounts conventionally grouped into three main categories with sub-divisions in each. The three main categories are:

(a) The Current Account: Under this are included imports and exports of goods and services, and unilateral transfers of cash, goods and services.

(b) The Capital Account: Under this are grouped transactions leading to changes in foreign financial assets and liabilities of the country.

(c) The Reserve Account: In principle this is nothing different from the capital account in as much as it also relates to financial assets and liabilities. However, in this category only 'reserve assets' are included. These are the assets which the monetary authority of the country uses to settle the deficits and surpluses that arise on the other two categories taken together.

### *1.3 Currency Convertibility*

Currencies like the US dollar, Japanese yen and deutschemark are said to be fully convertible while those like the Burmese kyat and Cuban peso are said to be non-convertible. In India, debate is on about the advisability of making the rupee convertible on capital account.

Convertibility of a currency is a matter of degree. IMF defines a currency to be 'convertible' if it is freely convertible into a foreign currency and vice versa for all transactions included in the current account of the balance of payments. Note that this does not mean that there are no restrictions on foreign trade—import and export duties, quotas, prohibitions etc. These are matters of trade restriction and not currency convertibility. What current account convertibility means is that provided a current account transaction does not violate any provisions of trade control (or any other relevant legislation), the home currency can be

freely converted into any foreign currency and vice versa in settlement of such a transaction.

# UNIT 2: FUNCTION AND STRUCTURE OF THE FOREX MARKET

**Contents**


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2.3 Forex Market Participants
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## 2.0 AIMS AND OBJECTIVES

At the end of the unit the student will have learned:

- who are the forex market participants?
- about the spot market and spot rate quotations
- about the forward market and forward rate quotations
- about the swap transactions.

## 2.1 INTRODUCTION

**Money Represents Purchasing Power**. Possessing money from your country gives you the power to purchase goods and services produced (or assets held) by other residents of your country. But to purchase goods and services produced by the residents of another country generally first requires purchasing the other country's currency. This is done by selling one's own currency for the currency of the country with whose residents you desire to transact. More formally, one's own currency has been used to buy *foreign exchange,* and in so doing the buyer has converted his purchasing power into the purchasing power of the seller's country.

The market for foreign exchange is the largest financial market in the world by virtually any standard. It is open somewhere in the world 365 days a year, 24 hours a day. Broadly defined, the **foreign exchange (FX** or **FOREX) market** encompasses 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, trading in foreign currency options and futures contracts, and currency swaps. Obviously, one chapter cannot adequately cover all these topics. Consequently, we confine the discussion in this chapter to the spot and forward market for foreign exchange.

This unit begins with an overview of the function and structure of the foreign exchange market and the major market participants that trade currencies in this market.

Following is a discussion of the spot market for foreign exchange. This section covers how to read spot market quotations, derives cross-rate quotations, and develops the concept of triangular arbitrage as a means of ensuring market efficiency. The chapter concludes with a discussion of the forward market for foreign exchange. Forward market quotations are presented, the purpose of the market is discussed, and the purpose of swap rate quotations is explained.

This unit lays the foundation for much of the discussion throughout the remainder of the text. Without a solid understanding of how the foreign exchange market works, international finance cannot be studied in an intelligent manner.

## 2.2 FUNCTION AND STRUCTURE OF THE FOREX MARKET

The structure of the foreign exchange market is an outgrowth of one of the primary functions of a commercial banker: to assist clients in the conduct of international commerce.

For example, a corporate client desiring to import merchandise from abroad would need a source for foreign exchange if the import was invoiced in the exporter’s home currency.

Alternatively, the exporter mig ht need a way to dispose of foreign exchange if payment for the export was invoiced and received in the importer’s home currency. Assisting in foreign exchange transactions of this type is one of the services that commercial banks provide for their clients, and one of the services that bank customers expect from their bank.

The spot and forward foreign exchange market is an **over-the-counter (OTC) market**; that is, trading does not take place in a central marketplace where buyers and sellers congregate. Rather, the foreign exchange market is a worldwide linkage of bank currency traders, nonbank dealers, and FX brokers who assist in trades connected to one another via a network of telephones, telex machines, computer terminals, and automated dealing systems. Reuters, and EBS are the largest vendors of quote screen monitors used in trading currencies. The communications system of the foreign exchange market is second to none, including industry, governments, the military, and national security and intelligence operations. Twenty-four-hour-a-day currency trading follows the sun around the globe. Three major market segments can be identified: Australasia, Europe, and North America. Australasia includes the trading centers of Sydney, Tokyo, Hong Kong, Singapore, and Bahrain; Europe includes Zurich, Frankfurt, Paris, Brussels, Amsterdam, and London; and North America includes New York, Montreal, Toronto, Chicago, San Francisco, and Los Angeles. Most trading rooms operate over a 9- to 12-hour working day, although some banks have experimented with operating three eight-hour shifts in order to trade around the clock. Especially active trading takes place when the trading hours of the Australasia centers and the European centers overlap and when the European and North American centers overlap. More than half of the trading in the United

States occurs between 8:00 A.M. and noon eastern standard time (1:00 P.M. and 5:00 P.M. Greenwich Mean Time [London]), when the European markets were still open.

Certain trading centers have a more dominant effect on the market than others. For example, trading diminishes dramatically in the Australasian market segment when the Tokyo traders are taking their lunch break!

## 2.3 FX MARKET PARTICIPANTS

The market for foreign exchange can be viewed as a two-tier market. One tier is the **Wholesale** or **interbank market** and the other tier is the **retail** or **client market**. FX market participants can be categorized into five groups: international banks, bank customers, non bank dealers, FX brokers, and central banks.

*International banks* provide the core of the FX market. Approximately 100 to 200 banks worldwide actively "make a market" in foreign exchange, that is, they stand willing to buy or sell foreign currency for their own account. These international banks serve their retail clients, the *bank customers,* in conducting foreign commerce or making international investment in financial assets that require foreign exchange. Bank customers broadly include MNCs, money managers, and private speculators. According to 2001 BIS statistics, retail or bank client transactions account for approximately 13 percent of FX trading volume. The other 87 percent of trading volume is from interbank trades between international banks or nonbank dealers. *Nonbank dealers* are large nonbank financial institutions such as investment banks, whose size and frequency of trades make it cost-effective to establish their own dealing rooms to trade directly in the interbank market for their foreign exchange needs. In 2001, nonblank dealers accounted for 28 percent of interbank trading volume.

Part of the interbank trading among international banks involves adjusting the inventory positions they hold in various foreign currencies. However, most interbank trades are *speculative* or *arbitrage* transactions, where market participants attempt to correctly judge the future direction of price movements in one currency versus another or attempt to profit from temporary price discrepancies in currencies between competing dealers. Market psychology is a key ingredient in currency trading, and a dealer

can often infer another's trading intention from the currency position being accumulated.

*FX brokers* match dealer orders to buy and sell currencies for a fee, but do not take a position themselves. Brokers have knowledge of the quotes offered by many dealers in the market. Consequently, interbank traders will use a broker primarily to disseminate as quickly as possible a currency quote to many other dealers. In recent years, since the introduction and increased usage of electronic dealing systems, the use of brokers has declined because the computerized systems duplicate many of the same services at much lower fees. The BIS reports that among major currency pairs about 50–70 percent turnover is conducted through electronic banking systems. One frequently sees or hears news media reports that the *central bank* (national monetary authority) of a particular country has intervened in the foreign exchange market in an attempt to influence the price of its currency against that of a major trading partner, or a country that it "fixes" or "pegs" its currency against. *Intervention* is the process of using foreign currency reserves to buy one's own currency in order to decrease its supply and thus increase its value in the foreign exchange market, or alternatively, selling one's own currency for foreign currency in order to increase its supply and lower its price. Recall from Chapter 2 that systematic intervention by member states of the European Union through the Exchange Rate Mechanism was a key ingredient in the operation of the European Monetary System, whose purpose was to maintain stability in the exchange rates between member states.

Central banks of major industrialized countries also frequently intervene in the foreign exchange market to influence the value of their currency relative to a trading partner.

For example, intervention that successfully increases the value of one's currency against a trading partner may reduce exports and increase imports, thus alleviating persistent trade deficits of the trading partner.

Central bank traders intervening in the currency market often lose bank reserves in attempting to accomplish their goal. However, there is little evidence that even massive intervention can materially affect exchange rates.

## 2.4 CORRESPONDENT BANKING RELATIONSHIPS

The interbank market is a network of **correspondent banking relationships**, with large commercial banks maintaining demand deposit accounts with one another, called correspondent banking accounts. The correspondent bank account network allows for the efficient functioning of the foreign exchange market.

This rather contrived example assumes that U.S. Bank and Dutch Exporter both have bank accounts at EZ Bank. A more realistic interpretation is to assume that EZ Bank represents the entire euro-zone banking system. Additionally, the example implies some type of communication system between U.S. Bank and EZ Bank. The *Society for Worldwide Interbank Financial Telecommunications* (*SWIFT*) allows international commercial banks to communicate instructions of the type in this example to one another. SWIFT is a private nonprofit message transfer system with headquarters in Brussels, with intercontinental switching centers in the Netherlands and Virginia. The *Clearing House Interbank Payments System* (*CHIPS*) in cooperation with the U.S. Federal Reserve Bank System, called Fedwire, provides a clearinghouse for the interbank settlement of U.S. dollar payments between international banks. Returning to our example, suppose U.S. Bank first needed to purchase euros in order to have them for transfer to Dutch Exporter. U.S. Bank can use CHIPS for settling the purchase of euros for dollars from, say, Swiss Bank, with instructions via SWIFT to Swiss Bank to deposit the euros in its account with EZ Bank and to EZ Bank to transfer ownership to Dutch Exporter. The transfer between

Swiss Bank and EZ Bank would in turn be accomplished through correspondent bank accounts or through a European clearinghouse.

In August 1995, *Exchange Clearing House Limited* (*ECHO*), the first global clearinghouse for settling interbank FOREX transactions, began operation. ECHO was a multilateral netting system that on each settlement date netted a client's payments and receipts in each currency, regardless of whether they are due to or from multiple counter parties. Multilateral netting eliminates the risk and inefficiency of individual settlement. In 1997, CLS Services Limited merged with ECHO. Currently, operation of the system has been suspended.

## *Check Your Progress – 1*

1. Who are the participants in the forex market?

   _____

   _____

2. What are the functions of forex market?

   _____

   _____

3. Explain briefly about the correspondent banking relationships?

   _____

   _____

## 2.5 THE SPOT MARKET

The **spot market** involves almost the immediate purchase or sale of foreign exchange.

Typically, cash settlement is made two business days (excluding holidays of either the buyer or the seller) after the transaction for trades between the U.S. dollar and a non–North American currency. For regular spot trades between the U.S. dollar and the Mexican peso or the Canadian dollar,

settlement takes only one business day.1 According to BIS statistics, spot foreign exchange trading accounted for 33 percent of FX trades in 2001. Exhibit 4.3 provides a detailed analysis of foreign exchange turnover by instrument and counterparty.

## 2.6 SPOT RATE QUOTATIONS

**Spot rate** currency quotations can be stated in direct or indirect terms. **direct quotations** from the U.S. perspective, that is, the price of one unit of the foreign currency priced in U.S. dollars. For example, the Monday spot quote for one British pound was $1.5272. (Forward quotations for one-, three-, and six-month contracts, which will be discussed in a following section, appear directly under the spot quotations for six currencies.)

**Indirect quotations** from the U.S. perspective, that is, the price of one U.S. dollar in the foreign currency. For example, in the third column, we see that the Monday spot quote for one dollar in British pound sterling was £0.6548. Obviously, the direct quotation from the U.S. perspective is an indirect quote from the British viewpoint, and the indirect quote from the U.S. perspective is a direct quote from the British viewpoint.

It is common practice among currency traders worldwide to both price and trade currencies against the U.S. dollar. For example, BIS statistics indicate that in 2001, 90 percent of currency trading in the world involved the dollar on one side of the transaction.In recent years, however, the use of other currencies has been increasing, especially in dealing done by smaller regional banks. For example, in Europe many European currencies were traded against the deutsche mark. Overall, in 2001, 38 percent of all currency trading worldwide involved the euro on one side of the transaction.With respect to other major currencies, 23 percent involved the Japanese yen, 13 percent the British pound, 6 percent the Swiss franc, and 5 percent the Canadian dollar.

Most currencies in the interbank market are quoted in **European terms**, that is, the U.S. dollar is priced in terms of the foreign currency (an indirect quote from the U.S. perspective). By convention, however, it is standard practice to price certain currencies in terms of the U.S. dollar, or in what is referred to as **American terms** (a direct quote from the U.S. perspective). Prior to 1971, the British pound was a nondecimal currency; that is, a pound was not naturally divisible into 10 subcurrency units. Thus, it was cumbersome to price decimal currencies in terms of the pound. By necessity, the practice developed of pricing the British pound, as well as the Australian dollar, New Zealand dollar, and Irish punt, in terms of decimal currencies, and this convention continues today. When the common euro currency was introduced, it was decided that it also would be quoted in American terms. To the uninitiated, this can be confusing, and it is something to bear in mind when examining currency quotations.

In this textbook, we will use the following notation for spot rate quotations. In general, $S(j/k)$ will refer to the price of one unit of currency $k$ in terms of currency $j$. Thus, the American term quote from Exhibit 4.4 for British pounds on Monday, August 19, is $S(\$/£ _ 1.5272$. The corresponding European quote is $S(£/\$) _ .6548$. When the context is clear as to what terms the quotation is in, the less cumbersome $S$ will be used to denote the spot rate.

It should be intuitive that the American and European term quotes are reciprocals of one another. That is,

$$S(\$/£) = \frac{1}{S(£/\$)}$$

$$1.5272 = \frac{1}{.6548} \qquad (4.1)$$

and

$$S(£/\$) = \frac{1}{S(\$/£)}$$

$$.6548 = \frac{1}{1.5272} \qquad (4.2)$$

## 2.7 THE BID-ASK SPREAD

Up to this point in our discussion, we have ignored the bid-ask spread in FX transactions.

Interbank FX traders buy currency for inventory at the **bid price** and sell from inventory at the higher **offer** or **ask price**. What are they, bid or ask? In a manner of speaking, the answer is both, depending on whether one is referring to the American or European term quotes. Note the wording directly under the *Exchange Rates* title. The key to our inquiry is the sentence that reads: “Retail transactions provide fewer units of foreign currency per dollar.” The word “provide” implies that the quotes in the third and fourth columns under the “Currency per U.S. $” heading are buying, or bid quotes. Thus the European term quotations are interbank bid prices.

To be more specific about the £/$ quote we have been using as an example, we can specify that it is a bid quote by writing *S*(*£/$b*) _ .6548, meaning the bank dealer will bid, or pay, £0.6548 for one U.S. dollar. However, if the bank dealer is buying dollars for British pound sterling, it must be selling British pounds for U.S. dollars. This implies that the $/£ quote we have been using as an example is an ask quote, which we can designate as *S*(*$/£a*) _ 1.5272. That is, the bank dealer will sell one British pound for $1.5272.

Returning to the reciprocal relationship between European and American term quotations, the recognition of the bid-ask spread implies:

$$S(\$/£_a) = \frac{1}{S(£/\$_b)}$$

In American terms, the bank dealer is asking $1.5272 for one British pound; that means the bank dealer is willing to pay, or bid, less. Interbank bid-ask spreads are quite small.

Let's assume the bid price is $0.0005 less than the ask; thus *S*($/£*b*) _ 1.5267. Similarly, the bank dealer will want an ask price in European terms greater than its bid price. The reciprocal relationship between European and American term quotes implies:

$$\begin{aligned} S(£/\$_a) &= \frac{1}{S(\$/£_b)} \\ &= \frac{1}{1.5267} \\ &= .6550 \end{aligned}$$

Thus, the bank dealer's ask price of £0.6550 per U.S. dollar is indeed greater than its bid price of £0.6548.

## 2.8 SPOT FX TRADING

For most currencies, quotations are carried out to four decimal places in both American and European terms. However, for some currencies (e.g., the Japanese yen, Slovakian koruna, South Korean won) quotations in European terms are carried out only to two or three decimal places, but in American terms the quotations may be carried out to as many as eight decimal places (see, for example, the Turkish lira). In the interbank market, the standard-size trade among large banks in the major currencies is for the U.S.-dollar equivalent of $10,000,000, or "ten dollars" in trader jargon.

Dealers quote both the bid and the ask, willing to either buy or sell up to $10,000,000 at the quoted prices. Spot quotations are good for only a few seconds. If a trader cannot immediately make up his mind whether to buy or sell at the proffered prices, the quotes are likely to be withdrawn. In conversation, interbank FX traders use a shorthand abbreviation in expressing spot currency quotations. Consider the $/£ bid-ask quotes from above, $1.5267– $1.5272.

The “1.52” is known as the *big figure,* and it is assumed to be known by all traders. The second two digits to the right of the decimal place are referred to as the *small figure.*Since spot bid-ask spreads are typically around 5 “points,” it is unambiguous for a trader to respond with “67–72” when asked what is his quote for British pound sterling. Similarly, “97 to 02” is a sufficient response for a quote of $1.5297–$1.5302, where the big figures are 1.52 and 1.53, respectively, for the bid and ask quotes.

The establishment of the bid-ask spread will facilitate acquiring or disposing of inventory.

Suppose most $/£ dealers are trading at $1.5267–$1.5272. A trader believing the pound will soon appreciate substantially against the dollar will desire to acquire a larger inventory of British pounds. A quote of “68–73” will encourage some traders to sell at the higher than market bid price, but also dissuade other traders from purchas-ing at the higher offer price. Analogously, a quote of “66–71” will allow a dealer to lower his pound inventory if he thinks the pound is ready to depreciate.

The retail bid-ask spread is wider than the interbank spread; that is, lower bid and higher ask prices apply to the smaller sums traded at the retail level. This is necessary to cover the fixed costs of a transaction that exist regardless of which tier the trade is made in. Interbank trading rooms are typically organized with individual traders dealing in a particular currency. The dealing rooms of large banks are set up with traders dealing against the U.S. dollar in all the major currencies: the Japanese yen, euro,

Canadian dollar, Swiss franc, and British pound, plus the local currency if it is not one of the majors.

Individual banks may also specialize by making a market in regional currencies or in the currencies of less-developed countries, again all versus the U.S. dollar. Additionally, banks will usually have a cross-rate desk where trades between two currencies not involving the U.S. dollar are handled. It is not uncommon for a trader of an active currency pair, to make as many as 1,500 quotes and 400 trades in a day.2 In smaller European banks accustomed to more regional trading, dealers will frequently quote and trade versus the euro.

A bank trading room is a noisy, active place. Currency traders are typically young, high-energy people, who are capable of interpreting new information quickly and making high-stakes decisions.

## 2.9 CROSS-EXCHANGE RATE QUOTATIONS

Let’s ignore the transaction costs of trading temporarily while we develop the concept of a cross-rate. A **cross-exchange rate** is an exchange rate between a currency pair where neither currency is the U.S. dollar. The cross exchange rate can be calculated from the U.S. dollar exchange rates for the two currencies, using either European or American term quotations. For example, the €/£ cross-rate can be calculated from American term quotations as follows:

$$S(€/£) = \frac{S(\$/£)}{S(\$/€)} \tag{4.5}$$

where from Exhibit 4.4,

$$S(€/£) = \frac{1.5272}{.9764} = 1.5641$$

That is, if £1.00 cost $1.5272 and €1.00 cost $0.9764, the cost of 1.00 in euros is €1.5641. In European terms, the calculation is

$$S(€/£) = \frac{S(€/\$)}{S(£/\$)} \tag{4.6}$$

$$= \frac{1.0242}{.6548}$$

$$= 1.5641.$$

Analogously,

$$S(£/€) = \frac{S(\$/€)}{S(\$/£)} \tag{4.7}$$

$$= \frac{.9764}{1.5272}$$

$$= .6393$$

and

$$S(£/€) = S(£/\$)/S(€/\$) \tag{4.8}$$
$$= .6548/1.0242$$
$$= .6393$$

Equations 4.5 to 4.8 imply that given $N$ currencies, one can calculate a triangular matrix of the $N \times (N-1)/2$ cross exchange rates. Daily in the *Financial Times* appear the 36 cross exchange rates for all pair combinations of nine currencies and stated as $S(j/k)$ and $S(k/j)$. Exhibit 4.6 presents an example of the table for Monday, August 19, 2002.

## 2.10 ALTERNATIVE EXPRESSIONS FOR THE CROSS-EXCHANGE RATE

For some purposes, it is easier to think of cross exchange rates calculated as the product of an American term and a European exchange rate rather than as the quotient of two American term or two European term exchange rates. For example, substituting $S(€/\$)$ for $1/S(\$/€)$ allows Equation 4.5 to be rewritten as:

$$\begin{aligned} S(€/£) &= S(\$/£) \times S(€/\$) \\ &= 1.5272 \times 1.0242 \\ &= 1.5642 \end{aligned} \tag{4.9}$$

where the difference from 1.5641 is due to rounding.

In general terms,

$$S(j/k) = S(\$/k) \times S(j/\$) \tag{4.10}$$

and, taking reciprocals of both sides of Equation 4.10 yields

$$S(k/j) = S(k/\$) \times S(\$/j) \tag{4.11}$$

## 2.11 THE CROSS-RATE TRADING DESK

Earlier in the chapter, it was mentioned that most interbank trading goes through the dollar. Suppose a bank customer wants to trade out of British pound sterling into Swiss francs. In dealer jargon, a nondollar trade such as this is referred to as a **currency against currency** trade. The bank will frequently (or effectively) handle this trade for its customer by selling British pounds for U.S. dollars and then selling U.S. dollars for Swiss francs. At first blush, this might seem ridiculous. Why not just sell the British pounds directly for Swiss francs? To answer this question, let's return to Exhibit 4.6 of the cross exchange rates. Suppose a bank's home currency was one of the nine currencies in the exhibit and that it made markets in the other eight currencies. The bank's trading room would typically be organized with eight trading desks, each for trading one of the nondollar currencies against the U.S. dollar. A dealer needs only to be concerned with making a market in his nondollar currency against the dollar. However, if each of the nine currencies was traded directly with the

others, the dealing room would need to accommodate 36 trading desks. Or worse, individual traders would be responsible for making a market in several currency pairs, say, the €/$, €/£, and €/SF, instead of just the €/$. As Grabbe (1996) notes, this would entail an informational complexity that would be virtually impossible to handle.

Banks handle currency against currency trades, such as for the bank customer who wants to trade out of British pounds into Swiss francs, at the cross-rate desk. Recall from

Equation 4.10 that a $S(SF/£)$ quote can be obtained from the product of $S(\$/£)$ and $S(SF/\$)$.

Recognizing transaction costs implies the following restatement of

Equation 4.10:

$$S(SF/£_b) = S(\$/£_b) \times S(SF/\$_b) \qquad (4.12)$$

The bank will quote its customer a selling (bid) price for the British pounds in terms

Swiss francs determined by multiplying its American term bid price for British pounds and its European term bid price (for U.S. dollars) stated in Swiss francs.

Taking reciprocals of Equation 4.12 yields

$$S(£/SF_a) = S(£/\$_a) \times S(\$/SF_a) \qquad (4.13)$$

which is analogous to Equation 4.11. In terms of our example, Equation 4.13 says the bank could alternatively quote its customer an offer (ask) price for Swiss francs in terms of British pounds determined by multiplying its European term ask price (for

U.S. dollars) stated in British pounds by its American term ask price for Swiss francs.

## 2.12 TRIANGULAR ARBITRAGE

Certain banks specialize in making a direct market between nondollar currencies, pricing at a narrower bid-ask spread than the cross-rate spread. Nevertheless, the implied cross-rate bid-ask quotations imposes a discipline on the nondollar market makers. If their direct quotes are not consistent with cross exchange rates, a triangular arbitrage profit is possible. **Triangular arbitrage** is the process of trading out of the U.S. dollar into a second currency, then trading it for a third currency, which is in turn traded for U.S. dollars. The purpose is to earn an arbitrage profit via trading from the second to the third currency when the direct exchange rate between the two is not in alignment with the cross exchange rate.

## 2.13 SPOT FOREIGN EXCHANGE MARKET -MICROSTRUCTURE

Market microstructure refers to the basic mechanics of how a marketplace operates.

Five recent empirical studies on FX market microstructure shed light on the operation of the spot FX marketplace. Huang and Masulis (1999) study spot FX rates on DM/$ trades over the October 1, 1992 to September 29, 1993, period. They find that bid-ask spreads in the spot FX market increase with FX exchange rate volatility and decrease with dealer competition. These results are consistent with models of market microstructure.

They also find that the bid-ask spread decreases when the percentage of large dealers in the marketplace increases. They conclude that dealer competition is a fundamental determinant of the spot FX bid-ask spread.

Lyons (1998) tracks the trading activity of a DM/$ trader at a large New York bank over a period of five trading days. The dealer he tracks was extremely profitable over the study period, averaging profits of $100,000 per day in volume of $1 billion. Lyons is able to disentangle total trades into those that are speculative and those that are nonspeculative, or where the dealer acts as a financial intermediary for a retail client. He

determines that the dealer's profits come primarily from the dealer's role as an intermediary.

This makes sense, since speculative trading is a zero-sum game among all speculators, and in the long-run it is unlikely that any one trader has a unique advantage.

Interestingly, Lyons finds that the half-life of the dealer's position in nonspeculative trades is only 10 minutes! That is, the dealer typically trades or swaps out of a nonspeculative position within 20 minutes.

Private information is, indeed, an important determinant of spot exchange rates.
Cheung and Chinn (2001) conducted a survey of U.S. foreign exchange traders and received 142 usable questionnaires. The purpose of their survey was to elicit information about several aspects of exchange rate dynamics not typically observable in trading data. In particular they are interested in traders' perceptions about news events—innovations in macroeconomic variables—that cause movements in exchange rates. The traders they survey respond that the bulk of the adjustment to economic announcements regarding unemployment, trade deficits, inflation, GDP, and the Federal funds rate takes place within one minute. In fact, "about one-third of the respondents claim that full price adjustment takes place in less than 10 seconds"! They also find that central bank intervention does not appear to have a substantial impact on exchange rates, but intervention does increase market volatility. Dominguez (1998) confirms this latter finding.

## *Check Your Progress – 2*

1. What is spot market?

_____

_____

2. What are the types of spot rate quotations?

_____

_____

3. Explain briefly about the cross exchange rates?

_____

_____

4. Write a short notes on triangular arbitrage?

_____

_____

## 2.14 THE FORWARD MARKET

In conjunction with spot trading, there is also a forward foreign exchange market. The **forward market** involves contracting today for the future purchase or sale of foreign exchange. The forward price may be the same as the spot price, but usually it is higher (at a premium) or lower (at a discount) than the spot price. Forward exchange rates are quoted on most major currencies for a variety of maturities. Bank quotes for maturities of 1, 3, 6, 9, and 12 months are readily available. Quotations on nonstandard, or brokenterm, maturities are also available. Maturities extending beyond one year are becoming more frequent, and for good bank customers, a maturity extending out to 5, and even as long as 10 years, is possible.

## 2.15 FORWARD RATE QUOTATIONS

To learn how to read forward exchange rate quotations, let’s examine Exhibit 4.4. Notice that **forward rate** quotations appear directly under the spot rate quotations for four major currencies (the British pound, Canadian dollar, Japanese yen, and Swiss franc) for one-, three, and six-month

maturities. As an example, the settlement date of a three-month forward transaction is three calendar months from the spot settlement date for the currency. That is, if today is September 3, 2003, and spot settlement is September
5, then the forward settlement date would be December 5, 2003, a period of 93 days from September 3.

In this textbook, we will use the following notation for forward rate quotations. In general, *FN*(*j*/*k*) will refer to the price of one unit of currency *k* in terms of currency *j* for delivery in months. *N* equaling 1 denotes a one-month maturity based on a 360-day banker's year. Thus, *N* equaling 3 denotes a three-month maturity. When the context is clear, the simpler notation *F* will be used to denote a forward exchange rate.

Forward quotes are either direct or indirect, one being the reciprocal of the other.

From the U.S. perspective, a direct forward quote is in American terms. As examples, let's consider the American term Swiss franc forward quotations in relationship to the spot rate quotation for Monday, August 19, 2002. We see that:

$$S(\$/SF) = .6653$$
$$F_1(\$/SF) = .6660$$
$$F_3(\$/SF) = .6670$$
$$F_6(\$/SF) = .6684$$

From these quotations, we can see that in American terms the Swiss franc is trading at a *premium* to the dollar, and that the premium increases out to six months, the further the forward maturity date is from August 19.

European term forward quotations are the reciprocal of the American term quotes. In
European terms, the corresponding Swiss franc forward quotes to those stated above are:

$$S(SF/\$) = 1.5030$$
$$F_1(SF/\$) = 1.5016$$
$$F_3(SF/\$) = 1.4993$$
$$F_6(SF/\$) = 1.4961$$

From these quotations, we can see that in European terms the dollar is trading at a *discount* to the Swiss franc and that the discount increases out to six months, the further the forward maturity date is from August 19. This is exactly what we should expect, since the

European term quotes are the reciprocals of the corresponding American term quotations.

## 2.16 LONG AND SHORT FORWARD POSITIONS

One can buy (take a long position) or sell (take a short position) foreign exchange forward.

Bank customers can contract with their international bank to buy or sell a specific sum of FX for delivery on a certain date. Likewise, interbank traders can establish a long or short position by dealing with a trader from a competing bank. Exhibit 2.9 graphs both the long and short positions for the three-month Swiss franc contract, using the American quote for August 19, 2002, from Exhibit 2.4. The graph measures profits or losses on the vertical axis. The horizontal axis shows the spot price of foreign exchange on the maturity date of the forward contract, *S*3(*$/SF*). If one uses the forward contract, he has “locked in” the forward price for forward purchase or sale of foreign exchange. Regardless of what the spot price is on the maturity date of the forward contract, the trader buys (if he is long) or sells (if he is short) at *F*3(*$/SF*) _ .6670 per unit of FX. Forward contracts can also be used for speculative purposes, as the following example demonstrates.

## 2.17 FORWARD CROSS-EXCHANGE RATES

Forward cross exchange rate quotations are calculated in an analogous manner to spot cross-rates, so it is not necessary to provide detailed examples. In generic terms,

$$F_N(j/k) = \frac{F_N(\$/k)}{F_N(\$/j)} \tag{4.14}$$

or

$$F_N(j/k) = \frac{F_N(j/\$)}{F_N(k/\$)} \tag{4.15}$$

and

$$F_N(k/j) = \frac{F_N(\$/j)}{F_N(\$/k)} \tag{4.16}$$

or

$$F_N(k/j) = \frac{F_N(k/\$)}{F_N(j/\$)} \tag{4.17}$$

## 2.18 SWAP TRANSACTIONS

Forward trades can be classified as outright or swap transactions. In conducting their trading, bank dealers do take speculative positions in the currencies they trade, but more often traders offset the currency exposure inherent in a trade. From the bank's standpoint, an **outright forward transaction** is an uncovered speculative position in a currency, even though it might be part of a currency hedge to the bank customer on the other side of the transaction. Swap transactions provide a means for the bank to mitigate the currency exposure in a forward trade. A **swap transaction** is the simultaneous sale (or purchase) of spot foreign exchange against a forward purchase (or sale) of approximately an equal amount of the foreign currency.

Because interbank forward transactions are most frequently made as part of a swap transaction, bank dealers in conversation among themselves

use a shorthand notation to quote bid and ask forward prices in terms of *forward points* that are either added to or subtracted from the spot bid and ask quotations.

Quoting forward rates in terms of forward points is convenient for two reasons.

First, forward points may remain constant for long periods of time, even if the spot rates fluctuate frequently. Second, in swap transactions where the trader is attempting to minimize currency exposure, the actual spot and outright forward rates are often of no consequence. What is important is the premium or discount differential, measured in forward points. To illustrate, suppose a bank customer wants to sell dollars three months forward against British pound sterling. The bank can handle this trade for its customer and simultaneously neutralize the exchange rate risk in the trade by selling (borrowed) dollars spot against British pounds. The bank will lend the pound sterling for three months until they are needed to deliver against the dollars it has purchased forward. The dollars received will be used to liquidate the dollar loan. Implicit in this transaction is the interest rate differential between the dollar borrowing rate and the pound sterling lending rate. The interest rate differential is captured by the forward premium or discount measured in forward points. As a rule, when the interest rate of the foreign currency is greater than the interest rate of the quoting currency, the outright forward rate is less than the spot exchange rate, and vice versa. This will become clear in the following chapter on international parity relationships.

## 2.19 FORWARD PREMIUM

It is common to express the premium or discount of a forward rate as an annualized percentage deviation from the spot rate. The forward premium (or discount) is useful

for comparing against the interest rate differential between two countries, as we will see more clearly in Chapter 5 on international parity relationships. The **forward premium** or **discount** can be expressed in American or European terms. Obviously, if a currency is trading at a premium (discount) in American terms, it will be at a discount (premium) in European terms.

## *Check Your Progress – 3*

1. What is forward market?

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2. What are the types of forward rate quotations?

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3. Explain briefly about the swap transactions?

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4. Write a short notes on forward premium?

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## 2.20 SUMMARY

This chapter presents an introduction to the market for foreign exchange. Broadly defined, the foreign exchange market encompasses 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 and futures contracts. This chapter limits the discussion to the spot and forward market for foreign exchange. The other topics are covered in later chapters.

1. The FX market is the largest and most active financial market in the world. It is open somewhere in the world 24 hours a day, 365 days a year.
2. The FX market is divided into two tiers: the retail or client market and the wholesale or interbank market. The retail market is where international banks service their customers who need foreign exchange to conduct international commerce or trade in international financial assets. The great majority of FX trading takes place in the interbank market among international banks that are adjusting inventory positions or conducting speculative and arbitrage trades.
3. The FX market participants include international banks, bank customers, nonblank FX dealers, FX brokers, and central banks.
4. In the spot market for FX, nearly immediate purchase and sale of currencies takes place. In the chapter, notation for defining a spot rate quotation was developed.

Additionally, the concept of a cross exchange rate was developed. It was determined that nondollar currency transactions must satisfy the bid-ask spread determined from the cross-rate formula or a triangular arbitrage opportunity exists.

5. In the forward market, buyers and sellers can transact today at the forward price for the future purchase and sale of foreign exchange. Notation for forward exchange rate quotations was developed. The use of forward points as a shorthand method for expressing forward quotes from spot rate quotations was presented.

Additionally, the concept of a forward premium was developed.

## 2.21 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

### CYP – 1

1. FX market participants can be categorized into five groups:
    - International banks,
    - Bank customers,

- Nonbank dealers,
- FX brokers,
- Central banks.

2. The structure of the foreign exchange market is an outgrowth of one of the primary functions of a commercial banker: *to assist clients in the conduct of international commerce*.

For example, a corporate client desiring to import merchandise from abroad would need a source for foreign exchange if the import was invoiced in the exporter's home currency.

Alternatively, the exporter might need a way to dispose of foreign exchange if payment for the export was invoiced and received in the importer's home currency.

Assisting in foreign exchange transactions of this type is one of the services that commercial banks provide for their clients, and one of the services that bank customers expect from their bank.

3. The inter-bank market is a network of **correspondent banking relationships**, with large commercial banks maintaining demand deposit accounts with one another, called correspondent banking accounts. The correspondent bank account network allows for the efficient functioning of the foreign exchange market.

## CYP – 2

1. The **spot market** involves almost the immediate purchase or sale of foreign exchange. Typically, cash settlement is made two business days (excluding holidays of either the buyer or the seller) after the transaction for trades between the U.S. dollar and a non–North American currency. For regular spot trades between the U.S. dollar and the Mexican peso or the Canadian dollar, settlement takes only one business day.
2. **Spot rate** currency quotations can be stated in direct or indirect terms.

**Direct quotations** from the U.S. perspective, that is, the price of one unit of the foreign currency priced in U.S. dollars.

**Indirect quotations** from the U.S. perspective, that is, the price of one U.S. dollar in the foreign currency. Obviously, the direct quotation from the U.S. perspective is an indirect quote from the British viewpoint, and the indirect quote from the U.S. perspective is a direct quote from the British viewpoint.

Most currencies in the interbank market are quoted in **European terms**, that is, the U.S. dollar is priced in terms of the foreign currency (an indirect quote from the U.S. perspective). By convention, however, it is standard practice to price certain currencies in terms of the U.S. dollar, or in what is referred to as **American terms** (a direct quote from the U.S. perspective).

3. A **cross-exchange rate** is an exchange rate between a currency pair where neither currency is the U.S. dollar. The cross exchange rate can be calculated from the U.S. dollar exchange rates for the two currencies, using either European or American term quotations.
4. **Triangular arbitrage** is the process of trading out of the U.S. dollar into a second currency, then trading it for a third currency, which is in turn traded for U.S. dollars. The purpose is to earn an arbitrage profit via trading from the second to the third currency when the direct exchange rate between the two is not in alignment with the cross exchange rate.

## CYP – 3

1. In conjunction with spot trading, there is also a forward foreign exchange market. The **forward market** involves contracting today for the future purchase or sale of foreign exchange. The forward price may be the same as the spot price, but usually it is higher (at a premium) or lower (at a discount) than the spot price. Forward exchange rates are quoted on most major currencies for a variety of maturities. Bank

quotes for maturities of 1, 3, 6, 9, and 12 months are readily available. Quotations on nonstandard, or broken term, maturities are also available. Maturities extending beyond one year are becoming more frequent,

2. Notice that **forward rate** quotations appear directly under the spot rate quotations for four major currencies (the British pound, Canadian dollar, Japanese yen, and Swiss franc) for one-, three, and six-month maturities. As an example, the settlement date of a three-month forward transaction is three calendar months from the spot settlement date for the currency. That is, if today is September 3, 2003, and spot settlement is September 5, then the forward settlement date would be December 5, 2003, a period of 93 days from September 3.
3. Swap transactions provide a means for the bank to mitigate the currency exposure in a forward trade. A **swap transaction** is the simultaneous sale (or purchase) of spot foreign exchange against a forward purchase (or sale) of approximately an equal amount of the foreign currency.

4. It is common to express the premium or discount of a forward rate as an annualized percentage deviation from the spot rate. The forward premium (or discount) is useful for comparing against the interest rate differential between two countries. The **forward premium** or **discount** can be expressed in American or European terms. Obviously, if a currency is trading at a premium (discount) in American terms, it will be at a discount (premium) in European terms.

## 2.22 MODEL EXAMINATION QUESTIONS

1. Give a full definition of the market for foreign exchange.
2. What is the difference between the retail or client market and the wholesale or interbank market for foreign exchange?
3. Who are the market participants in the foreign exchange market?

4. How are foreign exchange transactions between international banks settled?

5. What is meant by a currency trading at a discount or at a premium in the forward market?

6. Why does most interbank currency trading worldwide involve the U.S. dollar?

7. Banks find it necessary to accommodate their clients' needs to buy or sell FX forward, in many instances for hedging purposes. How can the bank eliminate the currency exposure it has created for itself by accommodating a client's forward transaction?

8. ACD/$ bank trader is currently quoting a small figure bid-ask of 35–40, when the rest of the market is trading at CD1.3436–CD1.3441. What is implied about thetrader's beliefs by his prices?

9. What is triangular arbitrage? What is a condition that will give rise to a triangular arbitrage opportunity?

## 2.23 REFERENCES & SUGGESTED READINGS

*Money and Finance* 17 (1998), pp. 161–90.

"The Foreign-Exchange Market: Big," *The Economist,* September 23, 1995.Grabbe, J. Orlin. *International Financial Markets,* 3rd ed. Englewood Cliffs, N.J.: Prentice Hall,1996.*Money and Finance* 17 (1998), pp. 97–115.

# *UNIT 3: THE DETERMINATION OF EXCHANGE RATES*

### *Contents*

3.0 Aims and Objectives

3.1 Introduction

3.2 Setting the Equilibrium Spot Exchange Rate

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3.3.1 The Nature of Money and Currency Values
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3.4.2 Sterilized Vs Unsterilized Intervention
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3.4.4 Open Market Operations
3.5 The Equilibrium Approach to Exchange Rates
3.6 Summary and Conclusions
3.7 Answers to Check Your Progress Questions
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## 3.0 AIMS AND OBJECTIVES

After completion of the unit, the student should be able to:

- explain the nature of exchange rates and how they are set.
- describe what an exchange rate is and how it is determined in a *freely floating exchange rate* regime – that is, in the absence of government intervention.
- discuss the role of expectations in exchange rate determination.
- examine the different forms and consequences of central bank intervention in the foreign exchange market.

## 3.1 INTRODUCTION

Unit 2 described the workings of the foreign exchange market and its offshoots – the forward, futures, and options markets. However, although they discussed quotes on foreign currencies, they did not explain the nature of exchange rates and how they are set. Such an understanding is critical to dealing with currency risk. The purpose of this chapter is to provide that understanding.

The chapter first describes what an exchange rate is and how it is determined in a *freely floating exchange rate* regime – that is, in the absence of government intervention. The chapter next discusses the role of expectations in exchange rate determination. It also examines the different forms and consequences of central bank intervention in the foreign exchange market.

Before proceeding further, here are definitions of several terms commonly used to describe currency changes. Technically, a *devaluation* refers to decrease in the stated par value of a *pegged currency*. By contrast, a *floating currency* – one whose value is set primarily by market forces – is said to *depreciate* if it loses value and to *appreciate* if it gains value. However, discussions in this book will use the terms devaluation and depreciation and revaluation and appreciation interchangeably.

## 3.2 SETTING THE EQUILIBRIUM SPOT EXCHANGE RATE

On the most fundamental level, *exchange rates* are market-clearing prices that equilibrate supplies and demands in foreign exchange markets. The determinants of currency supplies and demands are first discussed with the aid of the following two-country model featuring the United States and Germany. Later, the various currency influences will be studied more closely.

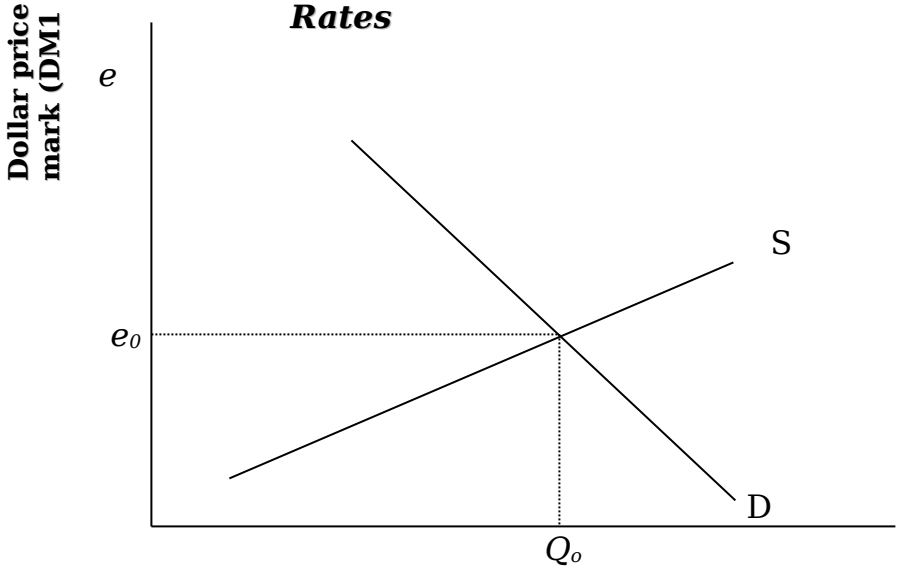
The demand for the Deutsche mark (DM), Germany's currency, in the foreign exchange market (which in this two-country world is equivalent to the supply of dollars) derives from the American demand for German goods and services and DM-denominated financial assets. An increase in the DM's dollar value is equivalent to an increase in the dollar price of German products. This higher dollar price will normally reduce the U.S. demand for German goods, services, and assets. Conversely, as the dollar value of the DM falls, Americans will demand more DM to buy the less-

expensive German products, resulting in a downward sloping demand curve for Deutsche marks.

Similarly, the supply of Deutsche marks (which is equivalent to the demand for dollars) is based on German demand for U.S. goods and services and dollar-denominated financial assets. As the dollar value of the Deutsche mark increases, which lowers the DM cost of U.S. goods, the increased German demand for U.S. goods will cause an increase in the German demand for dollars and, hence, an increase in the amount of Deutsche marks supplied. [1]

In Exhibit 3.1, *e* is the spot exchange rate (dollar value of one DM), and Q is the quantity of Deutsche marks supplied and demanded. The DM supply (S) and demand (D) curves intersect at $e_0$, the equilibrium exchange rate. The quantity of DM exchanged at this price is $Q_0$.

***EXHIBIT 3.1 Equilibrium Exchange Rates***




[1] This statement holds provided the price elasticity of German demand, E, is greater than 1. In general, E = (ΔQ/Q)/(ΔP/P), where Q is the quantity of goods demanded, P is the price, and ΔQ is the change in quantity demanded for a change in price, ΔP, if E>1, then total spending goes up when price declines.

Suppose that the supply of dollars increases relative to its demand. This excess growth in the money supply will cause inflation in the United States, which means that U.S. prices begin to rise relative to prices of German goods and services. German consumers are likely to buy fewer U.S. products and begin switching to German substitutes, leading to a decrease in the amount of Deutsche marks supplied at every xchange rate. The result is a leftward shift in the DM supply curve to S' in Exhibit 3.2. Similarly, higher prices in the United States will lead American consumers to substitute German imports for U.S. products, resulting in an increase in the demand for Deutsche marks as depicted by D'. In effect, both Germans and Americans are searching for the best deals worldwide and will switch their purchases accordingly. Hence, a hither rate of inflation in the United States than in Germany will simultaneously increase German exports to the United States and reduce U.S. exports to Germany.

A new equilibrium rate $e_1 > e_0$ results. In other words, a higher rate of inflation in the United States than in Germany will lead to a depreciation of the dollar relative to the Deutsche mark or, equivalently, to an appreciation of the mark relative to the dollar.

In general, a nation running a relatively high rate of inflation will find its currency declining in value relative to the currencies of countries with lower inflation rates. This relationship will be formalized as purchasing power parity (PPP).

Depending on the current value of the Deutsche mark relative to the dollar, the amount of DM appreciation or depreciation is computed as the fractional increase or decrease in the dollar value of the DM:

$$\text{Amount of DM appreciation (depreciation)} = \frac{\text{New dollar value of DM} - \text{Old dollar value of DM}}{\text{Old dollar value of DM}}$$

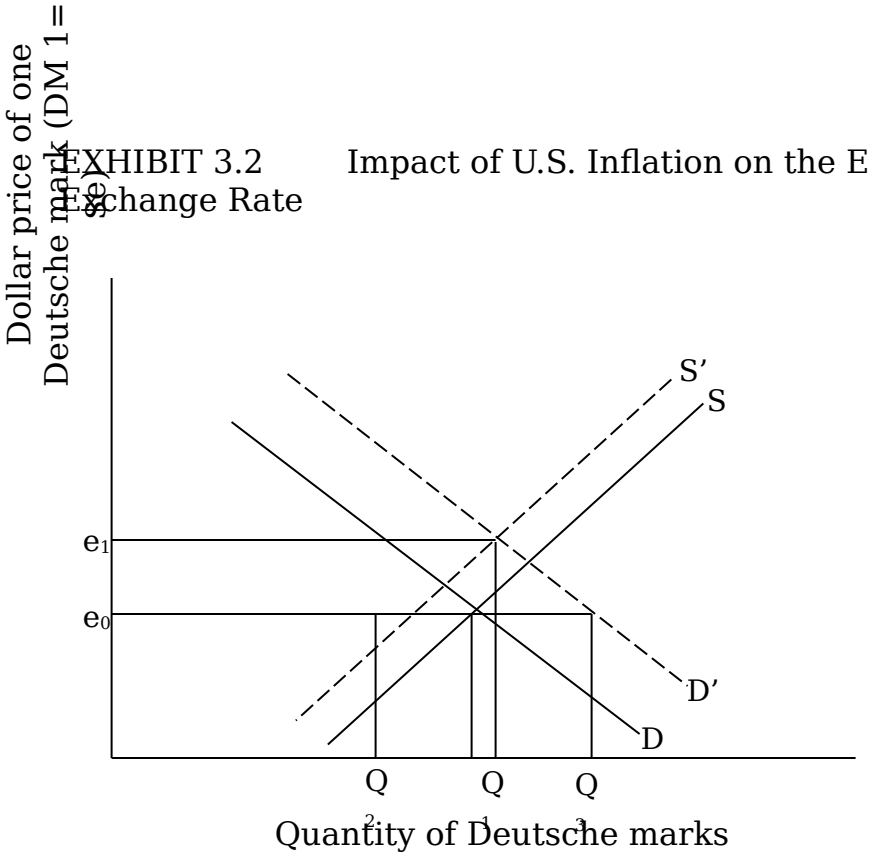
$$= \frac{e_1 - e_0}{e_0} \qquad (3.1)$$

Alternatively, the dollar is said to have depreciated (appreciated) by the fractional decrease (increase) in the DM value of the dollar:

$$\text{Amount of DM appreciation (depreciation)} = \frac{\text{New DM value of dollar} - \text{Old DM value of dollar}}{\text{Old DM value of dollar}}$$

$$= \frac{1/e_1 - 1/e_0}{1/e_0} = \frac{e_0 - e_1}{e_1} \qquad (3.2)$$

EXHIBIT 3.2 Impact of U.S. Inflation on the Equilibrium Exchange Rate




For example, an increase in the exchange rate from $0.63 to $0.68 is equivalent to a DM appreciation of 6.25% [(0.68 – 0.63)/0.63 = 0.0625] or

a dollar depreciation of 5.88% [(0.63 – 0.68)/0.68 = -0.0588]. (Why don't the two exchange rate changes equal each other?[2])

ILLUSTRATION

**Calculating Dollar Appreciation Against the Italian Lira.** On July 19, 1985, the Italian lira devalued by 17% against the U.S. dollar. By how much has the dollar appreciated against the lira?

*Solution.* If $e_0$ is the initial dollar value of the lira and $e_1$ is the post-devaluation exchange rate, then we know from Equation 3.1 that $(e_1 - e_0)/e_0 = -17\%$. Solving for $e_1$ in terms of $e_0$ yields $e_1 = 0.83e_0$. From Equation 3.2, we know that the dollar's appreciation against the lira equals $(e_0 - e_1)/e_1$ or $(e_0 - 0.83e_0)/ 0.83e_0 = 0.17/0.83 = 20.38\%$.

Interest rate differentials will also affect the equilibrium exchange rate. A rise in U.S. interest rates relative to German rates, all else being equal, will cause investors in both nations to switch from DM- to dollar-denominated securities to take advantage of the higher dollar rates. The net result will be depreciation of the DM in the absence of government intervention. Similarly, because a stronger economy attracts capita, economic growth should lead to a stronger currency. Empirical evidence supports this hypothesis.

Other factors that can influence exchange rates include political and economic risks. Investors prefer to hold lesser amounts of riskier assets; thus, low-risk currencies – those associated with more politically and economically stable nations – are more highly valued than higher-risk currencies.

[2] The reason the DM appreciation is unequal to the amount of dollar depreciation depends on the fact that the value of one currency is the inverse of the value of the other one. Hence, the percentage change in currency values differs because the base off which the change is measured differs.

## 3.3 EXPECTATION AND THE ASSET MARKET MODEL OF EXCHANGE RATES

Although currency values are affected by current events and current supply and demand flows in the foreign exchange market, they also depend on expectations about future exchange rate movements. And the exchange rate expectations are influence by every conceivable economic, political, and social factor.

The role of expectations in determining exchange rates depends on the fact that currencies are financial assets and that an exchange rate is simply the relative price of two financial assets – one country's currency in terms of another's. Thus, currency prices are determined in the same manner that the prices of assets such as stocks, bonds, gold, or real estate are determined. Unlike the prices of services or products with short storage lives, asset prices are influenced comparatively little by current events. Rather, they are determined by people's willingness to hold the existing quantities of assets, which in turn depends on their expectations of the future worth of these assets. Thus, for example, frost in Florida can bump up the price of oranges, but it should have little impact on the price of the citrus groves producing the organs; instead, longer-term expectations of the demand and supply of organs governs the value of these groves.

Similarly, the value today of a given currency, say, the dollar, depends on whether or not – and how strongly – people still want the amount of dollars and dollar-denominated assets they held yesterday. According to this view – known as the *asset market model* of exchange rate determination – the exchange rate between two currencies represents the price that just balances the relative supplies of, and demands for, assets denominated in those currencies. Consequently, shifts in preferences can lead to massive shifts in currency values.

Since the desire to hold a currency today depends critically on expectations of the factors that can affect the currency's future value, what matters is not only what is happening today but what markets expect will happen in the future. Thus, currency values are forward looking; they are set by investor expectations of their issuing countries' future economic prospects rather than by contemporaneous events alone.

### 3.3.1 The Nature of Money and Currency Values

To understand the factors that affect currency values, it helps to examine the special character of money. To begin, money has value because people are willing to accept it in exchange for goods and services. The value of money, therefore, depends on its purchasing power. Money also provides *liquidity* – that is, you can readily exchange it for goods or other assets, thereby facilitating economic transactions. Thus, money represents bout a *store of liquidity*. The demand for money, therefore, depends on money's ability to maintain its value and on the level of economic activity. Hence, the lower the expected inflation rate, the more money people will demand. Similarly, higher economic growth means more transactions and a greater demand for money to pay bills.

The demand for money is also affected by the demand for assets denominated in that currency. The higher the expected real return and the lower the riskiness of a country's assets, the greater is the demand for its currency to buy those assets. In addition, as people who prefer assets denominated in that currency (usually residents of the country) accumulate wealth, the value of the currency rises.

Because the exchange rate reflects the relative demands for two moneys, factors that increase the demand for the home currency should also increase the price of home currency on the foreign exchange market. In summary, the economic factors that affect the currency's value include its usefulness as a store of value, determined by its expected rate of

inflation; the demand for liquidity, determined by the volume of transactions in that currency; and the demand for assets denominated in that currency, determined by the risk-return pattern on investment in that nation's economic growth and political and economic stability. All three factors ultimately depend on the soundness of the nation's economic policies. The sounder these policies, the more valuable the nation's currency will be; conversely, the more uncertain a nation's future economic and political course, the riskier its assets will be, and the more depressed and volatile its currency's value.

The asset market view that sound economic policies strengthen a currency is challenged by critics who point to the links between the huge U.S. budget deficits, high real interest rates, and the strong dollar in the early 1980s. But others find this argument unconvincing, especially now that the dollar has fallen while the deficit has risen further. If the big deficits were responsible for high real U.S. interest rates, there would be more evidence that private borrowing was being crowded out in interest-sensitive areas, such as fixed business investment and residential construction. Yet the rise in real interest rates coincided with rapid growth in capital spending.

An alternative explanation for high real interest rates is that a vigorous U.S. economy, combined with a major cut in business taxes in 1971, raised the after-tax profitability of business investments. The result was capital spending boom and a strong dollar.

Indeed, if large government deficits and excessive government borrowing cause currencies to strengthen, then the Argentine austral and Brazilian cruzeiro should be among the strongest currencies in the world. Instead, they are among the weakest currencies since their flawed economic policies scare off potential investors.

### 3.3.2 Central Bank Reputations and Currency Values

Another critical determinant of currency values is central bank behaviour. A *central bank* is the nation's official monetary authority; its job is to use the instruments of monetary policy, including the sole power to create money, so as to achieve one or more of the following objectives: price stability, low interest rates, or a target currency value. As such, the central bank affects the risk associated with holding money. This risk is inextricably linked to the nature of a *fiat money*. Until 1971, every major currency was liked to a commodity. Today no major currency is liked to a commodity. With a commodity base, usually gold, there was a stable, long-term anchor to the price level. Prices varied to great deal in the short term, but they eventually returned to where they had been.

With a fiat money, there is no anchor to the price level – that is, there is no standard of value that investors can use to find out what the currency's future value might be. Instead, a currency's value is largely determined by the central bank through its control of the money supply. If the central bank creates too much money, inflation will occur and the value of money will fall. *Expectations* of the central bank behaviour will also affect exchange rates today; a currency will decline if people *think* the central bank will expand the money supply in the future.

Viewed this way, money becomes a brad name product whose value is backed by the reputation of the central bank that issues it. And just as reputations among automobiles vary – from Mercedes Benz to Yugo – so currencies come backed by a range of quality reputations – from the Deutsche mark, Swiss franc, and Argentine austral on the low side. Underlying these reputations is trust in the willingness of the central bank to maintain price stability.

The high-quality currencies are those expected to maintain their purchasing power because they are issued by reputable central banks. In contrast, the low-quality currencies are those that bear little assurance their purchasing power will be maintained. And as in the car market,

high-quality currencies sell at a premium, and low-quality currencies sell at a discount (relative to their values based on economic fundamentals alone). That is, investors demand a risk premium to hold a riskier currency, whereas safer currencies will be worth more than their economic fundamentals would indicate.

Because good reputations are slow to build and quick to disappear, many economists recommend that central banks adopt rules for price stability that are verifiable, unambiguous, and enforceable.[3] Absent such rules, the natural accountability of central banks to government becomes an avenue for political influence. The greater scope for political influence will, in turn, add to the perception of inflation risk.

The importance of expectations and central bank reputation in determining currency values was dramatically illustrated on June 2, 1987, when the financial markets learned that Paul Volcker was resigning as chairman of the Federal Reserve Board. Within seconds after this news appeared on the ubiquitous video screens used by traders to watch the world, both the price of the dollar on foreign exchange markets and the prices of bonds began a steep decline. By day's end, the dollar had fallen 2.6% against the Japanese yen, and the price of Treasury bonds declined 2.3% - one of the largest one-day declines ever. The price of corporate bonds fell by a similar amount. All told, the value of U.S. bonds fell by more than $100 billion.

The response by the financial markets reveals the real forces that are setting the value of the dollar and interest rates under our current monetary system.

The import of what happened on June 2, 1987, is that prices of the dollar and those billions of dollars in bonds were changed by nothing more or

[3] See, for example, W. Lee Hoskins, "A European system of Central Banks: Observations from Abroad, "*Economic Commentary*. Federal Reserve Bank of Cleveland, November 15, 1990

less than investors changing their collective assessment of what actions the Fed would or wouldn't take. A critical lesson for business people and policymakers alike surfaces: A shift in the trust that people have for a currency can change its value now by changing its expected value in the future. The level of interest rates is also affected by trust in the future value of money. All else being equal, the greater the trust in the promise that money will maintain its purchasing power, the lower interest rtes will be. This theory will be formalized as the Fisher effect.

## Check Your Progress – 1

1. How the spot exchange rate is set by equilibrium?

_____

_____

2. Explain about expectations model of exchange rates?

_____

_____

3. Explain briefly about asset market model of exchange rates?

_____

_____

4. Write about the effect of central bank reputation on the currency values ?

_____

_____

## 3.4 THE FUNDAMENTALS OF CENTRAL BANK NTERVENTION

The exchange rate is one of the most important prices in a country because it links the domestic economy and the rest-of-world economy. As such, it affects relative national competitiveness.

We have already seen the link between exchange rate changes and relative inflation rates. The important point for now is that an appreciation of the exchange rate beyond that necessary to offset the inflation differential between two countries raises the price of domestic goods relative to the price of foreign goods. This rise in the *real* or *inflation adjusted exchange rate* – measured as the nominal exchange rate adjusted for changes in relative prices levels – proves to be a mixed blessing. For example, the rise in the value of the U.S. dollar from 1990 to 1985 translated directly into reduction in the dollar prices of imported goods and raw materials. As a result, prices of imports and of products that compete with imports began to ease. This development contributed significantly to the slowing of U.S. inflation in the early 1980s.

Yet the rising dollar had some distinctly negative consequences for the U.S. economy as well. Declining dollar prices of imports had their counterpart in the increasing foreign currency prices of U.S. products sold abroad. As a result, American exports became less competitive in world markets, and American-made import substitutes became less competitive in the United States. Sales of domestic traded goods declined, generating unemployment in the traded-goods sector and inducing a shift in resources from the traded-to the nontraded-goods sector of the economy.

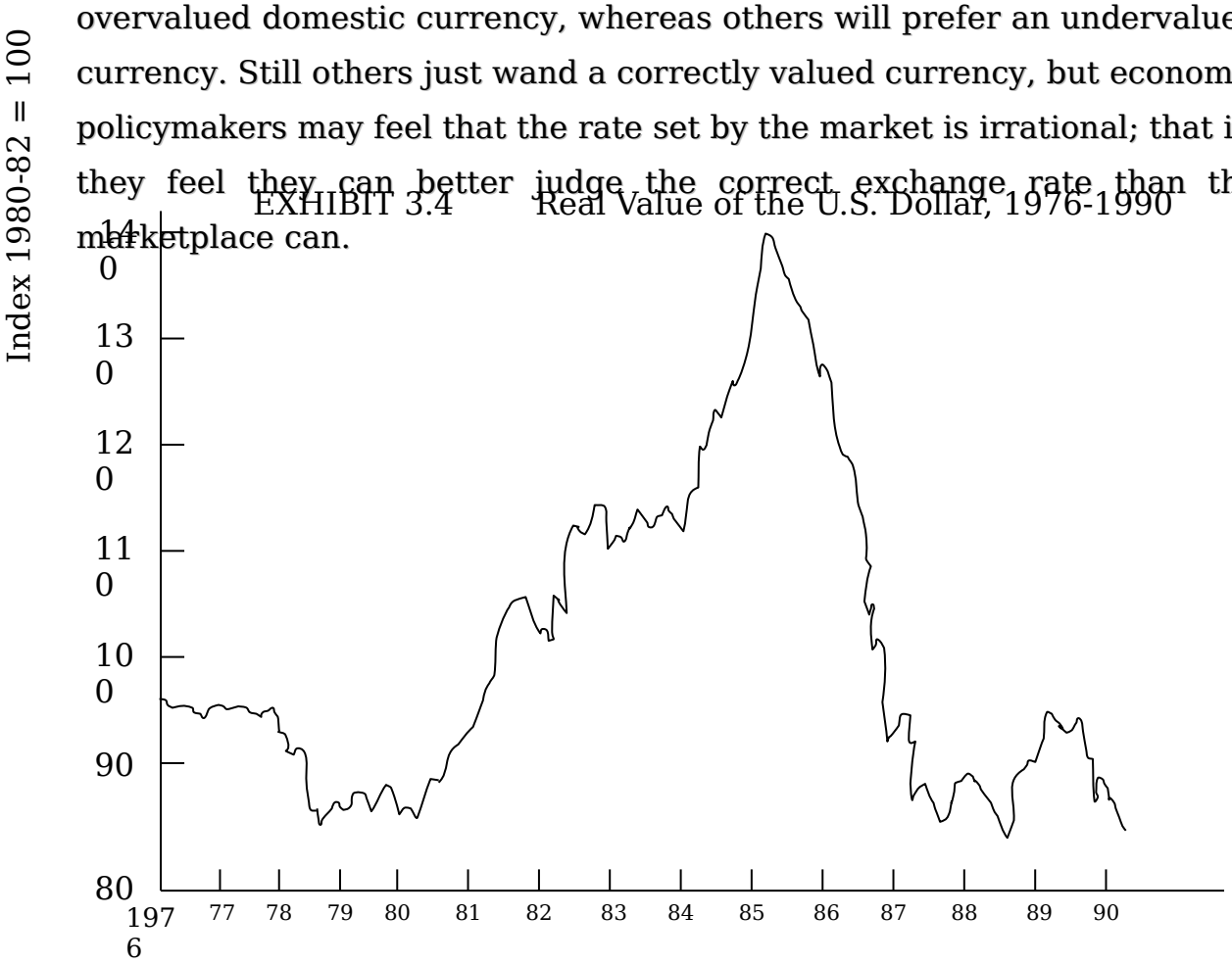
Alternatively, home currency depreciation results in more competitive traded-goods sector, stimulation domestic employment and inducing a shift in resources from the nontraded- to the traded-goods sector. The bad part is that currency weakness also results in higher prices for

imported goods and services, eroding living standards and worsening domestic inflation.

From its peak in mid-1985, the U.S. dollar fell by more than 50% over the next few years, enabling Americans to experience the joys and sorrows of both strong and a weak currency in less than a decade. The weak dollar made U.S. companies more competitive worldwide; at the same time, it lowered the living standards of Americans who enjoyed consuming foreign goods and services. Exhibit 3.3 charts the real value of the U.S. dollar from 1976 to 1990.

Depending on their economic goals, some governments will prefer an overvalued domestic currency, whereas others will prefer an undervalued currency. Still others just wand a correctly valued currency, but economic policymakers may feel that the rate set by the market is irrational; that is, they feel they can better judge the correct exchange rate than the marketplace can.

EXHIBIT 3.4 Real Value of the U.S. Dollar, 1976-1990



No matter what category they fall in, most governments will be tempted to intervene in the foreign exchange market to move the exchange rate to the level consistent with their goals or beliefs. *Foreign exchange market intervention* refers to official purchases and sales of foreign exchange that nations undertake through their central banks to influence their currencies.

### 3.4.1 Foreign Exchange Market Intervention

Although the mechanics of central bank intervention vary, the general purpose of each variant is basically the same: to increase the market demand for on currency by increasing the market supply of another. To see how this purpose can be accomplished, suppose in the previous example that the Bundesbank wants to reduce the value of the DM from $e_1$ to its previous equilibrium value of $e_0$. To do so, the Bundesbank must sell an additional ($Q_3$ – $Q_2$) DM in the foreign exchange market, thereby eliminating the shortage of DM that would otherwise exist at $e_0$. This sale of DM (which involves the purchase of an equivalent amount of dollars will also eliminate the excess supply of ($Q_3$ – $Q_2$)$e_0$ dollars that now exists at $e_0$. The simultaneous sale of DM and purchase of dollars will balance the supply and demand for DM (and dollars) at $e_0$.

If the Fed also wants to raise the value of the dollar, it will buy dollars with Deutsche marks. Regardless of whether the Fed or the Bundsbank initiates this foreign exchange operation, the net result is the same: The U.S. money supply will fall, and Germany’s money supply will rise.

### 3.4.2 Sterilized Versus Unsterilized Intervention

The two examples just discussed are instances *unsterilized* intervention: that is, the monetary authorities have not insulated their domestic money supplies from the foreign exchange transactions. In both cases, the U.S. money supply will fall, and the German money supply will rise. As noted earlier, an increase (decrease) in the supply of money, all other things

held constant, will result in more (less) inflation. Thus, the foreign exchange market intervention will not only change the exchanger rate, it will also increase German inflation, while reducing U.S. inflation. Recall it was the jump in the U.S. money supply that caused this inflation. These money supply changes will also affect interest rtes in both countries.

To neutralize these effects, the Fed and/or the Bundesbank can *sterilize* the impact of their foreign exchange market intervention on the domestic money supply through an *open-market operation*, which is just the sale or purchase of U.S. Treasury securities. For example, the purchase of U.S. Treasury bills by the Fed supplies reserves to the banking system and increases the U.S. money supply. Following the open-market operation, therefore, the public will hold more cash and bank deposits and fewer Treasury securities; if the Fed buys enough T-bills, the U.S. money supply will return to its preintervention level. Similarly, the Bundesbank could neutralize the impact of intervention on the German Treasury securities.

### 3.4.3 The Effects of Foreign Exchange Market Intervention

The basic problem with intervention is that it is likely to be either ineffectual or irresponsible. Because sterilized intervention entails a substitution of DM-denominated securities for dollar-denominated ones, the exchange rate will be permanently affected only if investors view domestic and foreign securities as being imperfect substitutes. If this is the case, then the exchange rate and relative interest rates must change to induce investors to hold the new portfolio of securities.

But if investors consider these securities to be perfect substitutes, then no change in the exchange rate or interest rates will be necessary to convince investors to hold this portfolio. In this case, sterilized intervention is ineffectual. This conclusion is consistent with the experiences of the United States and other industrial nations in their

intervention policies. Between March 1973 and April 1983, industrial nations bought and sold a staggering $772 billion of foreign currencies to influence exchange rates. More recently, the U.S. government bought over $3.6 billion of foreign currencies between July 1988 and July 1990 to stem the rise in the value of the dollar. Despite these large interventions, exchange rates appear to have been moved largely by basic market forces.

On the other hand, unsterilized intervention can have a lasting effect on exchange rates, but insidiously – by creating inflation in some nations and deflation in others. In the example presented above, Germany would wind up with a permanent (and inflationary) increase in its money supply, and the United States would end up with a deflationary decrease in money supply. If the resulting increase in German inflation and decrease in U.S. inflation were sufficiently large, the exchange rate would remain at $e_0$ without the need for further government intervention. But it is the money supply changes, and not the intervention by itself, that affect the exchange rate. Moreover, moving the *nominal* (or actual) exchange rate from $e_1$ to $e_0$ should not affect the real exchange rate because the changer in inflation rates offsets the nominal exchange rate change.

If forcing a currency below its equilibrium level causes inflation, if follows that devaluation cannot be much use as a means of restoring competitiveness. A devaluation improves competitiveness only to the extent that it does not cause higher inflation. If the devaluation causes domestic wages and prices to rise, any gain in competitiveness is quickly eroded.

Of course, when the world's central banks execute a coordinated surprise attack, the impact on the market can be dramatic – for a short period. Early in the morning on February 27, 1985, for example, Western European central bankers began telephoning banks and investment firms in London, Frankfurt, Milan, and other financial centers to order the sale

of hundreds of millions of dollars; the action - joined a few hours later by the Federal Reserve in New York – panicked the markets and drove the dollar down by 5% that day.

But keeping the market off balance requires credible repetitions. Shortly after the February 27 blitzkrieg, the dollar was back on the rise. The Fed intervened again, but it wasn't until clear signs of a U.S. economic slowdown emerged that the dollar turned down in March.

### 3.4.4 Open-Market Operations

To summarize, exchange market intervention will have a lasting influence on exchange rates if the intervention leads to permanent changes in relative money supplies. Thus, if the DM appreciation is viewed as resulting from a shortage of DM, an alternative to foreign exchange market intervention is for the Bundesbank to expand the supply of DM by buying Treasury bills from the public. Some of these added DM will be spent on foreign goods, services, and assets. More DM will be sold in the foreign exchange market to buy dollars to carry out these planned purchases. If the Bundesbank expands the money supply sufficiently through its open-market operations, the increases supply of DM in the foreign exchange market will cause the equilibrium exchange rate to return to $e_0$.

Conversely, if the depreciating dollar is traced to an excess of dollars, the Fed could reduce the U.S. money supply by selling Treasury bills to the public. As the U.S. money supply declines, fewer dollars will be sold in the foreign exchange market. If the drop in the U.S. money supply is large enough, the demand for DM will drop sufficiently to return the equilibrium exchange rate to $e_0$.

Open-market operations affect the equilibrium exchange rate in a manner analogous to unsterilized intervention – primarily through their impact on inflation rates. In the case of Bundesbank open-market operations, the

increased supply of DM will raise the German inflation rate. If enough DM are created, German inflation will rise to the level of U.S. inflation, and the old equilibrium exchange rate $e_0$ will be restored. Alternatively, if the U.S. money supply is reduced sufficiently, the initial inflation that shifted the equilibrium exchange rate will end, and $e_0$ will again be the equilibrium rate. In either event, the real exchange rate and relative competitiveness should remain unchanged because the shift in inflation rates offsets the nominal currency change.

To summarize the empirical evidence, *real* exchange rates are primarily determined by real economic variables, such as relative national incomes and interest rates between countries; real exchange rates, in turn, determine the magnitudes and the direction of flows of goods, services, and capital among countries. A change in the supply-demand relationship in the foreign exchange market that was brought about by intervention may temporarily influence the movement of the real exchange rate. However, unless the underlying economic variables that typically give rise to broadly based, market-generated supply-and-demand forces change, these forces will eventually swamp the impact of the intervention. Thus, nations intent on fixing their exchange rate in defiance of market forces must ultimately bow to those forces or else resort to currency controls.

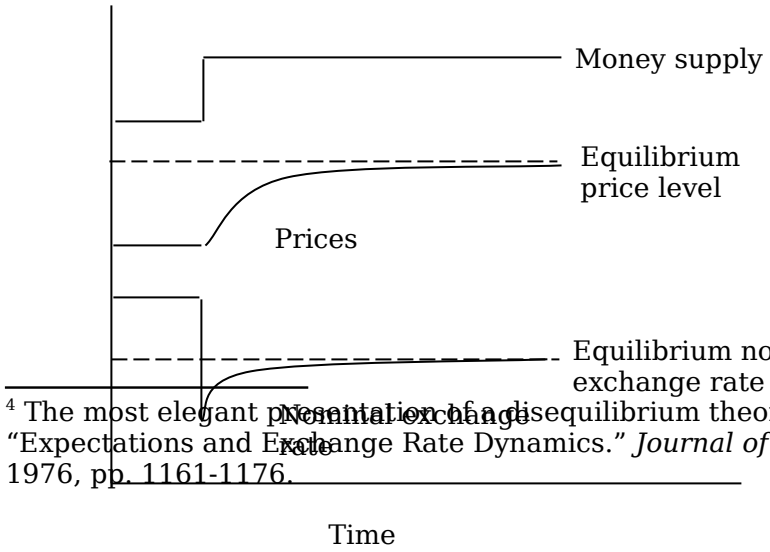
## 3.5 THE EQUILIBRIUM APPROACH TO EXCHANGE RATES

We have seen that changes in the nominal exchange rate are largely affected by variations or expected variations in relative money supplies. These nominal exchange rate changes are also highly correlated with changes in the real exchange rate. Indeed, many commentators believe that nominal exchange rate changes *cause* real exchange rate changes. As defined earlier, the *real* exchange rate is the relative price of foreign

goods in terms of domestic goods. Thus, changes in the nominal exchange rate, through their impact on the real exchange rate, are said to help or hurt companies and economies.

One explanation for the correlation between nominal and real exchange rate changes is supplied by the disequilibrium theory of exchange rates.[4] According to this view, various frictions in the economy cause goods prices to adjust slowly over time, whereas nominal exchange rate adjust quickly in response to new information or changes in expectations. As a direct result of the differential speeds of adjustment in the goods and currency markets, changes in nominal exchange rates caused by purely monetary disturbances are naturally translated into changes in real exchange rates and can lead to exchange rate "overshooting," whereby the short-term change in the exchange rate exceeds, or overshoots, the long-term change in the equilibrium exchange rate (see Exhibit 3.5). This view underlies most popular accounts of exchange rate changes and policy discussions that appear in the media. It implies that currencies may become "overvalued" or "undervalued" relative to equilibrium, and that these disequilibria affect international competitiveness in ways that are not justified by changes in comparative advantage.

**EXHIBIT 3.5** Exchange Rate Overshooting According to the Disequilibrium Theory of Exchange Rates




[4] The most elegant presentation of a disequilibrium theory is in Rudiger dornbusch, "Expectations and Exchange Rate Dynamics." *Journal of Political Economy*, December 1976, pp. 1161-1176.

However, the disequilibrium theory has been criticized by some economists in recent years. In this place, they have suggested an equilibrium approach to exchange rates changes.[5] The basis for the equilibrium approach is that markets clear – supply and demand are equated – through prices adjustments. Real disturbances to supply or demand in the goods market cause changes in relative prices, including the real exchange rate. These changes in the real exchange rate are often accomplished, in part, through changes in the nominal exchange rate. Repeated shocks in supply or demand thereby create a correlation between changes in nominal and real exchange rates.

The equilibrium approach has three important implications for exchange rates. First, exchange rates do not "cause" changes in relative prices but are part of the process through which the changes occur in equilibrium; that is, changes in relative prices and in real exchange rate occur simultaneously, and both are related to more fundamental economic factors.

Second, attempts by government to affect the real exchange rate vial foreign exchange market intervention will fail. The direction of causation runs from the real exchange rate change to the nominal exchange rate change, and not vice versa; changing the nominal exchanger rate by altering money supplies will affect relative inflation rates in such a way as to leave the real exchange rate unchanged.

[5] See, for example, Alan C. Stockman, "The Equilibrium Approach to Exchange Rates," *Economic Review,* Federal Reserve Bank of Richmond, March/April 1987, pp. 12-30. This section is based on his article.

Finally, there is no simple relation between changes in the exchange rate and changes in international competitiveness, employment, or the trade balance. With regard to the latter, trade deficits do not “cause” currency depreciation, nor does currency depreciation by itself help reduce a trade deficit.

Some of the implications of equilibrium approach may appear surprising. They conflict with many of the claims that are commonly made in the financial press and by politicians; they also seem to conflict with experience. But according to the equilibrium view of exchange rates, many of the assumptions and statements commonly made in the media are simply wrong, and experiences may be very selective.

Econometric testing of these models is in its infancy, but there is some evidence that supports the equilibrium models, although it is far from conclusive. According to the disequilibrium approach, a change in the real exchange rate occurs in response to changes in the nominal exchange rate because of sticky prices. But as prices eventually adjust toward their new equilibrium levels, the real exchange rate should return to its equilibrium value. Monetary disturbances, then, should create temporary movements in real exchange rates. Initial increases in the real exchange rate should be followed by later decreases as nominal prices adjust to equilibrium.

But statistical evidence indicates that changes in real exchange rate tend, on average, to be nearly permanent or to persist for very long periods of time. The evidence also indicates that changes in nominal exchange rates – even very short-term day-to-day changes – are even temporary real shocks, cause most of the major changes in real exchange rates. On the other hand, it is consistent with the view that most changes in real exchange rate are due to real shocks with a large permanent component. Changers in real and nominal exchange rates are very highly correlated

and have similar variances, supporting the view that most changes in nominal exchange rates are due to largely permanent, real disturbances.

An alternative explanation is that we are seeing the effects of a sequence of monetary shocks, so that even if any given exchange rate change is temporary, the continuing shocks keep driving the exchange rate from its long-run equilibrium value. Thus, the sequence of these temporary changes is a permanent change. Moreover, if the equilibrium exchange rate is itself constantly subject to real shocks, we would not expect to see reversion in real exchange rates. The data do not allow us to distinguish between these hypotheses.

Another feature of the data is that the exchange rate varies much more than the ratio of price levels. The equilibrium view attributes this “excess variability” to shifts in demand and/or supply between domestic and foreign goods; the shifts affect the exchange rate but not relative inflation rates. Supply-and-demand changes also operate indirectly to alter relative prices of foreign and domestic goods by affecting the international distribution of wealth.

Although the equilibrium theory of exchange rates is consistent with selected empirical evidence, it may stretch its point too far. Implicit in the eq2uilibrium theory is the view that money is just a unit of account – a measuring rod for value – with no intrinsic value. However, because money is an asset it is possible that monetary and other policy changes, by altering the perceived usefulness and importance of money as a store of value or liquidity, could alter real exchange rates. The evidence presented earlier that changes in anticipated monetary policy can alter real exchange rates supports this view. Moreover, the equilibrium theory fails to explain a critical fact: The variability of real exchange rates has been much greater when currencies are floating than when they are fixed. This fact is easily explained, if we view money as an asset, by the

greater instability in relative monetary policies in a floating rate system. The real issue then is not whether monetary policy – including its degree of stability – has any impact at all on real exchange rates but whether that impact of first- or second-order importance.

Despite important qualifications, the equilibrium theory of exchange rates provides a useful addition to our understanding of exchange rate behaviour. Its main contribution is to suggest an explanation for exchange rate behaviour that is consistent with the notion that markets work reasonably well if they are permitted to.

## Check Your Progress – 2

1. Explain about the central bank intervention in the foreign exchange market?

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2. Write a short notes on
   a. Sterilized intervention
   b. unsterlised intervention

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3. What are the effects of foreign exchange market intervention?

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4. Explain about the equilibrium approach to exchange rates?

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## 3.6 SUMMARY AND CONCLUSIONS

This chapter studied the process of determining exchange rates under a floating exchange rate system. We saw that in the absence of government intervention, exchange rates respond to the forces of supply and demand, that in turn are dependent on relative inflation rates, interest rates, and GNP growth rates. Monetary policy is crucial here. If the central band expands the money supply at a faster rate than the growth in money demand, the purchasing power of money declines both at home (inflation) and abroad (currency depreciation). In addition, the healthier the economy is, the stronger the currency is likely to be. Exchange rates are also crucially affected by expectations of future exchange rate changes, which depend on forecasts of future economic and political conditions.

In order to achieve certain economic or political objectives, governments often intervene in the currency markets to affect the exchange rate. Although the mechanics of such intervention vary, the general purpose of each variant is basically the same: to increase the market demand for one currency by increasing the market supply of anther. Alternatively, the government can control the exchange rate directly by setting a price for its currency and then restricting access to the foreign exchange market.

A critical factor that helps explain the volatility of exchange rates is that with a fiat money there is no anchor to a currency's value, nothing around which beliefs can coalesce. In this situation, where people are unsure of what to expect, any new piece of information can dramatically alter their beliefs. Thus, if the underlying domestic economic policies are unstable, exchange rates will be volatile as traders react to new information.

## 3.7 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

### CYP – 1

1. Refer to section 3.2
2. Refer to section 3.3
3. Refer to section 3.3

4. Refer to section 3.3.2

**CYP – 2**

1. Refer to section 3.4
2. a. Refer to section 3.4.2.

   b. Refer to section 3.4.2
3. Refer to section 3.4.3
4. Refer to section 3.5

## 3.8 MODEL EXAMINATION QUESTIONS

1. Explain how the equilibrium spot exchange rate is set?
2. Discuss about the expectations and the asset market model of exchange rates and their determination?
3. Critically examine as to how the central bank intervenes in the exchange rate determination process?
4. Briefly discuss about the equilibrium approach?

## UNIT 4: FUTURES AND OPTIONS ON FOREIGN EXCHANGE

### Content

4.0 Aims and Objectives
4.1 Introduction
4.2 Futures Contracts: Some Preliminaries
    4.2.1 Currency Futures Markets
    4.2.2 Basic Currency Futures Relationships
    4.2.3 Eurodollar Interest Rate Futures Contracts
4.3 Options Contracts: Some Preliminaries
    4.3.1 Currency Options Markets
    4.3.2 Currency Futures Options

4.3.3 Basic Option-Pricing Relationships at
4.3.4 Expiration
4.3.5 American Option-Pricing Relationships
4.3.5 European Option-Pricing Relationships
4.3.6 Binomial Option-Pricing Model
4.3.7 European Option-Pricing Formula
4.3.8 Empirical Tests of Currency Options
4.4 Summary
4.5 Answers to Check Your Progress Questions
4.6 Model Examination Questions

## 4.0 AIMS AND OBJECTIVES

After completion of the chapter the student should be able:

- to understand fully about traded currency futures contracts, options contracts, and options on currency futures that are useful for both speculating on foreign exchange price movements and hedging exchange rate uncertainty.
- to compare forward and futures contracts, noting similarities and differences between the two.
- to understand about the markets where futures are traded, the currencies on which contracts are written, contract specifications for the various currency contracts, and Eurodollar interest rate futures contracts.
- to know options contracts on foreign exchange, comparing and contrasting
- the options and the futures markets.
- to identify the exchanges where options are traded.
- to discuss about the over-the-counter options market
- to explain the Basic option-pricing boundary relationships using actual market prices.
- to illustrate how a speculator might use currency options

- to understand currency option pricing model.

## 4.1 INTRODUCTION

In this chapter, we introduce exchange traded currency futures contracts, options contracts, and options on currency futures that are useful for both speculating on foreign exchange price movements and hedging vexchange rate uncertainty. These contracts make up part of the foreign exchange market that was introduced in the material, where we discussed spot and forward exchange rates.

The discussion begins by comparing forward and futures contracts, noting similarities and differences between the two. We discuss the markets where futures are traded, the currencies on which contracts are written, contract specifications for the various currency contracts, and Eurodollar interest rate futures contracts. These are useful for hedging short-term dollar interest rate risk in much the same way as forward rate agreements, Next, options contracts on foreign exchange are introduced, comparing and contrasting the options and the futures markets. The exchanges where options are traded are identified and contract terms are specified. The over-the-counter options market is also discussed. Basic option-pricing boundary relationships are illustrated using actual market prices. Additionally, illustrations of how a speculator might use currency options are also provided. The chapter closes with the development of a currency option pricing model.

## 4.2 FUTURES CONTRACTS: SOME PRELIMINARIES

A *forward contract* was defined as a vehicle for buying or selling a stated amount of foreign exchange at a stated price per unit at a specified time in the future. Both forward and futures contracts are classified as

**derivative** or **contingent claim securities** because their values are derived from or contingent upon the value of the underlying security. But while a **futures** contract is similar to a forward contract, there are many distinctions between the two. A forward exchange contract is tailor-made for a client by his international bank; in contrast, a futures contract has **standardized** features and is **exchange-traded,** that is, traded on organized exchanges rather than over the counter. A client desiring a position in futures contracts contacts his broker, who transmits the order to the exchange floor where it is transferred to the trading pit. In the trading pit, the price for the order is negotiated by open outcry between floor brokers or traders.

The main standardized features are the **contract size** specifying the amount of the underlying foreign currency for future purchase or sale and the **maturity date** of the contract. A futures contract is written for a specific amount of foreign currency rather than for a tailor-made sum. Hence, a position in multiple contracts may be necessary to establish a sizable hedge or speculative position. Futures contracts have specific **delivery months** during the year in which contracts mature on a specified day of the month. An **initial margin** must be deposited into a collateral account to establish a futures position. The initial margin is generally equal to about 2 percent of the contract value. Either cash or Treasury bills may be used to meet the margin requirement. The account balance will fluctuate through daily settlement, as the following discussion makes clear. The margin put up by the contract holder can be viewed as “good-faith” money that he will fulfill his side of the financial obligation.

The major difference between a forward contract and a futures contract is the way the underlying asset is priced for future purchase or sale. A forward contract states a price for the future transaction. By contrast, a futures contract is **settled-up,** or **marked-to-market,** daily at the

settlement price. The **settlement price** is a price representative of futures transaction prices at the close of daily trading on the exchange.

A buyer of a futures contract (one who holds a **long** position) in which the settlement price is higher (lower) than the previous day's settlement price has a positive (negative) settlement for the day. Since a long position entitles the owner to purchase the underlying asset, a higher (lower) settlement price means the futures price of the underlying asset has increased (decreased). Consequently, a long position in the contract is worth more (less). The change in settlement prices from one day to the next determines the settlement amount. That is, the change in settlement prices per unit of the underlying asset, multiplied times the size of the contract, equals the size of the daily settlement to be added to (or subtracted from) the long's margin account. Analogously, the seller of the futures contract (**short** position) will have his margin account increased (or decreased) by the amount the long's margin account is decreased (or increased). Thus, futures trading between the long and the short is a **zero-sum game;** that is, the sum of the long and short's daily settlement is zero. If the investor's margin account falls below a **maintenance margin** level (roughly equal to 75 percent of the initial margin), **variation margin** must be added to the account to bring it back to the initial margin level in order to keep the position open. An investor who suffers a liquidity crunch and cannot deposit additional margin money will have his position liquidated by his broker. The marking-to-market feature of futures markets means that market participants realize their profits or suffer their losses on a day-to-day basis rather than all at once at maturity as with a forward contract. At the end of daily trading, a future contract is analogous to a new forward contract on the underlying asset at the new settlement price with a one-day shorter maturity. Because of the daily marking-to-market, the futures price will converge through time to the spot price on the last day of trading in the contract. That is, the final settlement price at which

any transaction in the underlying asset will transpire is the spot price on the last day of trading. The effective price is, nevertheless, the original futures contract price, once the profit or loss in the margin account is included.

Two types of market participants are necessary for a derivatives market to operate: **speculators** and **hedgers.** A speculator attempts to profit from a change in the futures price. To do this, the speculator will take a long or short position in a futures contract depending upon his expectations of future price movement. A hedger, on the other hand, wants to avoid price variation by locking in a purchase price of the underlying asset through a long position in the futures contract or a sales price through a short position. In effect, the hedger passes off the risk of price variation to the speculator, who is better able, or at least more willing, to bear this risk.

Both forward and futures markets for foreign exchange are very liquid. A **reversing trade** can be made in either market that will close out, or neutralize, a position. In forward markets, approximately 90 percent of all contracts result in the short making delivery of the underlying asset to the long. This is natural given the tailor-made terms of forward contracts. By contrast, only about 1 percent of currency futures contracts result in delivery. While futures contracts are useful for speculation and hedging, their standardized delivery dates are unlikely to correspond to the actual future dates when foreign exchange transactions will transpire. Thus, they are generally closed out in a reversing trade. The **commission** that buyers and sellers pay to transact in the futures market is a single amount paid up front that covers the *round-trip* transactions of initiating and closing out the position. These days, through a discount broker, the commission charge can be as little as $15 per currency futures contract. In futures markets, 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 sells to the clearinghouse. This feature of

futures markets facilitates active secondary market trading because the buyer and the seller do not have to evaluate one another's creditworthiness. The clearinghouse is made up of *clearing members*.

**Distinction between Futures and Forward Contracts**

| **Futures:** | **Forward:** |
|---|---|
| ***Trading Location***<br>Traded competitively on an organized exchange | Traded by bank dealers via a network of telephones, telex machines, and computerized dealing systems |
| ***Contractual Size***<br>Standardized amount of the underlying asset | Tailor-made to the needs of the participant |
| **Settlement**<br>Daily settlement, or marking-to-market, done by the futures clearinghouse through the participant's margin account | Participant buys or sells the contractual amount of the underlying asset from the bank at maturity at the forward (contractual) price. |
| **Expiration Date**<br>Standardized delivery dates. | Tailor-made delivery date that meets the need of the investor. |
| **Delivery**<br>Delivery of the underlying asset is seldom made. Usually a reversing trade is transacted to exit the market | Delivery of the underlying asset is commonly made |
| ***Trading Costs***<br>Bid-ask spread plus broker's commission. | Bid-ask spread plus indirect bank charges via compensating balance requirements. |

Individual brokers who are not clearing members must deal through a clearing member to clear a customer's trade. In the event of default of one side of a futures trade, the clearing member stands in for the defaulting party, and then seeks restitution from that party. Theclearinghouse's

liability is limited because a contractholder's position is marked-to market daily. Given the organizational structure, it is only logical that the clearinghouse maintains the futures margin accounts for the clearing members. Frequently, a futures exchange may have a **daily price limit** on the futures price, that is, a limit as to how much the settlement price can increase or decrease from the previous day's settlement price. Forward markets do not have this. Obviously, when the price limit is hit, trading will halt as a new market-clearing equilibrium price cannot be obtained. Exchange rules exist for expanding the daily price limit in an orderly fashion until a market-clearing price can be established. On May 16, 1972, trading first began at the Chicago Mercantile Exchange (CME) in currency futures contracts.

### 4.2.1 Currency Futures Markets

For each delivery month for each currency, we see the opening price quotation, the high and the low quotes for the trading day (in this case August 19, 2002), and the settlement price. Each is presented in American terms, that is, $F(\$/i)$. (We use the same symbol $F$ for futures prices as for forward prices, and explain why shortly.) For each contract, the **open interest** is also presented. This is the total number of short or long contracts outstanding for the particular delivery month. Note that the open interest is greatest for each currency in the **nearby** contract, in this case the September 2002 contract. Since few of these contracts will actually result in delivery, if we were to follow the open interest in the September contracts through time, we would see the number for each different currency decrease as the last day of trading (September 16, 2002) approaches as a result of reversing trades. Additionally, we would note increased open interest in the December 2002 contract as trading interest in the soon-to-be nearby contract picks up. In general, open interest (loosely an indicator of demand) typically decreases with the term to maturity of most futures contracts.

### *4.2.2 Basic Currency Futures Relationships*

**EXAMPLE 1**

**Reading Futures Quotations** As an example of reading futures quotations, let's use the December 2002 Canadian dollar contract. From table, we see that on Monday, August 19, 2002, the contract opened for trading at a price of $0.6370/CD, and traded in the range of $0.6327/CD (low) to $0.6396/CD throughout the day. During its lifetime, the December 2002 contract has traded in the range of $0.6190/CD (low) to $0.6620/CD (high). The settlement ("closing") price was $0.6336/CD. The open interest, or the number of December 2002 contracts outstanding, was 8,472. At the settlement price of $0.6336, the holder of a long position in one contract is committing himself to paying $63,360 for CD100,000 on the delivery day, December 18, 2002, if he actually takes delivery. Note that the settlement price decreased $.0051 from the previous day. That is, it fell from $0.6887/CD to $0.6336/CD. Both the buyer and the seller of the contract would have their accounts marked-to-market by the change in the settlement prices. That is, one holding a long position from the previous day would have $510 (_ $.0051 _ CD100,000) subtracted from his margin account and the short would have $510 added to his account.

Even though marking-to-market is an important economic difference between the operation of futures markets and the forward market, it has little effect on the pricing of futures contracts as opposed to the way forward contracts are priced. To see this, note the pattern of CD forward prices from the *Exchange Rates* presented. They go from a spot price of $0.6356/CD to $0.6350 (1 month) to $0.6337 (3 months) to $.6315 (6 months). To the extent that forward prices are an unbiased predictor of future spot exchange rates, the market is anticipating the U.S. dollar to

depreciate over the next six months versus the Canadian dollar. Similarly, we see a depreciating pattern of the U.S. dollar from the pattern of settlement prices for the CD futures contracts: $0.6355 (September) to $0.6336 (December) to $0.6317 (March 2003) to $0.6299 (June). It is also noteworthy that both the forward and the futures contracts together display a chronological depreciating pattern. For example, the September futures contract price (with delivery date of September 18) and the December futures contract price (with a delivery date of December 18) surround the 1 month forward price (with a value date of September 23) and the 3 month forward price (with a value date of November 21), displaying a consistent depreciating pattern: $0.6355, $0.6350, $0.6337, and $0.6336, respectively. Thus, both the forward market and the futures market are useful for **price discovery,** or obtaining the market's forecast of the spot exchange rate at different future rates.

Example 1 implies that futures are priced very similarly to forward contracts. In the Interest Rate Parity (IRP) model, which states that the forward price for delivery at time *T* is

*FT*($/*i*) _ *S*0 ($/*i*)

(1 _ *r*$)*T*

(1 _ *ri*)*T*

We will use the same equation to define the futures price. This should work well since the similarities between the forward and the futures markets allow arbitrage opportunities if the prices between the markets are not roughly in accord.

### 4.2.3 Eurodollar Interest Rate Futures Contracts

To this point, we have considered only futures contracts written on foreign exchange.

Nevertheless, future contracts are traded on many different underlying assets. One particularly important contract is the Eurodollar interest rate

futures traded on the Chicago Mercantile Exchange and the Singapore International Monetary Exchange (SIMEX).

The Eurodollar contract has become the most widely used futures contract for hedging short-term U.S. dollar interest rate risk. It can be used by Eurobanks as an alternative (see problem 7 at the end of this chapter) to the forward rate agreement (FRA) we considered in Chapter 6 for hedging interest risk due to a maturity mismatch between Eurodollar deposits and rollover Eurocredits. Other Eurocurrency futures contracts that trade are the Euroyen, EuroSwiss, and the EURIBOR contract, which began trading after the introduction of the euro.

The CME Eurodollar futures contract is written on a hypothetical $1,000,000 ninety-day deposit of Eurodollars. The contract trades in the March, June, September, and December cycle. The hypothetical delivery date is the third Wednesday of the delivery month. The last day of trading is two business days prior to the delivery date. The contract is a cash settlement contract. That is, the delivery of a $1,000,000 Eurodollar deposit is not actually made or received. Instead, final settlement is made through realizing profits or losses on the margin account on the delivery date based on the final settlement price on the last day of trading. Exhibit 9.5 presents an example of CME Eurodollar futures quotations. Note that contracts trade out many years into the future

**EXAMPLE 2 Speculating and Hedging with Currency Futures**

Suppose a trader takes a position on August 19, 2002, in one December 2002 CD futures contract at $0.6336/CD. The trader holds the position until the last day of trading when the spot price is $0.6200/CD. This will also be the final settlement price because of **price convergence.** The trader's profit or loss depends upon whether he had a long or short position in the December CD contract. If the trader had a long position, and he was a speculator with no underlying position in Canadian dollars,

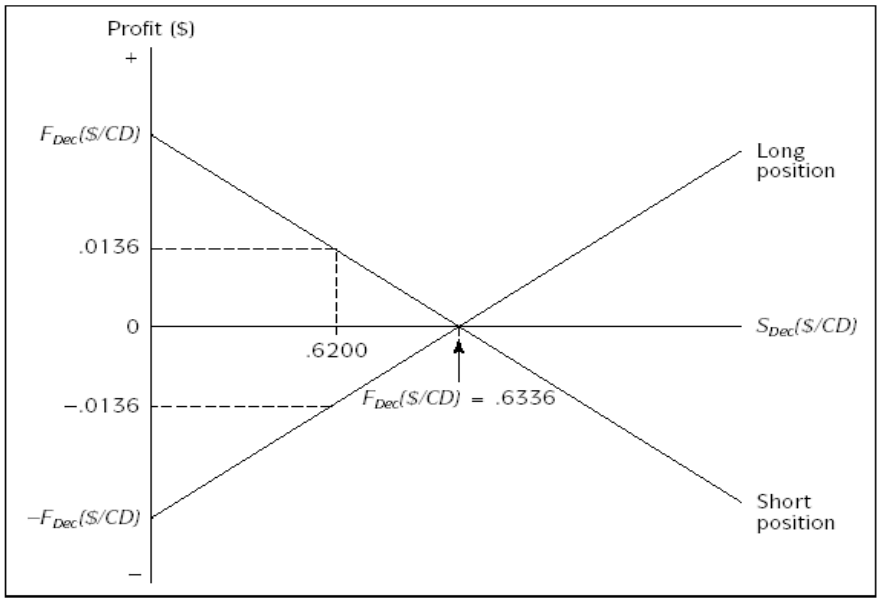
he would have a cumulative loss of _$1,360 [_ ($0.6200 _ $0.6336) _ CD100,000] from August 19 through December 18. This amount would be subtracted from his margin account as a result of daily marking-to-market. If he takes delivery, he will pay out-of-pocket $62,000 for the CD100,000 (which have a spot market value of $62,000). The effective cost, however, is $63,360 (_ $62,000 _$1,360), including the amount subtracted from the margin money. Alternatively, as a hedger desiring to acquire CD100,000 on December 18 for $0.6336/CD, our trader has locked in a purchase price of $63,360 from a long position in the December CD futures contract.

If the trader had taken a short position, and he was a speculator with no underlying position in Canadian dollars, he would have a cumulative profit of $1,360 [_$0.6336 _ $0.6300) _ CD100,000] from August 19 through December 18. This amount would be added to his margin account as a result of daily marking-to market. If he makes delivery, he will receive $62,000 for the CD100,000 (which also cost $62,000 in the spot market). The effective amount he receives, however, is $63,360 (_ $62,000 _ $1,360), including the amount added to his margin account. Alternatively, as a hedger desiring to sell CD100,000 on December 18 for $0.6336/CD, our trader has locked in a sales price of $63,360 from a short position in the December CD futures contract. Exhibit 9.4 graphs these long and short futures positions.  he pattern of Eurodollar futures prices suggests that it is expected to increase hrough time. Nevertheless, the treasurer believes that a 90-day rate of return of 2.36 percent is a decent rate to “lock in,” so he decides to hedge against lower hree-month LIBOR in June 2003. By hedging, the treasurer is locking in a certain eturn of $118,000 (_ $20,000,000 _ .0236 _ 90/360) for the 90-day period the MNC has $20,000,000 in excess funds.

To construct the hedge, the treasurer will need to buy, or take a long position, in urodollar futures contracts. At first it may seem

counterintuitive that a long position s needed, but remember, a decrease in the implied three-month LIBOR yield auses the Eurodollar futures price to increase. To hedge the interest rate risk in a $20,000,000 deposit, the treasurer will need to buy 20 June 2003 contracts.Assume that on the last day of trading in the June 2003 contract three-month LIBORs 2.10 percent. The treasurer is indeed fortunate that he chose to hedge. At 2.10 percent, a 90-day Eurodollar deposit of $20,000,000 will generate only $105,000 f interest income, or $13,000 less than at a rate of 2.36 percent. In fact, the treasurer ill have to deposit the excess funds at a rate of 2.10 percent. But the shortfall will be made up by profits from the long futures position. At a rate of 2.10 percent, the final ettlement price on the June 2003 contract is 97.90 (_ 100 _ 2.10). The profit earned n the futures position is calculated as: [97.90 _ 97.64] _ 100 bp _ $25 _ 20 contracts_ $13,000. This is precisely the amount of the shortfall.

Graph of Long and Short Position in the December 2002 Canadian Dollar Futures Contract




www.simex.com

This is the website of the Singapore International Monetary Exchange. It

provides detailed information about the derivative products traded on it.

## Eurodollar Interest Rate Futures Contracts

EXHIB**EXAMPLE3** Reading Eurodollar Futures Quotations Eurodollar futures prices are stated as an index number of three-month LIBOR, calculated as: *F* _ 100 _ LIBOR. For example, from Exhibit 5 we see that the June 2003 contract (with hypothetical delivery on June 18, 2003) had a settlement price of 97.64 on Monday, August 19, 2002. The implied three-month LIBOR yield is thus 2.36 percent. The minimum price change is one basis point (bp). On $1,000,000 of face value, a one-basis-point change represents $100 on an annual basis. Since the contract is for a 90-day deposit, one basis point corresponds to a $25 price change.

**EXAMPLE | 9.4** Eurodollar Futures Hedge As an example of how this contract can be used to hedge interest rate risk, consider the treasurer of a MNC, who on August 19, 2002, learns that his firm expects to receive $20,000,000 in cash from a large sale of merchandise on June 21, 2000. The money will not be needed for a period of 90 days. Thus, the treasurer should invest the excess funds for this period in a money market instrument such as a Eurodollar deposit.

The treasurer notes that three-month LIBOR is currently 1.77 percent. (See *Money Rates* in the inside back cover.) The implied three-month LIBOR rate in the June 2003 contract is considerably higher at 2.36 percent. Additionally, the treasurer notes that the pattern of future expected three-month LIBOR rates implied by the pattern of Eurodollar futures prices suggests that it is expected to increase through time. Nevertheless, the treasurer believes that a 90-day rate of return of 2.36 percent is a decent rate to "lock in," so he decides to hedge against lower three-month LIBOR in June 2003. By hedging, the treasurer is locking in a certain return of $118,000 (= $20,000,000 × .0236 × 90/360) for the 90-day period the MNC has $20,000,000 in excess funds.

To construct the hedge, the treasurer will need to buy, or take a long position, in Eurodollar futures contracts. At first it may seem counterintuitive that a long position is needed, but remember, a decrease in the implied three-month LIBOR yield causes the Eurodollar futures price to increase. To hedge the interest rate risk in a $20,000,000 deposit, the treasurer will need to buy 20 June 2003 contracts.

Assume that on the last day of trading in the June 2003 contract three-month LIBOR is 2.10 percent. The treasurer is indeed fortunate that he chose to hedge. At 2.10 percent, a 90-day Eurodollar deposit of $20,000,000 will generate only $105,000 of interest income, or $13,000 less than at a rate of 2.36 percent. In fact, the treasurer will have to deposit the excess funds at a rate of 2.10 percent. But the shortfall will be made up by profits from the long futures position. At a rate of 2.10 percent, the final settlement price on the June 2003 contract is 97.90 (= 100 − 2.10). The profit earned on the futures position is calculated as: [97.90 − 97.64] × 100 bp × $25 × 20 contracts = $13,000. This is precisely the amount of the shortfall.

## Check Your Progress – 1

1. What is future contract?

_____

_____

2. Distinguish between futures and forward contracts?

_____

_____

3. Explain briefly about the currency futures markets?

_____

_____

4. Write a short notes on eurodollar interest rate futures contracts?

_____

_____

## 4.3 OPTIONS CONTRACTS: SOME PRELIMINARIES

An **option** is a contract giving the owner the right, but not the obligation, to buy or sell given quantity of an asset at a specified price at some time in the future. Like a futures or forward contract, an option is a derivative, or contingent claim, security. Its value is derived from its definable relationship with the underlying asset—in this chapter, foreign currency, or some claim on it. An option to buy the underlying asset is a **call,** and an option to sell the underlying asset is a **put.** 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.** In options terminology, the buyer of an option is frequently referred to as the long and the seller of an option is referred to as the **writer** of the option, or the short.

Because the option owner does not have to exercise the option if it is to his disadvantage, the option has a price, or **premium.** There are two types of options, American and European. The names do not refer to the continents where they are traded, but rather to their exercise characteristics. A **European option** can be exercised only at the maturity or expiration date of the contract, whereas an **American option** can be exercised at any time during the contract. Thus, the American option allows the owner to do everything he can do with a European option, and more.

### 4.3.1 Currency Options Markets

Prior to 1982, all currency option contracts were over-the-counter options written by international banks, investment banks, and brokerage houses. Over-the-counter options are tailor-made according to the specifications of the buyer in terms of maturity length, exercise price, and the amount of the underlying currency. Generally, these contracts are written for large amounts, at least $1,000,000 of the currency serving as the underlying asset. Frequently, they are written for U.S. dollars, with the deutsche mark, British pound, Japanese yen, French franc, Canadian dollar, and Swiss franc serving as the underlying currency, though options are also available on less actively traded currencies.

Over-the-counter options are typically European style.

In December 1982, the Philadelphia Stock Exchange (PHLX) began trading options on foreign currency. Currently, trading is in seven major currencies and the euro against the U.S. dollar. Most trading is in *mid-month* options. These options trade in a March, June, September, and December expiration cycle with original maturities of 3, 6, 9, and 12 months, plus two near-term months so that there are always options with one-, two-, and three-month expirations. These options mature on the Friday before the third Wednesday of the expiration month. Exhibit 9.6 shows the currencies on which options are traded at the PHLX and the amount, or size, of

underlying currency per contract. Note that the size of PHLX option contracts are half the corresponding futures contract size, as noted in Exhibit 9.2. The trading hours of these contracts are 2:30 A.M. to 2:30 P.M. Philadelphia time, except for the Canadian dollar, which trades between 7:00 A.M. and 2:30 P.M. The volume of OTC currency options trading is much larger than that of organizedexchange option trading. According to the Bank for International Settlements, in 2001 the OTC volume was approximately $60 billion per day. By comparison exchangetraded currency option volume was approximately $1.2 billion per day, or about 10 million contracts per year. Nevertheless, the market for exchange-traded options is very important, even to the OTC market. As Grabbe (1996) notes, international banks and brokerage houses frequently buy or sell standardized exchange-traded options, which they then repackage in creating the tailor-made options desired by their clients.

However, at times OTC options and forward contracts provide trading advantages over their exchange-traded counterparts, as the International Finance in Practice box on page 000 makes clear.

**Philadelphia Stock Exchange Option Contract Specifications***

| Currency | Contract Size | Mid-Month | Month-End | Long-Term |
|---|---|---|---|---|
| *Premium Quoted in U.S. Dollars* | | | | |
| Australian dollar | AD50,000 | E,A | E,A | Not Traded |
| British pound | £31,250 | E,A | E,A | E |
| Canadian dollar | CD50,000 | E,A | E,A | Not Traded |
| Euro | EUR62,500 | E,A | E,A | Not Traded |
| Japanese yen | ¥6,250, 000 | E,A | E,A | E |
| Swiss franc | SF62,500 | E,A | E,A | Not Traded |

*E denotes European-style option, A denotes American style.
**Source:** Philadelphia Stock Exchange, *Standardized Currency Options*, www.phlx.com

The PHLX trades a variety of options contracts in order to provide a more complete market. In addition to the *mid-month* contracts, *long-term*

European-style contracts with original maturities of 18 to 24 months are traded in a June and December cycle on the British pound and the Japanese yen. The size of these contracts and the expiration procedure date are the same as the *mid-month* contracts. Additionally, *month-end* European and American-style options with original maturities of one, two, and three months began trading in 1992. All other contract terms remain the same as for the *midmonth* contracts.

The PHLX also trades currency options with custom-made contractual terms. Customized options allow users to customize the exercise price, expiration date up to two years, and the premium quotation in either units of currency or percent of underlying value for 56 currency pairs.

### 4.3.2 Currency Futures Options

The Chicago Mercantile Exchange trades American options on the currency futures contracts it offers. With these options, the underlying asset is a futures contract on the foreign currency instead of the physical currency. One futures contract underlies one options contract.

Most CME futures options trade with expirations based on the most current month of the March, June, September, December expiration cycle of the underlying futures contract and two noncycle months plus four weekly expirations. For example, in January options with expirations in January, February, and March would trade on futures with a March expiration. These options expire on the second Friday prior to the third Wednesday of the options contract month. Regular trading takes place each business day from 7:20 A.M. to 2:00 P.M. Chicago time. For most contracts, extended-hour trading on the GLOBEX2 system begins at 2:30 P.M. and continues until 7:05 A.M. Chicago time. On Sundays GLOBEX2 trading begins at 5:30 P.M. Options on currency futures behave very similarly to options on the physical currency since the futures price converges to the spot price as the futures contract nears maturity. Exercise of a futures option results in a long futures position for the call buyer or the put writer and a short

futures position for the put buyer or call writer. If the futures position is not offset prior to the futures expiration date, receipt or delivery of the underlying currency will, respectively, result or be required. In addition to the PHLX and the CME, there is some limited exchange-traded currency options trading at the BM&F Exchange in Brazil, on Euronext, and at the Tel-Aviv Stock Exchange.

### 4.3.3 Basic Option-Pricing Relationships at Expiration

To illustrate how currency options are priced, let's use quotations for PHLX options contracts presented in Exhibit7. The exhibit shows that both European- and Americanstyle options trade on the exchange. The American-style option quotations are the ones *without* a style designation specifically stated. At expiration, a European option and an American option (which has not been previously exercised), both with the same exercise price, will have the same terminal value. For call options the time *T* expiration value can be stated per unit of foreign currency as:

*CaT* _ *CeT* _ *Max*[*ST* _ *E,* 0], **.2)** where *CaT* denotes the value of the American call at expiration, *CeT* is the value of the European call at expiration, *E* is the exercise price per unit of foreign currency, *ST* is the expiration date spot price, and *Max* is an abbreviation for denoting the maximum of the arguments within the brackets. A call (put) option with S*T* _ *E*(*E* _ *ST*) expires **inthe- money** and it will be exercised. If *ST* _ *E* the option expires **at-the-money**. If S*T* _*E*(*E* _ *ST*) the call (put) option expires **out-of-the-money** and it will not be exercised.

Analogously, at expiration a European put and an American put will have the same value. Algebraically, the expiration value can be stated as:

*PaT* _ *PeT* _ *Max*[*E* _ *ST,* 0] **(4.3)** where *P* denotes the value of the put at expiration.

EXHIBIT 9.8A

**Graph of 67 September SF Call Option: Buyer'sPerspective**

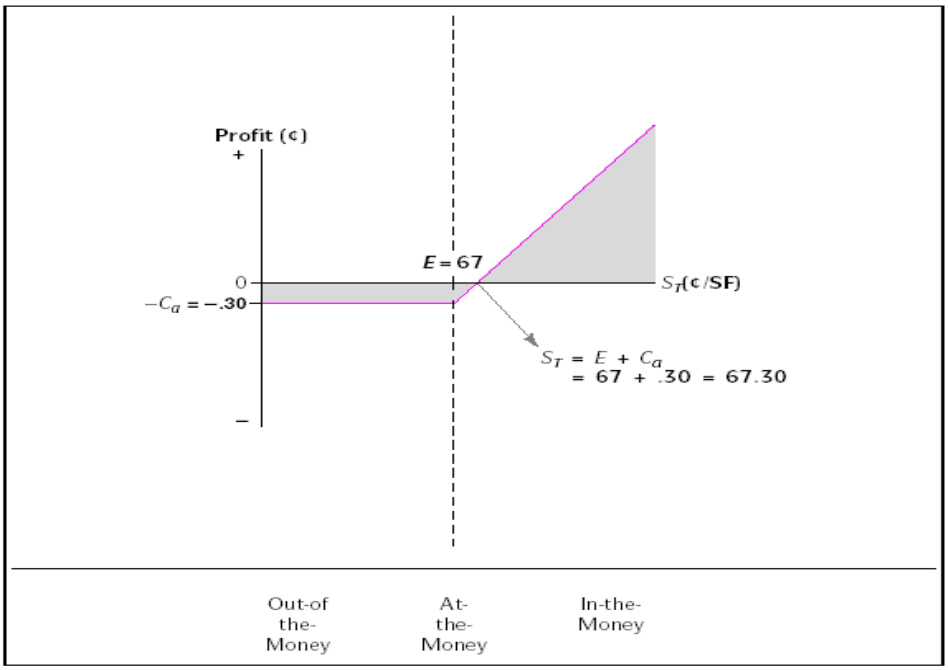
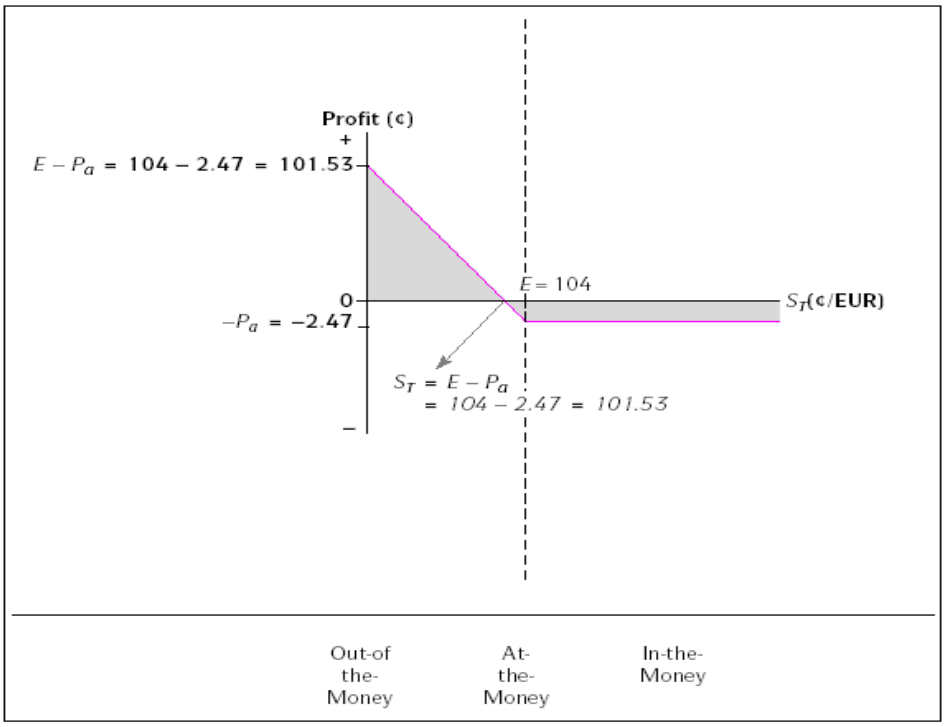



EXHIBIT 9.8B

**Graph of 104 September EUR Put Option: Buyer's Perspective**




### 4.3.4 American Option-Pricing Relationships

An American call or put option can be exercised at any time prior to expiration. Consequently, in a rational marketplace, American options will satisfy the following basic pricing relationships at time *t* prior to expiration:

*Ca* _ *Max*[*St* _ *E,* 0] and

*Pa* _ *Max*[*E* _ *St,* 0]

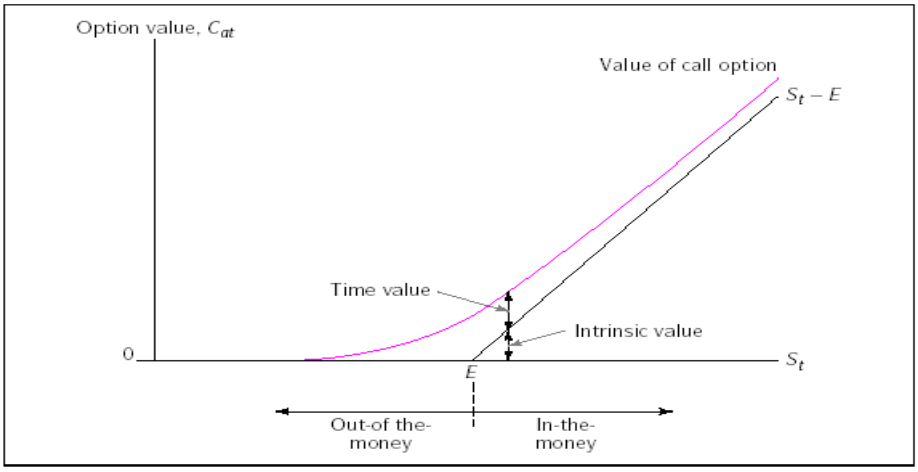
Verbally, these equations state that the American call and put premiums at time *t* will be at least as large as the immediate exercise value, or **intrinsic value,** of the call or put option. (The *t* subscripts are deleted from the call and put premiums to simplify the notation.)

Since the owner of a long-maturity American option can exercise it on any date that he could exercise a shorter maturity option he held on a currency, or at some later date after the shorter maturity option expires, it follows that all else remaining the same, the longer term American option will have a market price at least as large as the shorter term option.

A call (put) option with *St* _ *E*(*E* _ *St*) is referred to as trading in-the-money. If

*St* _ *E* the option is trading at-the-money. If *St* _ *E*(*E* _ *St*) the call (put) option is trading out-of-the-money. The difference between the option premium and the option's intrinsic value is nonnegative and sometimes referred to as the option's **time value.** For example, the time value for an American call is *Ca* _ *Max*[*St* _ *E,* 0]. The time value exists, meaning investors are willing to pay more than the immediate exercise value, because the option may move more in-the-money, and thus become more valuable, as time elapses. Exhibit 9.10 graphs the intrinsic value and time value for an American call option.

**Market Value, Time Value, and Intrinsic Value of an American Call Option**




## 4.3.5 European Option-Pricing Relationships

The pricing boundaries for European put and call premiums are more complex because they can only be exercised at expiration. Hence, there is a time value element to the boundary expressions. Exhibit 9.11 develops the lower boundary expression for a European call.

**Equation for a European Call Option Lower Boundary**

| | Current Time | Expiration | |
|---|---|---|---|
| | | $S_T \leq E$ | $S_T > E$ |
| *Portfolio A:* | | | |
| Buy Call | $-C_e$ | 0 | $S_T - E$ |
| Lend PV of $E$ in U.S. | $-E/(1 + r_{\$})$ | $E$ | $E$ |
| | $-C_e - E/(1 + r_{us})$ | $E$ | $S_T$ |
| *Portfolio B:* | | | |
| Lend PV of one unit of currency $i$ at rate $r_i$ | $-S_t/(1 + r_i)$ | $S_T$ | $S_T$ |

Exhibit 4.11 compares the cost and payoffs of two portfolios a U.S. dollar investor could make. Portfolio Ainvolves purchasing a European call option and lending (or investing) an amount equal to the present value of the exercise price, *E,* at the U.S. interest rate *r*$, which we assume corresponds to the length of the investment period. The cost of this investment is *Ce* _ *E*/(1 _ *r*$). If at expiration, *ST* is less than or equal to *E,* the call option will not have a positive exercise value and the call owner will let it expire worthless. If at expiration, *ST* is greater than *E,* it will be to the call owner's advantage to exercise the call; the exercise value will be *ST* _ *E* _ 0. The risk-free loan will pay off the amount *E* regardless of which state occurs at time *T.*

By comparison, the U.S. dollar investor could invest in portfolio B, which consists of lending the present value of one unit of foreign currency *i* at the foreign interest rate *ri,* which we assume corresponds to the length of the investment period. In U.S. dollar terms, the cost of this investment is *St* /(1 _ *ri*). Regardless of which state exists at time
*T,* this investment will pay off one unit of foreign currency, which in U.S. dollar terms will have value *ST*. It is easily seen from Exhibit 9.11 that if *ST* _ *E,* portfolios Aand B pay off the same amount, *ST*. However, if *ST* *E,* portfolio Ahas a larger payoff than portfolio B. It follows that in a rational marketplace, portfolio A will be priced to sell for at least as much as portfolio B, that is, *Ce* _ *E*/(1 _ *r*$) = *St* /(1 _ *ri*). This implies that
*Ce* *Max* _ _ ,0_ **(4.6)**
since the European call can never sell for a negative amount.

Similarly, it can be shown that the lower boundary pricing relationship for a European put is:

*E*

(1 _ *r*$)

*St*

(1 _ *ri*)

The derivation of this formula is left as an exercise for the reader. (Hint: Portfolio Ainvolves buying a put and lending spot, portfolio B involves lending the present value of the exercise price.)

Note that both *Ce* and *Pe* are functions of only five variables: *St, E, ri, r*$, and implicitly the term to maturity. From Equations 9.6 and 9.7, it can be determined that, when all else remains the same, the call premium *Ce* (put premium *Pe*) will increase:

1. The larger (smaller) is *St,*
2. The smaller (larger) is *E,*
3. The smaller (larger) is *ri,*
4. The larger (smaller) is *r*$, and
5. The larger (smaller) *r*$ is relative to *ri*.

Implicitly, both *r*$ and *ri* will be larger the longer the length of the option period. When

*r*$ and *ri* are not too much different in size, a European FX call and put will increase in price when the option term to maturity increases. However, when *r*$ is very much larger than *ri,* a European FX call will increase in price, but the put premium will decrease, when the option term to maturity increases. The opposite is true when *ri* is very much greater than *r*$.

Recall that IRP implies *FT* _ *St*[(1 _ *r*$)/(1 _ *ri*)], which in turn implies that *Ft* /(1

_ *r*$) _ *St* /(1 _ *ri*). Hence, European call and put prices on spot foreign exchange,

Equations 9.6 and 9.7 can be, respectively, restated as:3

*Ce* _ *Max* _ ,0_ **(4.8)**

and

*Pe* _ *Max* _ ,0_ **(4.9)**

### 4.3.6 Binomial Option-Pricing Model

The option pricing relationships we have discussed to this point have been lower boundaries on the call and put premiums, instead of exact equality expressions for the premiums. The binomial option-pricing model provides an exact pricing formula for an American call or put.4We will examine only a simple one-step case of the binomial model to better understand the nature of option pricing. We want to use the binomial model to value the a PHLX 67 September SF American call from Exhibit 9.7. We see from the exhibit that the option is quoted at a premium of .30 cents. The current spot price of the SF in American terms is *S* 0 _ 63.86 cents. We will further assume that the option's volatility (annualized standard deviation of the change in the spot rate) is _ _ 14 percent. The volatility on SF options has varied from less than 10 percent to over 14 percent over the past three years. This call option expires in 66 days on September 10, 1999, or in *T* _ 66/365 _ .1808 years. The one-step binomial model assumes that at the end of the option period the SF will have appreciated to *S uT* _ *S* 0 *u* or depreciated to *S dT* _ *S*0 *d,* where *u* _ *es__T* and *d* _ *1/u.* The spot rate at *T* will be either 67.78 _ 63.86 (1.06134) or 60.17 _ 63.86 (.94221), where *u* _ *e* .14_____ .1808 _ 1.06134 and *d* _ *1/u* _ .94221. At the exercise price of *E* _ 67, the option will only be exercised at time *T* if the SF appreciates; its exercise value would be *CuT* _ .78 _ 67.78 _ 67. If the SF depreciates it would not be rational to exercise the option; its value would be *CdT* _ 0.

The binominal option-pricing model only requires that *u* _ 1 _ *r*$ _ *d.* The twomonth

Eurodollar bid rate is 51/8 percent. Thus, 1 _ *r*$ _ (1.05125)*T* _ 1.00908. We see that 1.06134 _ 1.00908 _ .94221.

The binomial option-pricing model relies on the risk-neutral probabilities of the underlying asset increasing and decreasing in value. For our purposes, the risk-neutral probability of the SF appreciating is calculated as:

*q* _ (*F*T _ *S*0 *d*)/ *S*0(*u* _ *d*), where *FT* is the forward (or futures) price that spans the option period. We will use the September SF futures price on July 6, 1999, as our estimate of *FT*($/SF) _ $0.6433.Therefore, *q* _ (64.33 _ 60.17)/(67.78 _ 60.17) _ .5466.

It follows that the risk-neutral probability of the SF depreciating is 1 _ *q* _ 1 _ .5466 _ .4534.

Because the American call option can be exercised at any time, including time 0, the binomial call option premium is determined by:

C0 _ *Max*[*qCuT* _ (1 _ *q*)*CdT*]/(1 _ *r*$), *S*0 _ *E*] **(4.10)**

_ *Max*[.5466(0.78) _ .4534(0)]/(1.00908), 63.86 _ 67 ]

_ *Max*[.42, _3.14] _ .42 cents per SF.

Alternatively, (if *CuT* is positive) the binomial call price can be expressed as:

C0_ *Max*{[*FT* *h*_*E*((*S*0 *u*/*E*)(*h*_ 1) _ 1)]/(1 _ *r*$), S0 _ *E*}, **(4.11)**

where *h* _ (*CuT* _ *CdT*)/*S*0(*u* _ *d*) is the risk-free hedge ratio. The *hedge ratio* is the size of the long (short) position the investor must have in the underlying asset per option the investor must write (buy) to have a risk-free offsetting investment that will result in the investor receiving the same terminal value at time *T* regardless of whether the underlying asset increases or decreases in value. For our example numbers, we see that

*h* _ (.78 _ 0)/(67.78 _ 60.17) _ .1025.

Thus, the call premium is:

C0 _ *Max* {[64.33(.1025) _ 67((67.78/67)(.1025 _1) _ 1)]/(1.00908), 63.86 _ 67}_ *Max*[.42, _3.14] _ .42 cents per SF.

Equation 4.11 is more intuitive than Equation 4.10 because it is in the same general form as Equation 4.8. In an analogous manner, a binomial

put option-pricing model can be developed. Nevertheless, for our example, the binomial call option-pricing model yielded a price that was too large compared to the actual market price of .30 cents. This is what we might expect with such a simple model, and when using such an arbitrary value for the option's volatility. In the next section, we consider a more refined option-pricing model.

### 4.3.7 European Option-Pricing Formula

In the last section, we examined a simple one-step version of binomial option-pricing model. Instead, we could have assumed the stock price followed a multiplicative binomial process by subdividing the option period into many subperiods. In this case, *ST* and *CT* could be many different values. When the number of subperiods into which the option period is subdivided goes to infinity, the European call and put pricing formulas presented in this section obtain. Exact European call and put pricing formulas are:5

*Ce* _ S*te_ri*TN(*d*1) _ *Ee_r*$TN(*d*2) **(4.12)**

and

*Pe* _ *Ee_r*$TN(_*d*2) _ *Ste_ri*TN(_*d*1) **(4.13)**

The interest rates *ri* and *r*$ are assumed to be annualized and constant over the term to maturity *T* of the option contract, which is expressed as a fraction of a year.

Invoking IRP, where with continuous compounding *FT* _ *Ste*(*r*$_*ri*)*T*, *Ce* and *Pe*,

Equations 9.12 and 9.13 can be, respectively, restated as:

*Ce* _ [*FTN(d*1) _ *EN*(*d*2)]*e_r*$*T* **(4.14)**

and

*Pe* _ [*EN*(_*d*2) _ *FTN*(_*d*1)]*e_r*$*T* **(4.15)**

where

*d*1 _

and

*d*2 _ *d*1 _ _/__*T*.

*N*(*d*) denotes the cumulative area under the standard normal density function from __ to *d*1 (or *d*2). The variable _ is the annualized volatility of the exchange rate change

*ln*(S*t* _ *1*/S*t*). Equations 4.14 and 4.15 indicate that *Ce* and *Pe* are functions of only five variables: *F, E, r*$, *T,* and _. It can be shown that both *Ce* and *Pe* increase when _ becomes larger.

The value *N*(*d*) can be calculated using the NORMSDIST function of Microsoft Excel.

Equations 4.14 and 4.15 are widely used in practice, especially by international banks in trading OTC options.

### 4.3.8 Empirical Tests of Currency Options

Shastri and Tandon (1985) empirically test the American boundary relationships we developed in this chapter (Equations 4.4, 4.5, 4.6, 4.7, 4.8, and 4.9) using PHLX put and call data. They discover many violations of the boundary relationships, but conclude that nonsimultaneous data could account for most of the violations. Bodurtha and Courtadon (1986) test the immediate exercise boundary relationships (Equations 4.4 and 4.5) for PHLX American put and call options. They also find many violations when using last daily trade data. However, when they use simultaneous price data and incorporate transaction costs, they conclude that the PHLX American currency options are efficiently priced.

Shastri and Tandon (1986) also test the European option-pricing model using PHLX

American put and call data. They determine that a nonmember of the PHLX could not earn abnormal profits from the hedging strategies they examine. This implies that the

European option-pricing model works well in pricing American currency options. Barone-Adesi and Whaley (1987) also find that the European option-pricing model works well for pricing American currency options that

are *at* or *out-of-the money,* but does not do well in pricing *in-the-money* calls and puts. For *in-the-money* options, their approximate American option-pricing model yields superior results.

### Check Your Progress – 2

1. What is currency options market?

   _____

   _____

2. Explain about the currency futures options?

   _____

   _____

3. Explain briefly about the American option pricing relationships?

   _____

   _____

4. Explain briefly about the European option pricing relationships?

   _____

   _____

5. Explain briefly about the binomial option pricing model?

   _____

   _____

## 4.4 SUMMARY

This chapter introduced currency futures and options on foreign exchange. These instruments are useful for speculating and hedging foreign exchange rate movements.

1. Forward, futures, and options contracts are derivative, or contingent claim, securities. That is, their value is derived or contingent upon the value of the asset that underlies these securities.

2. Forward and futures contracts are similar instruments, but there are differences. Both are contracts to buy or sell a certain quantity of a specific underlying asset at some specific price in the future. Futures contracts, however, are exchange-traded, and there are standardized features that distinguish them from the tailor-made terms of forward contracts. The two main standardized features are contract size and maturity date.
3. Additionally, futures contracts are marked-to-market on a daily basis at the new settlement price. Hence, the margin account of an individual with a futures position is increased or decreased, reflecting daily realized profits or losses resulting from the change in the futures settlement price from the previous day's settlement price.
4. A futures market requires speculators and hedgers to effectively operate. Hedgers attempt to avoid the risk of price change of the underlying asset, and speculators attempt to profit from anticipating the direction of future price changes.
5. The Chicago Mercantile Exchange and the Philadelphia Board of Trade are the two largest currency futures exchanges.
6. The pricing equation typically used to price currency futures is the CIRP relationship, which is used also to price currency forward contracts.
7. Eurodollar interest rate futures contracts were introduced as a vehicle for hedginshort-term dollar interest rate risk, in much the same way as forward rate agreements, introduced in Chapter 6.
8. An option is the right, but not the obligation, to buy or sell the underlying asset for a stated price over a stated time period. Call options give the owner the right to buy, put options the right to sell. American options can be exercised at any time during their life, European options can only be exercised at maturity.

9. Exchange-traded options with standardized features are traded on two exchanges. Options on spot foreign exchange are traded at the Philadelphia Stock Exchange, and options on currency futures are traded at the Chicago Mercantile Exchange.
10. Basic boundary expressions for put and call option prices were developed and examined using actual options-pricing data.
11. A European option-pricing model for put and call options was also presented and explained using actual market data.

## 4.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

### *CYP – 1*

5. Refer to section 4.2
6. Refer to section 4.2
7. Refer to section 4.2.1
8. Refer to section 4.2.3

### *CYP – 2*

1. Refer to section 4.3.1
2. Refer to section 4.3.2
3. Refer to section 4.3.4
4. Refer to section 4.3.5
5. Refer to section 4.3.6

## 4.6 Model Examination Questions

1. Explain the basic differences between the operation of a currency forward market and a futures market.

2. In order for a derivatives market to function, two types of economic agents are needed: hedgers and speculators. Explain.
3. Why are most futures positions closed out through a reversing trade rather than held to delivery?
4. How can the FX futures market be used for price discovery?
5. What is the major difference in the obligation of one with a long position in a futures (or forward contract) in comparison to an options contract?
6. What is meant by the terminology that an option is in-, at-, or out-of-the-money?
7. List the arguments (variables) of which an FX call or put option model price is a function. How does the call and put premium change with respect to a change in the arguments?

## UNIT 5: CURRENCY AND INTEREST RATE SWAPS

### *Contents*


5.0 Aims and Objectives
5.1 Introduction
5.2 Major Types of Swap Structures
    5.2.1 Interest Rate Swaps
    5.2.2 Currency Swaps
5.3 Motivations Underlying Swaps
5.4 Evolution of Swap Markets
5.5 Applications of Swaps: Some Illustrations
5.6 Valuation of Swaps
5.7 Summary / Conclusions
5.8 Answers to Check Your Progress Questions
5.9 Model Examination Questions

## 5.0 AIMS AND OBJECTIVES

The purpose of this chapter is to present an exposition of the basic structures of financial swaps and their typical applications. The chapter also indicates how these products are valued and priced.

At the end of the unit, you will have acquired familiarity with:

- the basic or 'vanilla' swap products, viz. interest rate swaps, currency swaps and cross – currency interest rate swaps.
- motivations underlying the use of these products.
- typical applications of the basic structures.
- other common variants of swaps.
- principles of valuation and pricing.

## 5.1 INTRODUCTION

In previous Chapters, we analyzed a foreign exchange transaction known as swap. It involved a spot purchase (sale) of a currency A (say USD) coupled with a forward sale (purchase) of currency A, both against currency B (say DEM). It was like a temporary exchange of two currencies. We also say that it could be replicated by a lending – borrowing transaction – borrow currency A and lend currency B. During the Bretton Woods era of fixed exchange rates, such exchanges or swaps were frequently arranged between central banks of IMF member countries. For instance, suppose the French franc came under speculative attacks and the French central bank had to repeatedly intervene to defend the FRF/USD exchange rate by selling dollars and buying French francs; if the attacks continued, it would have to borrow dollars from another central bank like the US Federal Reserve. This could be arranged as either

- A loan of USD from Federal Reserve to Central Bank of France coupled with a loan of FRF from Bank of France to Federal Reserve,

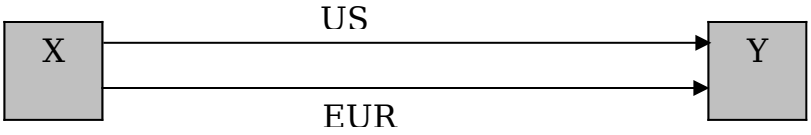
with right of offset i.e. a provision in the contract that if the Bank of France does not repay its USD loan, Federal Reserve is absolved of its obligation to repay the FRF loan. The interest rates on the two loans would be the respective risk – free money market rates.

Or

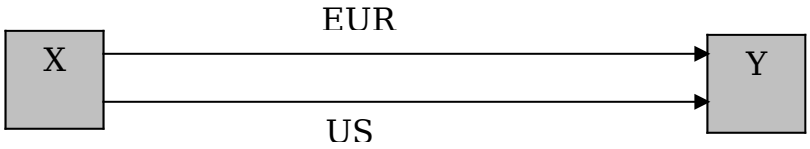
- As a spot purchase of USD by Bank of France from the Federal Reserve coupled with a forward sale both against FRF. The right of offset being implicit in a forward contract, does not have to be explicitly included and validated with some legal force. The forward margin would reflect the interest rate differential. This is an example of a one – off short – term swap.

Now consider the following situation. On January 1, 1999, an investor X borrows USD in order to invest in a Euro asset such as a five year French government bond denominated in Euro which pays semi – annual coupon and matures on December 31, 2003. The USD loan also requires semi – annual interest payments and bullet repayment on December 31, 2003. The first step is a spot sale of dollars against Euro to some investor Y in order to purchase the bonds. X now has a stream of Euro inflows and dollar outflows every six months for five years. In order to eliminate exchange rate risk, X enters into a series of ten forward contracts with Y, maturing at intervals of six months starting June 30, 1999, in which X sells a fixed quantity of Euro and buys a fixed amount of USD. First nine of thee contracts cover only the interest payments on the dollar loan while the last covers interest and repayment of principal. Exhibit 10.1 illustrates that. X has executed what has come to be known as a Fixed – to Fixed Currency Swap. In effect, X has exchanged or swapped a Euro asset into a dollar asset to match his dollar liability. The basic principle underlying all modern financial swaps is the same, viz. an exchange of one cash flow steam for another cash flow steam.

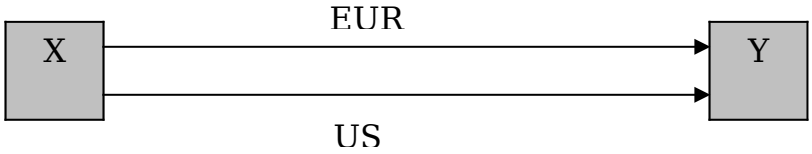
**Exhibit 5.1**



At the Start: January 1,



Every Six Months Starting June



At the End of Five Years December

Usually, but not always, the present values of the two cash flow streams computed using appropriate discount rates[1] are identical at the time the swap is traded. Consequently, like a forward contract traded at the market rate, a standard swap has zero value to begin with. In an off – market swap, there would be an up – front payment from one party to the other.

The precursors of the modern financial swap can be found in certain transactions used in the 1970's mainly to get around exchange controls. One of these was the Back – to – Back Loan. Suppose an investor in the UK wants to make a portfolio investment in a country say the US. However, exchange controls at that time in the UK made it an expensive proposition since the UK investor had to pay a premium for dollars purchased for investment purposes. Instead it could borrow US dollars from a bank in the US in return for a GBP 'loan to the US bank's branch in London – a GBP deposit with the US bank's London branch for a duration equal to that of the US dollar loan from the parent bank. It could then invest the US dollars in the US capital market without having to buy USD in the UK foreign exchange market and pay a premium. This

was known as a Back – to Back Loan. Since the two loans were separate transactions which were subject to different legal jurisdictions, it was difficult to incorporate the right of offset clause in the contract. A variant of this was the Parallel Loan. Suppose a UK firm has a subsidiary in the US and the subsidiary needs financing in US dollars. The UK parent has surplus funds but finds it impossible or expensive to transfer funds to the subsidiary because of exchange controls. Consequently, it locates a US firm with a UK subsidiary which needs funding in the UK. Under a parallel loan transaction, the UK parent gives a GBP loan to the US parent's UK subsidiary in return for a USD loan from the US parent to the UK parent's subsidiary. Interest is paid at market rates applicable to such loans. Once again, it is very difficult to incorporate the right of offset into the arrangement. From these beginnings the modern financial swap arose as a transaction in which two parties agreed to exchange a stream of cash flows at specified points in time over a specified period of time, with the right of offset which absolved each party from its commitment if the other party defaulted on its obligation.

This chapter will review the major types of financial swaps, illustrate their applications and provide an elementary discussion of their pricing and valuation.

## 5.2 MAJOR TYPES OF SWAP STRUCTURES

All swaps involve exchange of a series of periodic payments between two parties, usually through an intermediary which is a large international financial institution. The two payment streams are estimated to have identical present values at the outset when discounted at the respective cost of funds in the relevant primary financial markets. The two major types are Interest Rate Swaps (also known as Coupon Swaps) and Currency Swaps. These two are combined to give a Cross – Currency Interest Rate Swap. A number of variations are possible within each

major type. We will examine the structure of each of these in some detail and indicate some of the variations.

### 5.2.1 Interest Rate Swaps

A standard fixed – to – floating interest rate swap, known in the market jargon as a plain vanilla coupon swap (also referred to as 'exchange of borrowings') is an agreement between two parties in which each contracts to make payments to the other on particular dates in the future until a specified termination date. One party, known as the fixed rate payer, makes fixed payments all of which are determined at the outset. The other party known as the floating rate payer will make payments the size of which depends upon the future evolution of a specified interest rate index (such as the 6 – month LIBOR).[2] The key features of this swap are:[3]

#### The Notional Principal

The fixed and floating payments are calculated as if they were interest payments on a specified amount borrowed or lent. It is notional because the parties do not exchange this amount at any time; it is only used to compute the sequence of payments. In a standard swap, the notional principal remains constant throughout the life of the swap.

#### The Fixed Rate

It is the rate applied to the notional principal which is used to calculate the size of the fixed payment. Banks who make market in interest rate swaps quote the fixed rate that they are willing to pay if they are fixed rate payers in a swap and the fixed rate they are willing to receive if they are fixed rate payers in a swap and the fixed rate thy are willing to receive if they are floating rate payers in a swap. These are, respectively, their bid and offer swap rates. Thus for instance, a bank might quote a US dollar floating to fixed 5 – year swap rates as:

Treasuries + 30bp/Treasuries + 50bp. vs. 6 – month LIBOR

This quote means:

1. The bank is willing to make fixed payments at a rate equal to the current yield on 5 – year treasury notes plus 30 basis points (0.30%) in return for receiving floating payments at 6 – months LIBOR.
2. The bank is willing to accept fixed payments at a rate equal to 5 – year treasury notes plus 50 basis points in return for paying 6 – month LIBOR.

The swap rates are close to long – term interest rates charged to top quality borrowers.

Obviously, if the counterparty wishes to receive or make fixed payments at a rate other than the rates quoted by the bank, the bank will adjust the floating leg by adding or subtracting a margin over LIBOR. Suppose 5 – year treasury notes are yielding 8.50%. The bank is willing to pay 8.80% fixed in return for LIBOR; but a firm wishes to receive fixed payments at 9.25%. For this to happen, the bank will require floating payments at LIBOR + 1 margin. This is an example of what are called off market swaps.

### Floating Rate

In a standard swap at market rates, the floating rate is one of the market indexes such as LIBOR, prime rate, T – bill rate etc. The maturity of the underlying index equals the interval between the payment dates.[4]

### Trade Date, Effective Date, Reset Dates and Payment Dates.

Fixed rate payments are generally paid semi – annually or annually. For instance, they may be paid every March 1, and September 1, from March 1, 1996 to September 1, 2000, this being termination date of the swap. The trade date is the date on which the swap deal is concluded and the effective date is the date from which the first fixed and floating payments start to accrue. For instance, a 5 – year swap is traded on August 30, 1998 and the effective date is September 1, 1998, and ten payment dates is from March 1, 1999 to September 1, 2003. Floating rate payments in a

standard swap are ‘set in advance paid in arrears’. Each floating rate payment has three dates associated with it as shown in Exhibit 5.2.

**Exhibit 5.2**




Ds, the setting date is the date on which the floating rate applicable for the next payment is set. This the “reset” date. $D_1$ is the date from which the nest floating payment starts to accrue and $d_2$ is the date on which the payment is due. $D_s$ is usually two business days before $D_1$. $D_1$ is the day when the previous floating rate payment is made (for the first floating payment, $d_1$ is the effective above). If both the fixed and floating payments are semi – annual, $D_2$ will be the payment date for both the payments and the interval $D_1$ to $D_2$ would be six months. It is possible to have the floating payment set and paid in arrears i.e. the rate is set and payment made on $D_2$. This is another instance of an ‘off – market’ feature.

Fixed and Floating Payments

The fixed and floating payments are calculated as follows:

$$\text{Fixed Payment} = P \times R_{fx} \times F_{fx}$$

$$\text{Floating Payment} = P \times R_{fl} \times F_{fl}$$

Here, P is the notional principal, $R_{fx}$ is the fixed rate, $R_{fl}$ is the floating rate set on the reset date, $F_{fx}$ is known as the ‘Fixed rate day count fraction’ and $F_{fl}$ is the ‘Floating rate day count fraction’.

The last two are time periods over which the interest is to be calculated. For floating payments, it is either [($D_2$ – $D_1$)/360] or [$D_2$ – $D_1$)/365],[5] i.e. [Actual no. of days/360 or 365] depending upon the currency while, for the fixed payments, it is either one of these or a third convention known as '30/360' basis.[6] the 'Actual/365' basis is known as 'bond basis' and the 'Acutal/360' basis is called 'money market basis' in the US.

Further it should be noted that, in an interest rate swap, there is no exchange of underlying principal; only the streams of interest payments are exchanged between the two parties.

A number of variants of the standard structure are found in practice. The notional principal may change instead of remaining constant.[7] And the maturity of the floating index may not be identical to the interval between the two floating payments. The floating rate may be set not as equal to the value of the index on the setting date but as average of values on specified dates prior to the setting date.[8] in an off – market swap, the floating payments would have a margin over or under the index. A zero – coupon swap has only one fixed payment at maturity. A basis swap involves an exchange of two floating payments, each tied to a different market index, e.g. LIBOR and prime rate. In a callable swap, the fixed rate payer has the option to terminate the agreement prior to scheduled maturity while in a put exhibit swap, the fixed rate receiver has no such option. In an extendible swap, one of the partiers has the option to extend the swap beyond the scheduled termination date. In a forward start swap, the effective date is several months and even years after the trade date so that a borrower with a future funding need can take advantage of the prevailing favourable swap rates. Of course, all these option – like features have to be paid for by adjusting the size of the payments to be made or received.

We will look at an example in order to illustrate the above features of a standard interest rate swap.

### A Three Year Fixed – to Floating Interest Rate Swap

Notional principal P = $50 million

Trade Date: August 30, 1998.

Effective Date: September 1, 1991.

Fixed Rate: 9.5% p.a. payable semiannually.

Floating Rate: 6 – Month LIBOR.

Fixed and Floating Payment Dates: Every March 1 and September 1 starting March 1, 1999 until September 1, 2001.

Floating Rate Reset Dates: 2 business days prior to the previous floating payment date.

The fixed payments are as follows:

| Payment Date | Day Count Fraction | Amount |
|---|---|---|
| 1/3/1992 | 182/360 | $2401388.90 |
| 1/9/1992 | 184/360 | $2427777.80 |
| 1/3/1993 | 181/360 | $2388194.40 |
| 1/9/1993 | 184/360 | $2427777.80 |
| 1/3/1994 | 181/360 | $2388194.40 |
| 1/9/1994 | 184/360 | $242777.80 |

Suppose the floating rates evolve as follows:

| Reset Date | LIBOR (% p.a.) |
|---|---|
| 30/8/1998 | 9.80 |
| 28/2/1999 | 9.20 |
| 30/8/1999 | 9.50 |
| 27/2/2000 | 8.90 |
| 30/8/2000 | 9.70 |
| 27/2/2001 | 10.20 |

This will give rise the following floating payments:

| Payment Date | Amount ($) |
|---|---|
| 1/3/1999 | 2477222.20 |
| 1/9/1999 | 2351111.10 |
| 1/3/2000 | 2388194.40 |
| 1/9/2000 | 2274444.40 |
| 1/3/2001 | 2438472.20 |
| 1/9/2001 | 2606666.70 |

Normally, the payments would be netted out with only the net payment being transferred from the deficit to the surplus party.

### 5.2.2 Currency Swaps

In a currency swap, the two payment streams being exchanged are denominated in two different currencies. Usually, an exchange of principal amounts at the beginning and a re – exchange at termination are also a feature of a currency swap.

A typical fixed – to fixed currency swap works as follows. One party raises a fixed rate liability in USD while the other raises a fixed rate funding in DEM. The principal amounts are equivalent at the current spot rate of exchange. At the initiation of the swap contract, the principal amounts are exchanged with the first party getting DEM and the second party getting dollars. Subsequently, the first party makes periodic DEM payments to the second, computed as interest at a fixed rate on the DEM principal while it receives payments in dollars from the second party, which is computed as interest on the dollar principal. At maturity, the dollar and DEM principals are re – exchanged. A floating – to – floating currency swap will have both payments at floating rate but in different currencies. Contracts without the exchange and re – exchange of principals do exist. In most cases, an intermediary – a swap bank – structures the deal and routes the payments from one party to another.

A fixed – to floating currency swap is combination of a fixed – to fixed currency swap and a fixed – to floating interest rate swap. Here, one payment stream is at a fixed rate in currency X while the other is at a floating rate in currency Y.

For both the interest rate and currency swaps, we have given the examples of liability swaps, i.e. effective exchanging of one kind of liability for another. The same structures can be employed for asset swaps. For instance, a financial institution may have floating dollar

assets like corporate FRNs funded with fixed rate dollar liabilities. It can contract to exchange the stream of floating payments with a stream of fixed rate payments with another party which has the opposite problem. An investor with CHF assets funded with USD denominated liabilities can enter into a currency swap to match the currency denomination of assets and liabilities.

## 5.3 MOTIVATIONS UNDERLYING SWAPS

Why would a firm want to exchange one kind of liability or asset for another? Several explanations have been advance for the existence of a large and growing volume of activity in the swap markets. Most of these hypotheses rely on either a capital market imperfection or factors like differences in investor attitudes, informational asymmetries, differing financial norms, peculiarities of national regulatory and tax structures and so forth to explain why investors and borrowers use swaps.

Borrowers and investors differ in their preferences and market access. For instance, a manufacturing firm or a utility might prefer fixed rate funding to finance long – gestation investment projects. It finds that fixed rate investors do not view fixed rate funding very kindly, while it is able to borrow relatively easily in the floating rate market.[9] On the other side is a large international financial institution such as a money center bank which can borrow on excellent terms in the fixed rate market but prefers floating rate funding because it has a large portfolio of floating rate loans. Consider another firm which has borrowed from a Japanese government agency to finance imports of capital equipment from Japan. It exports to the Middle Eastern and African markets and expects to earn a steady income stream in US dollars. It might like to match the currency of its foreign exchange receivable and payables to hedge the exchange risk. An American firm might find that while it can raise funds easily in the large

US dollar domestic market, it is relatively unknown in Europe and faces rather high costs for a fixed rate CHF funding that it would like to raise. An investor with a portfolio of fixed rate assets might have strong views that rates are going to rise and so he or she may wish to shift to floating rate assets. To sum up, because of differences in preferences, market access and expectations, there are – at any time – borrowers and investors with mismatched assets and liabilities who would like to reshuffle their balance sheets or acquire new assets/liabilities to which direct access may be very difficult or expensive. Finally, swaps are also a low – cost device of achieving certain objectives which can be achieved by other means but at a higher transaction cost. For instance, a firm may wish to retire its foreign currency loan and refund itself in the home currency market. Apart from any penalties attached to prepayment, transactions costs would be higher if it retires an old issue and makes a new issue; the same objective can be achieved via a swap at a lower cost.

Obviously, swaps must help borrowers and investors overcome the difficulties posed by market access and/or provide opportunities for arbitraging some market imperfection. We will briefly look at some arguments offered to explain how swaps achieve this.

Quality Spread Differential (QSD)

This is one of the commonly offered explanations of the fixed – floating interest rate swaps. The argument can be illustrated by means of an example. Consider XYZ Inc., a ma nufacturing firm which wants to raise a 5 – year fixed rate dollar funding to finance an expansion project. Its credit rating is not very high, say BBB. It finds that it will have to pay 2% over 5 year treasury notes which are currently yielding 9%. In the floating rate market, it can issue 5 – year FRNs at a margin of 0.75% over the prime rate. N the other hand, ABC Inc., a large bank looking for floating rate funding finds that it will have to pay prime rate while in the fixed rate market, it can raise 5 – year funds at 50bp (0.50%) above T –

notes due to its AAA rating. Thus the spread demanded by the market between an AAA and a BBB credit is 150bp in the fixed rate segment while it is only 75bp in the floating rate segment. This differential is known as quality spread differential (QSD). The requirements and access of the two parties are summarized as follows:

| | XYZ | ABC |
|---|---|---|
| Requirement | Fixed Rate $ | Floating Rate $ |
| Cost fixed $ | 8% | 6.5% |
| Cost Floating $ | Prime + 0.75% | Prime |

Bank ABC has an absolute advantage over the corporation XYZ in both the markets but the corporation has a comparative advantage in the floating rate market.[10] both can achieve cost saving by each borrowing in the market where it has a comparative advantage and then doing a fixed – to floating interest rate swap. Suppose the notional principal is USD 100 million. The terms of the swap arranged by a swap bank can be as follows.

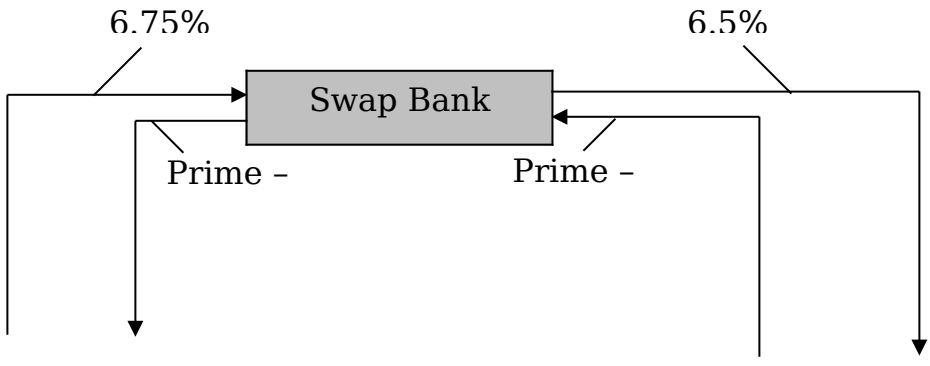
ABC borrows USD 100 million at 6.5%s.a. fixed.

XYZ borrows USD 100 million floating at Prime + 0.75 payable semi-annually.

ABC pays the swap bank (Prime – 0.25%) on USD 100 million every six months. The swap bank passes this on to XYZ. XYZ pays the swap bank 6.7%s.a. on USD 100 million. The swap bank pays ABC 6.5%s.a.

Exhibit 5.3 illustrates a typical fixed – to floating coupon swap.

**Exhibit 5.3 A Fixed – to – Floating Interest Rate Swap**






The key result is that both the parties have achieved their objectives with some cost saving:

XYZ Corp.: 6.75% + [prime + 0.75 – (prime – 0.25)] %

= 7.75% fixed rate, 25bp below its own cost of fixed rate funds.

ABC Bank: 6.5% - 6.5% + prime – 0.25%

= prime – 0.25%, 25bp below its own cost of floating funds.

Thus, the swap bank earns a margin of 25bp.

The cost savings could be achieved by exploiting the comparative advantage. By ABC borrowing in the rate market, there was a saving of 1.5% (= 8 – 6.5) and by XYZ borrowing in the floating market, there was a loss of 0.75% (= prime + 0.75 – prime) for a net gain of 0.75%. Notice that the gains of all three parties together equals this total gain. The division of the total gain between these parties is subject to negotiation depending upon supply and demand factors. The equal division assumed in the example is purely illustrative.[11]

QSD was one of the earliest explanations offered for interest rate swaps [Bicksler and Chen (1986)]. It continues to be featured in most non – rigorous discussions of swaps. However, the reasons for its existence and why the gains are not arbitraged away continue to be debated. The interested reader can consult the references at the end of this chapter to pursue this debate in greater depth.

### Market Saturation

One of the earliest currency swaps was the one between the World Bank and IBM executed in 1981. At the time the World Bank was looking for fixed rate funding in CHF and DEM to on – lend the funds to its clients. World Bank loans are serviced in the currency of borrowing so that exchange risk is entirely borne by the borrowing country. World Bank therefore had traditionally tended to borrow extensively in low nominal interest rate currencies such as the CHF and the DEM. Because of its frequent resort to these relatively small markets (compared to the US dollar domestic bond market), they had become 'saturated' with World Bank paper. Consequently, despite its top AAA rating, World Bank faced rather stiff terms for borrowing fixed rate CHF and DEM. IBM had existing liabilities in these currencies contracted at a time when the dollar was weak against these currencies. Since then, due to the appreciation of the dollar, it had made a capital gain on its liabilities which it wanted to lock in. Objectives of both parties were achieved by the World Bank making a dollar bond issue in the US market and then swapping this liability for IBM's existing liabilities in CHF and DEM.[12] We will look into the exact mechanics of the deal later in this chapter. Another explanation for currency swaps derives from the differences that were said to exist between attitudes of continental and US investors towards formal credit rating.[13] Continental investors are said to be less sensitive to formal credit rating and attach greater weight to a company's name, reputation etc. while US investors are said to be very particular about formal rating.[14] as a result of this, a company with world – wide reputation such as Coca Cola or General Motors, might find that even when its rating is not top quality, the spread that it has to pay over a top – rated borrower is less in the continental markets than in the US market. Consequently, it would be better off borrowing in say CHF or DEM and swapping into US dollars.

A typical currency swap situation is illustrated by this example:

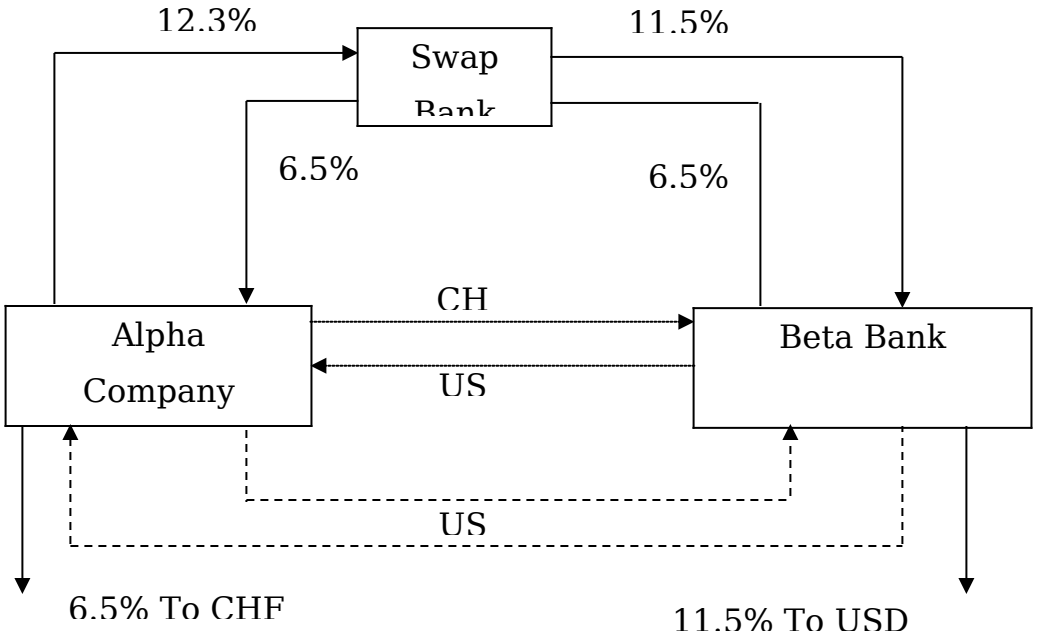
| Requirement: | Alpha Corp. Fixed rate USD Funding | Beta Bank Fixed rate CHF Funding |
|---|---|---|
| Cost of $ Funding: | 12.5% | 11.5% |
| Cost of CHF Funding: | 6.5% | 6% |

Once again, an overall saving of 1% can be achieved by the Beta bank borrowing in the dollar market, Alpha corporation in the CHF market and the two swapping the liabilities.

Exhibit 5.4 shows the structure.

Alpha corporation has effectively acquired fixed dollar funding at 12.30%, 20bp below its own cost while the Beta bank has acquired fixed rate Swiss franc funding at 20bp below its cost. The swap bank makes a gain of 10 bp[15] for a total gain of 50bp.

**Exhibit 5.4 A Currency Swap**



Investors use a variety of financial ratios such as the debt: equity ratio, interest coverage ratio etc. to assess financial health of a firm. Norms regarding 'acceptable' values of these ratios differ across countries. For instance, Japanese companies tend to have much higher debt:equity ratios than what would be considered acceptable in the US.[16] a Japanese firm wanting to raise dollar funding might find a direct approach to the US market unattractive because its rating may be affected by its high debt: equity ratio. It might be cheaper to borrow at home in Yen and then execute a swap.

### Hedging Price Risks

The factors considered so far made swaps an attractive funding tool from the point of view of lowering financing costs. An equally important objective underlying swaps is hedging of interest rate and exchange rate risks. Swapping out of a floating rate debt (or asset) into a fixe[1] rate debt (or asset) could be motivated purely by the desire to eliminate interest rate risk rather than saving on the borrowing costs (or improving return on investment). Similarly, swapping out of say a DEM denominated liability into a dollar denominated liability is a way of eliminating exchange rate exposure if the firm has certain future inflows in dollars. In a basis swap mentioned above, a bank with LIBOR tied assets funded with prime – tied liabilities may wish to eliminate basis risk (created by the fact that prime rate and LIBOR are not perfectly correlated) by doing a swap. Arditti (1996) has argued that swaps are possibly the only low – cost hedging device for long – dated risks and hence their continuing popularity. However, it must be kept in mind that the decision to undertake the kind of financing (or acquiring a portfolio of assets) which creates the exposure in the first place is usually motivated by some capital market imperfection or some special factor.[17]

### Other Considerations

A few other possibilities have been pointed out where swaps provide an efficient way of achieving the firm's objectives. In some capital markets like Japan, the authorities regulate the timings of foreign issues by means of a queue system. Suppose an American firm is way back in the queue and needs yen funding urgently. It can 'jump the queue' by entering into a currency swap with a firm which is at the head of the queue and is willing to accept dollar funding. A firm may be able to access markets via swaps which it otherwise cannot enter profitably. Occasionally, differences in tax law across countries create profitable swap opportunities. A firm which believes that the market is overestimating its credit risk may borrow floating say at LIBOR + 2% and swap into fixed. At subsequent rollovers it hopes to see its credit spread come down to say 1% thereby realizing a net saving. Thus informational asymmetries may be another reason driving the interest rate swap market. Finally, swaps can be used to convert callable debt into non – callable debt. If firms believe that the investors underprice the call option which they grant to the issuers of callable debt (and thus demand lower premium over comparable non – callable debt. Some examples later in the chapter will illustrate these possibilities.

## *Check Your Progress - 1*

1. Define swap?

_____

_____

2. List various types of swaps transactions?

_____

_____

3. Explain briefly about the interest rate swap?

_____

_____

## 5.4 EVOLUTION OF SWAP MARKETS

Most analysts agree that the origins of the swap markets can be traced back to 1970s when many countries imposed exchange regulations and restrictions on cross – border capital flows. Borrowers and investors wishing to diversify the currency composition of their assets and liabilities had to find ways of circumventing these controls. As we have seen above, devices like the back – to back loan and parallel loan were used for that purpose.

As exchange controls were liberalized in the 1980's, currency swaps with the same functional structure replaced parallel and back – to – back loans. Swaps were more flexible and required simpler documentation. The entire deal is covered by a single documentation, subject to a single jurisdiction and has a right of offset built into the contract. Further impetus to the growth of swaps was given by the realization that swaps enable the participants to lower financing costs by arbitraging a number of capital market imperfections, regulatory and tax differences. The disintermediation process of 1980's in which more and more borrowers started approaching the investors directly rather than through banks, encouraged merchant and investment bankers to look for other sources of income such as front – end fees for arranging swaps.

In the early years, swap banks only acted as brokers to match the two counterparties with complementary requirements and market access. When a firm wishing to swap out of a floating rate liability approached a bank, the bank located a counterparty wishing to swap out of a fixed rate liability, arranged a swap and collected a fee.[18] Normally such deals were associated with new borrowings.

With the increase in the use of swaps as an active asset/liability management tool, banks became market makers, i.e. a bank would 'take a swap on its own books' by itself becoming a counterparty in a swap. As

market makers, they provide bid/offer quotes for both interest rate and currency swaps. Subsequently, the bank would find a counterparty with exactly or nearly matching requirements and hedge the original swap by entering into a matching swap. In the meanwhile, it would hedge its exposure using other instruments such as futures, FRAs, treasury notes and T – bills.

With banks prepared to act as market makers, there was a tremendous increase in the liquidity of the swap markets in major convertible currencies. The outstanding volume (i.e. underlying principal amounts) of interest rate and currency swaps is estimated to be nearly twelve trillion dollars equivalent with about two – thirds of its in plain interest rate swaps. When a bank takes the swap onto its books, it subjects itself to a variety of risks. It assumes the credit risk of the countrerpary, [19] exchange rate risk, interest rate risk, basis risk and so forth. Even with laying off the swaps, it is impractical to attempt to fid an exact mach in terms of currency, maturity, payment frequencies, floating index etc. for each swap in its portfolio of swaps. Some residual risk always remains and may have to be hedged with other instruments. Also, there is the question of counterparty credit risk. Suppose a bank has a coupon swap with counterparty A in which it pays fixed and receives floating; it has offset this with another swap with counterparty B in which it pays floating and receives fixed. If counterparty A defaults, i.e. fails to make its floating payments, the agreement allows the bank to stop making the fixed payments to A; however, it must continue to meet its obligations under the swap with party B. Now it has a mismatched structure with fixed payments coming in and floating payments going out. It faces the risk of rising interest rates. It might attempt to replace the swap with A by another swap with some counterparty C. But it may have to do so at rates which result in a net loss.[20] Lately, banks have realized that a large swap portfolio exposes them to risks which are very complex in nature

and difficult to hedge.[21] The topic of managing the risk of a swap portfolio is beyond the scope of this book. The reader is referred to specialist works on the subject some of which are cited in the bibliography.

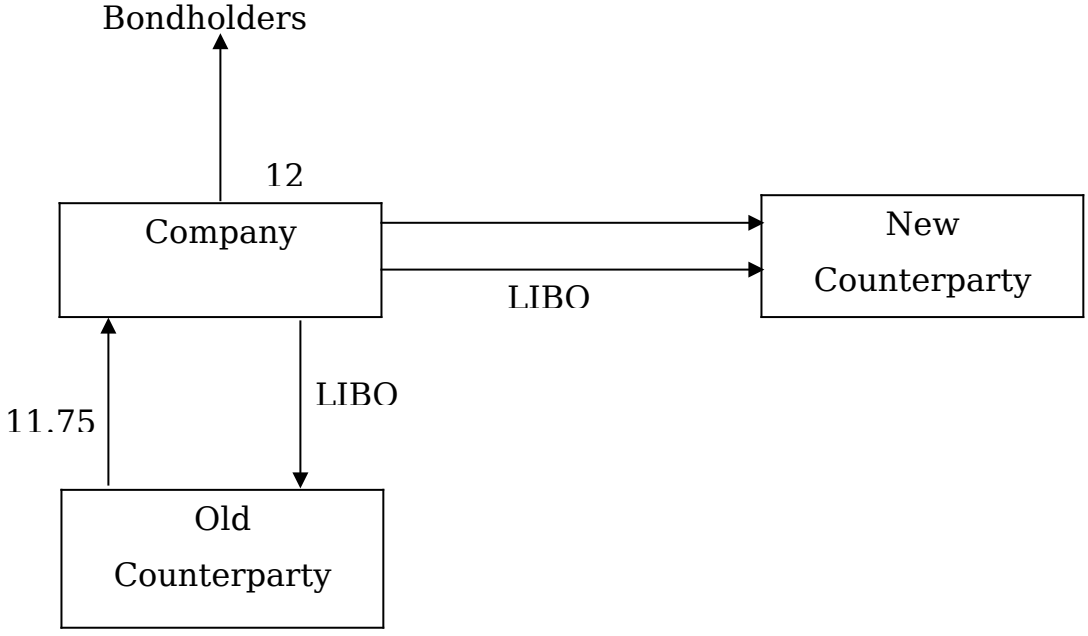
## 5.5 APPLICATIONS OF SWAPS: SOME ILLUSTRATIONS

### Locking in a Low Fixed Rate

We have seen above how a plain vanilla coupon swap is used to exploit the quality spread differential to reduce the cost of funding. We now illustrate one more application of interest rate swaps.

XYZ Co. raised 7 – year fixed rate funding three years ago via a bond issue at a cost of 12% p.a. It then swapped into floating rate funding in which it received fixed at 11.75% annual and paid 6 – month LIBOR. Thereby it achieved floating rate funding at LIBOR + 25bp. The rates have now eased and the firm wishes to lock – in its funding cost. The swap market is now quoting a swap offer rate of 8.60% against 6 – month LIBOR for 4 – year swaps. XYZ enters into a 4 – year swap in which it pays fixed at 8.60% annual and receives 6 – month LIBOR. It has locked – in a fixed funding cost of 8.85%. Exhibit 10.5 shows the structure of the swap.

**Exhibit 5.5 Locking in a Low Fixed Rate**



**The World Bank – IBM Currency Swap**[22]

This particular swap deal is said to have really launched the swap market. It was a part of World Bank's programme to diversify its sources of funding in low nominal interest rate currencies like the CHF and DEM since no single market could support a large borrowing requirement like the Bank's without getting saturated. In the summer of 1981, the World Bank wished to raise CHF and DEM funding for its lending programme. Instead of tapping these markets directly via fixed rate bond issues, it achieved the same objective by means of a currency swap with IBM at lower funding costs compared to a direct approach to these markets.

At that time, IBM had several outstanding bond issues in CHF and DEM on which a potential capital gain had been made because of the strengthening of the dollar against these two currencies and hardening of interest rates in these currencies. IBM wished to realize the gain by converting its liabilities to dollars. This could have been done by pre – paying the DEM and CHF bonds and refunding operations in dollars. However, in the absence of a call provision, pre – paying a liability could have raised some difficulties. There would also have been transaction costs of the new issue. Finally, IBM would have had to pay capital gains tax. The swap allowed IBM to achieve its objectives without these extra costs.

Under the swap, World Bank funded itself by means of a US dollar bond issue whose net proceeds equaled the present value of the DEM and CHF cash outflows on IBM's bonds. These present values were computed at discount rates which reflected DEM and CHF funding costs acceptable to the World Bank. The DEM and CHF present values were translated into USD at the prevailing spot rates. World Bank converted the dollar proceeds of its bond issue into DEM and CHF in the spot foreign

exchange market and on – lent these to its clients. A series of forward contract were arranged between the World Bank and IBM, in which World Bank sold DEM and CHF (received from its debtors) to IBM in exchange for USD. With these DEM and CHF inflows, IBM continued to service its outstanding bonds while the World Bank used the USD receipts to service its dollar bonds. The details of the deal can be found in Apte (1998).

The swap markets have evolved several innovative products during the last five or so year. Most of them are over – the counter products offered by commercial and investment banks, often with somewhat confusing proprietary names. They originated as a response to specific needs of investors and borrowers to achieve tailor – made risk profiles or to enable them to speculate on interest rates or exchange rates when their views regarding future movements in these prices differed from the market. we will briefly take a look at some of these which have gained considerable popularity over the years.

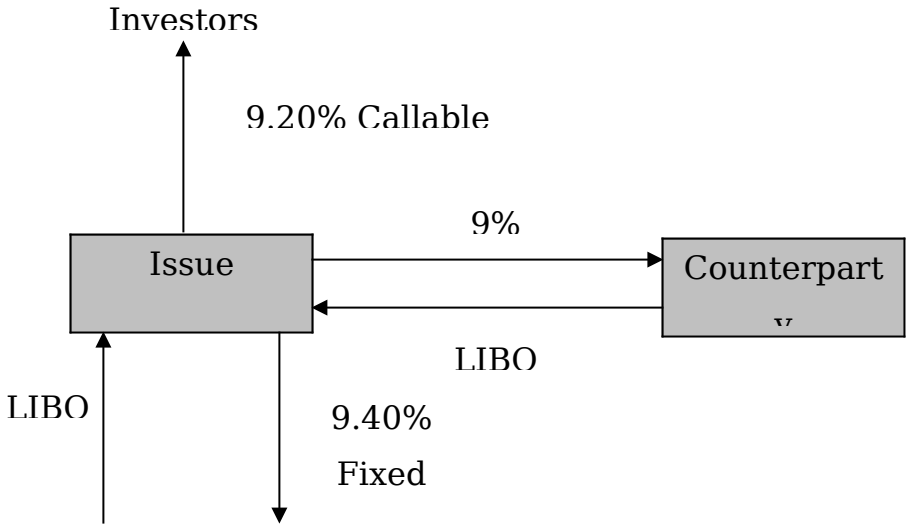
A Callable Interest Rate Swap is a swap in which the fixed rate payer has the option to terminate the swap at a specified point in time before maturity. A Puttable Swap can be terminated by the fixed rate receiver. Let us look at a particular application of a callable swap.

**Transforming Callable Debt into Straight Debt**

Recall that a callable bond has a provision for early redemption at the option of the issuer. The issuer will exercise the option if interest rates have fallen. A firm issues a 7 – year bond, callable at par after three years. The issue is priced to yield 9.20% which is 20bp above what the firm would have paid for a straight, i.e. non – callable bond. The firm then sells a seven year swap callable after 3 years in which it receives fixed at 9.40% and pays 6 – month LIBOR. The counterparty to this swap has paid a 40bp premium for the option to terminate the swap

prematurely. The firm now has floating rate debt at LIBOR – 20bp. It then combines this with a plain vanilla coupon swap in which it pays 9% fixed and receives 6 – month LIBOR. The entire structure is shown in Exhibit 10.6.

**Exhibit 5.6 Transforming Callable Debt with a Callable Swap**




After 3 years, if interest rates have risen, the bond will not be called. Also the callable swap will not be terminated. The firm has fixed rate funding at 8.8% for the entire seven – year period.

If the rates have fallen, the firm will redeem the bond issue and fund itself with a floating rate liability. Suppose it is able to do this at LIBOR. The counterparty in the callable swap will wish to terminate the swap. The plain vanilla swap will continue. The firm now has fixed rate funding at 9% for the remaining four years.

Swaptions, as the name indicates are options to enter into a swap at a specified future date, the terms of the swap being fixed at the time the swaption is transacted.

Consider first an interest rate swaption. [23] An industrial firm has an ongoing USD 500 million commercial paper programme in which it rolls over its paper every thirty days. Rates have recently crept lower but the

firm wants to protect itself and possibly benefit from a rise in rates. The rate it has to pay on its paper tracks a market index known as Federal Reserve's Composite Commercial Paper Index for AA rated companies.

The firm entered into a deal with Lehman Brothers which the latter have christened a 'Reversal Swaption'. The features of this deal are as follows:

1. The maturity of the contract is two years. Under the terms, the company receives from Lehman Brothers the commercial paper composite rate and pays 8.35% fixed. This is 15bp below the market swap rate for a two – year fixed vs. commercial paper swap.
2. At the end of three months, Lehman Brothers had the option of entering into a swap with maturity of 1 year and 9 months which would essentially reverse the first swap if the option is exercised. Under this second swap, Lehman Brothers would pay the firm 8.60% fixed and the firm would pay the commercial paper composite rate.

If, at the end of 3 months, the 21 – month fixed – to CP swap rate is greater than 8.60%, Lehman Brothers would exercise their option. The firm would borrow every month at the market CP rate but make a gain of 25bp on the swaps (pay 8.35% fixed and receive 8.60% fixed). Its borrowing cost would be 8.35% for the first three months and 25bp below the CP rate for the remaining 21 months. If the swap rate is below 8.60%, the option would not be exercised and the firm's borrowing cost would be fixed at 8.35% for two years.

A cross currency swaption (also known as circus option) is an option to enter into a cross – currency swap with any combination of fixed and floating rates. Party A sells/buys the right to enter into a currency swap with party B, on a specified date, wherein party A pays a stated fixed/floating rate in currency Y. The amounts of the two currencies for the final exchange of principals are also specified. There may or may not

be an initial exchange of principals. The following example illustrates an application.[24]

A French agency issues 5 – year FRF notes with 9.30% coupon for a total amount of FRF 500 million. The investors have a one – time option expiring in one year, to convert the notes into dollar notes with a coupon of 8.75% at an exchange rate of FRF 5.00/USD. The investor pays for this option in the form of a lower coupon. To hedge its risk in the event of exercise by the investors, the issuing agency enters into a cross – currency fixed – to fixed swaption with the following features:

- USD principal 100 million payable at maturity by the swaption writer.
- FRF principal 500 million payable at maturity by the French agency.
- Maturity: 4 years from exercise.
- Writer of the swaption pays 8.50% semiannual fixed dollars.
- The French agency pays 9.30% s.a. fixed FRF.
- No initial exchange of principals.
- Premium: 2.53%, i.e. FRF 12.65 million paid by the French agency.

How do the borrower and the investor view this deal? From the borrower's point of view, a borrowing cost of 9.97% has been locked in irrespective of whether or not the investor exercises the conversion option. This is somewhat lower than the agency's usual funding cost of 10% annual in FRF. The investor hopes to gain from the currency and interest rate movements. A dollar appreciation increases the value of the conversion option and protects the investor against rising dollar interest rates.

A number of other innovations have been employed to meet the specific requirements of borrowers and investors. Combinations of swaps with currency and interest rate options can provide almost infinite variations with complex payoff patterns and risks. Some of these are described in

Apte (1998). The reader may consult specialist works on the topic of financial swaps for many others. Some one – off tailor – made deals often appear in professional publications such as Euromoney and Risk.

## 5.6 VALUATION OF SWAPS

As we have seen above, in all swaps, one pays out a cash flow steam and receives another cash flow steam. Consequently, a swap is equivalent to a borrowing plus an investment. The value of a swap therefore is the difference between the present values of all inflows and all outflows. The market valuation of a series of cash flows depends upon the discount rate used. This in turn incorporates a risk – free interest rate and a risk premium. Valuation of a swap is necessary for the purpose of reporting to the shareholders as well as when the contract is terminated prematurely by negotiation or default to determine the amounts due to or from the counterparty.

The problem of pricing a swap is closely related to that of valuation. In essence, the pricing problem is to determine what rate should be quoted for one leg of the swap (e.g. the fixed rate in an interest rate swap), for a specified sequence of counter payments (e.g. floating payments at LIBOR), so that the two sequences have equal present values. Here we will discus the problem of valuing default – free, 'plan vanilla' swaps. [25] More advanced treatments can be found in the references cited at the end of this chapter.

A par swap is a swap which values to zero. Consider for instance a fixed – to floating 5 – year interest rate swap. A market maker bank is willing to swap a fixed payment at 8.5% s.a. against a 6 – month LIBOR, paid every six months. It will quote these rates for a top credit. By definition, the present values of the fixed and floating legs of the swap must be equal. In practice, a market maker would quote a bid and an offer swap rate as

we have seen above. the spread is the market maker's compensation. The value of the swap as of today is zero. Consider a currency swap. Again, suppose a market maker is willing to exchange 9% fixed on sterling with 6.5% fixed on an equivalent DEM principal for five years. This means that the present value of the sterling payments at 9% is equal to the present value of the DEM payments at 6.5%, both expressed in a common currency. Like a forward foreign exchange contract at market rates, a swap at market rates has zero value.

We will discuss two issues in relation to valuation and pricing of swaps. First how to value an existing or 'seasoned' swap entered into some time in the past which is yet to mature. Second, how to price an off – market swap or a swap with some special features.

### 5.6.1 Value of an Existing Interest Rate Swap

A financial institution has a fixed – to floating interest rate swap on its books under which it receives 11% fixed sterling semi – annually and pays a 6 – month sterling LIBOR. The swap was entered into 15 months ago, had a maturity of 5 years and a notional principal of GBP1 million. The last payment and reset date was 3 months ago. The LIBOR for the currency semester was set at 10.5%. The current 3 – month sterling LIBOR is 9.5% and the market swap rate for 4 year swaps is 10% semi annual versus LIBOR flat. We wish to determine the value of this old swap.

First consider the floating payments. Think of it as an FRN with par value GBP1 million paying interest at LIBOR. On the next reset date and every reset thereafter, the floating rate will be set equal to the then 6 – month LIBOR. Hence on those dates, the FRN will be valued at par. As however, the market value of this FRN is

$$\text{GBP } [(1{,}000{,}000)\,(1 + 0.0525)] / [1 + (0.095/4)] = \text{GBP } 1{,}028{,}083.$$

This is just the present value today, of the face amount plus the interest to be received 3 months from now.

Now consider the fixed leg. Think of it as a fixed rate bond with face value GBP 1 million, paying semi – annual coupons at 11%. There are 8 coupons to be received, each of GBP 55,000, with the first payment three months from now. Thus the cash flow schedule from the fixed leg is:

| Months from Now | Cash Flow (GBP) |
|---|---|
| 3 | 55,000 |
| 9 | 55,000 |
| 15 | 55,000 |
| 21 | 55,000 |
| 27 | 55,000 |
| 33 | 55,000 |
| 39 | 55,000 |
| 45 | 1,055,000 |

We must find the present value of this with a discount rate of 10.0%, the four year swap rate. This works out to GBP 1,056,206.[26]

Selling this swap is equivalent to selling an asset worth GBP 1,056,206 along with a liability worth GBP 1,028,083. The value of the swap is therefore GBP 28,123, 2.8123% of the face value. The firm can realise this gain by assigning the swap to another party.

Note that, we have ignored several refinements in this calculation. We have used the four year swap rate to value the fixed payments on a swap which has 3 years and 9 months to maturity and ignored the fact that the first fixed payment has to be made in 3 and not 6 months time. This is not strictly correct. Also, we have not used the precise day count fractions in finding present values. In practice, these refinements must be incorporated. See Apte (1998) for details.

### 5.6.2 Valuation of a Cross – Currency Interest Rate Swap

Sometime ago, Gouda Corp. a Dutch exporter of cheeses and other processed foods to US swapped a floating 9.5 million Dutch guilder liability into a USD 5 million fixed rate liability. Under the swap, the firm has to pay fixed dollar semi – annually at 9% p.a. and receives floating NLG at 6 – month LIBOR. At initiation, the swap had a maturity of 7 years. It is now 1 year and 10 months later. The market rate for a 5 – year fixed dollar versus 6 – month NLG LIBOR flat is now 10%. The last reset date was 4 months ago when the NLG LIBOR for the current semester was set at 8%. The current 2 – month NLG LIBOR is 7% and the dollar has depreciated to NLG 1.80/USD. The firm wishes to know how much it can gain up – front if it sells the swap.

As before, the present value of the floating leg is

NLG [9.5(1.04)]/ [1+ (0.07/6)] million = NLG 9,766,062.6

Once again, we argue that on the next reset date 2 months from now, the floater will be valued at par.

The dollar cash flows on the fixed leg are:

| Months from Now | Cash flow (USD) |
|---|---|
| 2 | 225,000 |
| 8 | 225,000 |
| 14 | 225,000 |
| 20 | 225,000 |
| 26 | 225,000 |
| 32 | 225,000 |
| 38 | 225,000 |
| 44 | 225,000 |

| | |
|---|---|
| 50 | 225,000 |
| 56 | 225,000 |
| 62 | 5,225,000 |

Using a discount rate of 5% per semester, the present value of this stream is USD 4,950,860.10 which translates into NLG 8,911,548.10 at the current exchange rate of NLG 1,80/USD.

Since the sale of the swap amounts to selling a fixed dollar liability and floating NLG asset the net value of the swap is NLG (9,766,062.6 – 8,911,548.1), i.e. NLG 845,514.5. The firm can lock in this gain by selling the swap.

We will conclude with an example of pricing off – market swaps.

**Pricing an Off – Market Cross – Currency Interest Rate Swap**

An Indian firm had issued fixed rate sterling bonds 3 years ago with a face value of GBP 10 million. The coupon is semiannual at 11% and the repayment is bullet 7 years from now. The firm would like to swap this into a floating dollar liability under which it will receive fixed sterling at 11% s.a. and pay floating dollars indexed to 6 – month LIBOR. A swap bank is quoting sterling fixed at 9.5% s.a. versus dollars 6 – month LIBOR float. The dollar fixed – to floating swap rate is 8% s.a. The present USD/GBP spot rate is 1.6400. We wish to determine the margin over LIBOR which the bank would charge the firm. The trick is to create cash flow schedules with equal present values.

Under the swap desired by the firm, the bank would be paying 1.5% more than its market swap rate. This is an annuity with 14 payments. The relevant discount rate is the current swap rate of 9.5%. The present value of the annuity is found from the usual annuity formula.

$$\left( 1 - \frac{1}{\left(1 + \frac{R}{m}\right)^{mn}} \right)$$

$$PVA(A, m, n, R) = A \times \frac{1 - \left(\frac{1}{1 + \frac{R}{m}}\right)^{mn}}{\frac{R}{m}}$$

Where, PVA (A, m, n, R), is the present value of an annuity of size A, paid m times a year, for n years and the discount rate is R p.a. In the present case A is 1.5, m is 2, n is 7 and R is 9.095 (9.5%). The resulting PV is 16.0882.

Now we find the margin over LIBOR such that the resulting annuity will have the same PV. In the above equation, we put R = 0.08, m = 2, n = 7 and PVA = 15.0882 and solve for A. This gives 1.43. Since this is calculated on bond – equivalent basis, we convert this into money market equivalent basis by multiplying by (360/365) to yield 1.41. Thus the firm would be asked to pay 1.41% above the 6 – month dollar LIBOR to receive 11% fixed sterling. [27] There is no exchange of principals at the beginning; at the end, the firm will pay USD 16.4 million and receive GBP 10 million which reflects the current spot rate. (The dollar floating payments will be on this principal).

These examples only illustrate the basic approach to valuation and pricing of swaps. In practice, the valuation procedures are more complex even for the standard coupon and currency swaps. When the swap involves non – standard features, further technicalities have to be incorporated. For a discussion of the 'zero – coupon' approach to valuation, see Apte (1998). More advanced discussions can be found in Sundaresan (1991) among others. Numerous examples of how market participants value swaps are contained in Miron and Swannell (1991).

## *Check Your Progress – 2*

1. Discuss about the evolution of swap markets?

_____

_____

2. Explain how the existing interest rate swap is valued?

_____

_____

3. Explain briefly about the valuation of a cross currency interest rate swap ?

_____

_____

## 5.7 SUMMARY AND CONCLUSION

Financial swaps represent an asset – liability management technique which enables investors and borrowers to reshuffle the characteristics of their asset – liability portfolios as well as exploit capital market imperfections and other anomalies to enhance the return on investment or reduce the cost of funding. In combination with other derivatives like options, swaps provide a very flexible tool to design financing packages suited to the specific requirements of a borrower. The market for swaps evolved during the 1980's as the exchange rate and the interest rate volatility increased and capital controls went on to be gradually liberalized or eliminated in most OECD countries. Swaps serve both as risk management products and as speculative tools to implement strategies based on particular views about exchange rates and interest rates.

## 5.8 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

### CYP - 1

9. Refer to section 5.1

10. Refer to section 5.2
11. Refer to section 5.2.1

**CYP – 2**

1. Refer to section 5.4
2. Refer to section 5.6.1
3. Refer to section 5.6.2

## 5.9 Model Examination Questions

1. Critically Review The Explanations Offered For The Emergece And Popularity Of Financial Swaps?
2. An Interest Rate Swap Was Entered Into At A Fixed Rate Of 13% Against Libor Both Annual. The Swap Has 5.25 Years To Go. The Current 5 Year Swap Rate Is 10%,The 3 Month Libor Is 7% And The One Yeat Libor At The Last Reset Date 9 Months Ago **Was 11%.** Compute Swap's Value?
3. A Currency Swap Was Entered Into At The Historic Swap Rates Of Hc 12% / Fc 6% And The Spot Rate Was 6 (Hc/Fc). The Swap Has 3.25 Years To Go. The Current 3 Years Swap Rates Are Hc 10% / Fc 5% And The Spot Rate Is 8. Compute The Swap's Value.
4. Explain In Brief About The Major Types Of Swap Structures?
5. Explain How The Swaps Are Valued?

# UNIT 6: INTERNATIONAL FINANCING

## Contents

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6.1 Introduction

6.2 The International Financing Decision
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6.4 Funding Avenues in Global Capital Markets
6.5 International Equity Financing
6.6 Summary and Conclusion
6.7 Answers to Check Your Progress Questions
6.8 Model Examination Questions

## 6.0 AIMS AND OBJECTIVES

At the end of the unit, THE STUDENT SHOULD have learned:

- what are the main considerations, which should guide the choice of a funding instrument and market in the context of international financing.
- how to assess the costs and risks of the various instruments.
- the principal features of the major markets and instruments

## 6.1 INTRODUCTION

The purpose of this chapter is to discuss the dimensions of the cross – border funding decision and get acquainted with the various funding avenues available in the global capital markets. The first part of this unit starts with the discussion on The International Financing Decision and tries to Evaluating different Borrowing Options available to international business organizations. The latter part of the unit lists out the Funding Avenues available for financing in Global Capital Markets and also a brief look at International Equity Financing.

## 6.2 THE INTERNATIONAL FINANCING DECISION

Before we undertake an examination of the various funding avenues in the global market we must discuss the issues involved in choosing a particular mix of financing in terms of markets, currencies and

instruments. While the main concern of this chapter is with medium – to – long term financing, we will also briefly discuss short – term borrowing.

The issue of the optimal capital structure and subsequently the optimal mix of funding instruments is one of the key strategic decisions for a corporation. Our aim here is to bring out the critical dimensions of this decision in so far as it involves international financing and examine the analytics of the cost – return tradeoff. The actual implementation of the selected funding programme involves several other considerations such as satisfying all the regulatory requirements, choosing the right timing and pricing of the issue, effective marketing of the issue, and so forth. We will only touch upon some of these aspects.

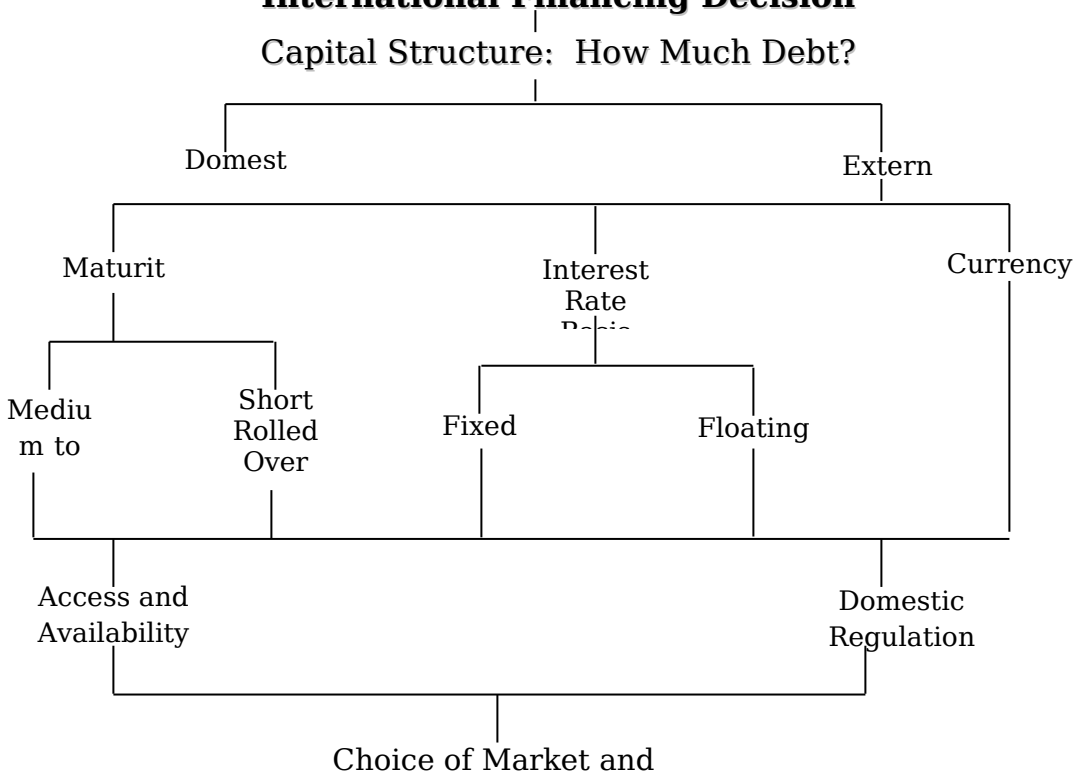
Exhibit 6.1 presents a schematic view of the international financing decision. The optimal capital structure for a firm or, in other words, corporate debt policy, has been a subject of a long – running debate in the finance literature since the publication of the seminal paper by Modigliani and Miller which argued that, in the absence of taxes, capital structure does not matter.

Next comes the issue of the optimal composition of a firm's liability portfolio. The firm usually has a wide spectrum of funding avenues to choose from. The critical dimensions of this decision are discussed as follows.

- Interest rate basis: Mix of fixed rate and floating rate debt.
- Maturity: The appropriate maturity composition of debt.
- Currency composition of debt.
- Which market segments should be tapped?

**xhibit 6.1**

**International Financing Decision**




Note that, these dimensions interact to determine the overall character of the firm's debt portfolio. For instance, long – term financing can be in the form of a fixed rate bond or an FRN or a short – term debt like commercial paper repeatedly rolled over. Each option has difference risk characteristics. Further, the possibility of incorporating various option features in the debt instrument or using swaps and other derivatives can enable the firm to separate cost and risk considerations. Individual financing decisions should be guided by their impact on the

characteristics – risk and cost – of the overall debt portfolio as well as possible effects on future funding opportunities.

Next let us address the question: "What should be the overall guiding principles in choosing a debt portfolio?' Giddy (1994) provides the following answer:

"The nature of financing should normally be driven by the nature of the business, in such a way as to make debt – service payments match the character and timing of operating earnings. Because this reduces the probability of financial distress, it allows the firm to have greater leverage and therefore a greater tax shield.[1] Deviation from this principle should occur only in the presence of privileged information or some other market imperfection. Market imperfections that provide cheaper financing exist in practice in a wide range of circumstances".

What he seems to emphasize is that there should be some correspondence between the sensitivity of the firm's operating cash flows to environmental risk factors such as exchange rates and interest rates on the one hand and the sensitivity of debt – service payments to the same factors on the other. Also, the time profile of debt – service payment should be similar to that of the operating cash flows. Deviations from this are justified either when the firm possesses superior information to 'beat the market' or some market imperfection which allows it to raise cheaper funding.

Let us see how this principle should be applied to the different dimensions of the borrowing decision mentioned above. Consider the choice between fixed and floating rate financing. Firms such as utilities, manufacturing firms etc. have relatively stable earnings or at least their operating cash flows are not highly sensitive to interest rate fluctuations. Such firms should naturally prefer fixed rate funding. On the other hand, financial institutions with floating rate assets would be natural floating

rate borrowers. If a firm has stable revenues in US dollars, it can reduce the probability of financial distress by borrowing in fixed rate dollars. Companies undertaking long gestation capital projects should ensure that sufficient financing on fixed terms is available for long periods and hence should prefer to stretch out their debt servicing obligations by borrowing for long terms. A factoring company on the other hand should finance itself with short – term borrowings.

Note however that this principle should not be followed blindly. Suppose that the yield curve is currently steeply sloping upward and a manufacturing firm is convinced, on the basis of superior information or analysis, that it will flatten out fairly soon. It may choose to borrow short – term and roll over such funding rather than lock itself into high – cost long – term debt. Or consider another example. Borrowing cost for a DEM loan is 5% whereas a USD loan would cost 9%. The uncovered interest parity condition tells us that this reflects the market's expectation that the DEM is likely to appreciate with respect to the dollar at roughly 4% per annum. A firm has export revenues in dollars but believes that the strength of the DEM is overestimated. It may choose to borrow in Deutschemarks despite the additional exposure it is subjecting itself to. Sometimes, such a decision may be motivated by considerations of market access or special factors such as availability of subsidized financing from state supported export finance agencies. At other times, some peculiar features of tax legislation may render borrowing in a particular currency more attractive even though the firm has no natural hedge against fluctuations in that currency.[2] There have been cases where firms have been able to raise cheap funding by offering the investors some options embedded in the debt instrument which were otherwise inaccessible to them because of regulatory restrictions.[3] many swap deals are motivated by the various imperfections in global capital

markets which allow a borrower to tap one market and then swap the liability to achieve the desired structure.

Overriding these considerations of costs and risks are issues of regulation and market access. Governments in some countries impose restrictions that prevent a firm from tapping a particular market segment even though that may be the optimal borrowing route under the circumstances. For instance, during the first half of 1990's, the Indian government decided to discourage recourse to external debt finance and in particular, did not permit short – term borrowing in foreign currency. On the other side, a particular market segment may be closed to a firm either because of its inadequate credit rating, investor unfamiliarity or inability of the firm to meet all the requirements – accounting standards, disclosure etc. – specified by the regulatory agency supervising the market.

In viewing the risks associated with a funding activity, a portfolio approach needs to be adopted. Diversification across currencies and instruments enables the firm to reduce the overall risk for a given funding cost target. It also helps to increase the investors' familiarity with the firm which makes future approaches easier.

Finally, it should be kept in mind that currency and interest rate exposures arising out of funding decisions should not be viewed in isolation. The firm should take a total view of all exposures – those arising out of its operating business and those on account of its financing decisions.

## 6.3 EVALUATING BORROWING OPTIONS

In evaluating a particular borrowing alternative, the following parameters have to be examined under alternative scenarios.

(a) The all – in cost of a particular funding instrument. The term 'all – in' means that the cost to be included is not just the interest but all other fees and expenses. We will illustrate below how to compute the all – in cost for a specific funding alternative.

(b) Interest rate and currency exposure arising from using a particular financing vehicle. Floating rate borrowing or short – term borrowing repeatedly rolled over exposes the firm to interest rate fluctuations. In the latter case, even the spread the firm will have to pay over the market index becomes uncertain. On the other hand, a long – term fixed rate borrowing without a call option locks the firm into a given funding cost so that the firm is unable to take advantage of falling rates. Funding in a foreign currency exposes the firm to all forms of currency exposure – transactions, translation and operating.

We will now look at some illustrative examples of how to evaluate the competing borrowing alternatives. These examples will serve to illustrate computation of all – in cost and also the dependence of these computations on the assumptions made about evolution of exchange rates and interest rates.

- It is January 2000. A firm needs a 5 – year funding of $25 million or equivalent. The following three options have been proposed by the investment bank which is rendering advice:

(a) A five – year, fixed rate USD bond issue with a coupon of 11% p.a. payable semi – annually. The floatation costs would be 3% of the face value up – front and in addition, there will be administrative expenses related to servicing of the bond which will amount to USD 50,000 every six months, payable with the coupon.

(b) A five – year FRN at 6 – month LIBOR plus a spread of 150 basis points, semi – annual payments and reset. Floatation costs will

amount to 2.5% up – front and there will be administrative expenses of $50,000 every six months. The currency of denomination of the FRNs will be US dollars.

(c) A five – year, fixed rate Deutschemark loan, face amount DEM 36.5 million at 8% p.a., interest payable semi annually on balance outstanding, principal to be amortized in five semi-annual installments after a 2½ years grace period. Upfront fees and costs will amount to DEM 500,000, and servicing costs will be DEM 65,000 every six months.

The current spot exchange rates are:

INR/USD: 42.50 INR/DEM = 25.00

On the basis of past rends and current inflationary forecasts, the dollar is expected to appreciate at the rate of 5% per year against the rupee and the DEM at the rate of 8% per year. The current 6 – month Eurodollar LIBOR is 6%. The following interest rate scenario is considered to be reasonable:

| Period | Expected LIBOR |
|---|---|
| 6mo – 12mo | 6.50% |
| 12mo – 16mo | 6.00% |
| 16mo – 24mo | 6.50% |
| 24mo – 30mo | 9.00% |
| 30mo – 36mo | 9.50% |
| 36mo – 42mo | 10.50% |
| 42mo – 46mo | 11.50% |
| 46mo – 54mo | 12.00% |
| 54mo – 60mo | 13.00% |

Exhibit 6.2(a) lays out the various dollar cash flows for the fixed rate bond issue alternative. Exhibit 6.2(b) gives the net cash flows in dollars and rupees assuming a per period (6 months) appreciation rate of 2.5%. Exhibits 6.3(a) and 6.3(b) do the same for the dollar FRN option and

Exhibits 6.4(a) and 6.4 (b) for the DEM loan option. For the FRN option, the interest rate scenario depicted above has been used to compute dollar interest payments and the same rate of dollar appreciation as in the case of the bond issue. For the DEM loan, the rate of DEM appreciation is 4% per semester.

The all – costs, conditional upon the assumed interest rate and exchange rate scenarios, are calculated by computing the IRRs of the rupee net cash flows in Exhibits 6.2(b), 6.3(b) and 6.4(b) respectively.[4] Note that these are semi – annual rates. They have to be annualized using the formula:

$$\text{Effective Annual Cost} = (1 + \text{Semiannual Rate})^2 - 1$$

The computed IRRs are shown in the bottom rows of Exhibits 6.1(b), 6.2(b) and 6.3(b). The corresponding effective annual costs are, respectively, 18.29%, 16.96% and 16.98%.

Based on these calculations, the dollar FRN issue appears to be the least costly alternative. However, remember that this conclusion is contingent upon a particular set of assumptions about the future evolution of interest rates and exchange rates. A more rigorous examination would require that we repeat the calculations under different scenarios and look at the expected real cost and the variance of the real cost of borrowing.

Consider a firm which is contemplating a fixed rate foreign currency loan (or a fixed rate foreign currency bond issue). The nominal rate of interest is I (expressed as a fraction not percentage), the maturity is N years, interest is paid annually and repayment is bullet. The principal amount is A. The rate of exchange at time t is denoted $S_t$ expressed as units of home currency per unit of foreign currency.

The real cost of this loan consists of three components, viz. the nominal interest, appreciation of the foreign currency and the domestic inflation.

$$R = I + \check{S} - \Pi$$

Where Š denotes the proportionate change in the spot rate and Л is the domestic rate is inflation.

The variance of the real cost therefore is.[5]

$$\text{Var}(R) = \text{Var}(Š) + \text{Var}(Л) - 2\text{Cov}(Š\ Л)$$

To compare loans denominated in alternative currencies, the expected real cost comparison can be based on comparison of effective nominal costs since the domestic inflation rate enters in both. However, to compare the variances of real costs, the covariance term is important. If the variance of both is nearly equal between two currencies, then the one which obeys the purchasing power parity with the home currency more closely will have a lower variance of real cost of borrowing.

If the real cost risk is ignored, the choice of currency should be based on a comparison of effective interest rates which consist of the nominal interest rate I, and the expected rate of appreciation of the foreign currency Š. When the nominal interest rate itself is not fixed – as with a floating rate loan or FRNs – an additional source of risk is introduce, viz. the variance of the nominal interest rate and its covariances with the exchange rate and domestic inflation rate. The volatility of nominal interest rates during the decade of the 1960's has been substantial and will continue to be so.

It is possible to cast the problem of choosing an optimal currency portfolio of foreign borrowing in the standard mean – variance framework. [6] To operationalise the framework, however, one needs estimates of variances and covariances of exchange rates, interest rates and inflation rates. Invariably, these have to be obtained from past data and one has to assume that the structure of variances and covariances remains unchanged over time[6] – a very dubious assumption indeed.

### 6.3.1 Impact of taxes:

Also note that we have ignored the impact of taxes. A valid comparison between various borrowing options should be based on post – tax calculations. If exchange losses on foreign liabilities are allowed to be set off against operating profits and equally, exchange gains are added to the taxable profits, then the pre – tax and post – tax comparisons would give identical results from the borrower's point of view. Suppose an Indian company is planning to borrow for one year. The choice is between a dollar borrowing and a yen borrowing. The nominal rates are 6% and 4% respectively and the expected appreciation is 5% for the dollar and 9% for the yen. The effective expected pre – tax cost is 13% for both dollar and yen. If the Indian company's tax rate is 50%, the expected post – tax costs are 6.5%. On either basis, the company would be indifferent between the two after of course ignoring the risk.

However from the investor's point of view, if exchange gains are treated as capital gains and taxed at a lower rate, bonds denominated in a faster appreciating currency would be more attractive. Suppose the above Indian company's lenders are dollar based investors who have identical expectations about exchange rate movements so that they expect the yen to appreciate 4% against the dollar. Further suppose the tax rates for these investors are 40% on interest income and 20% on exchange gains. Then the after – tax return would be 4.6% on the dollar asset [= (1 – 0.4) X 6%] and 5.6% on the yen denominated asset [= (1 – 0.4) X 4% + (1 – 0.2) X 4%]. This would make the yen investment more attractive. The consequence of this may be a lower nominal interest rate on the yen borrowing, making it a preferred borrowing vehicle. This is a stylized illustration of the impact of taxes on financing decisions. There are 'tax – spared' loans in which, the borrower's government does not deduct any withholding tax on interest paid to the non – resident lender, but nevertheless, the lender's government allows a tax deduction as if a withholding tax ahs been paid. These and other considerations imply that

the tax angle is very important. In reality, international taxation is a very complicated are and appropriate expert advice should be sought while evaluating borrowing alternatives.

### Check Your Progress – 1

1. Explain about the international financing decision?

_____

_____

2. What parameters are to be used in evaluating borrowing options?

_____

_____

3. Explain briefly about the impact of taxes in evaluating borrowing options?

_____

_____

## 6.4 FUNDING AVENUES IN GLOBAL CAPITAL MARKETS

Starting sometime in the mid – 1960's, financial markets around the world witnessed a number of significant changes. The 'financial revolution' was characterized by both tremendous quantitative expansion and an unprecedented qualitative transformation in the institutions, instruments and regulatory structures. The major trends were liberalization, integration and globalization.

Globalization of financial markets during the 1960's and the first half of 1990's was driven by two underlying forces. Growing and continually shifting imbalance between savings and investment in individual countries, reflected in their current account balances necessitated massive cross – border financial flows. For instance, during the latter part of 1960's, the massive surpluses of the OPEC countries had to be recycled, i.e. fed back into the economies of oil importing nations. During

the 1960's, the large current account deficits of the US had to be financed primarily from the mounting surpluses in Japan and Germany. During the 1990's, developing countries as a group have experienced huge current account deficits and have also had to resort to international financial markets to bridge the gap between their incomes and expenditures as the volume of concessional aid from official bilateral and multilateral sources has fallen far short of their financing requirements.

The other motive force was the increasing preference on the part of investors for international diversification of their asset portfolios. This would result in gross cross – border financial flows, even in the absence of current account imbalances, though the net flows would be zero. Several investigators have established that significant risk reduction is possible via global diversification of portfolios. Initially, cross – border diversification was confined to within OECD countries but as the decade of 1990's unfolded, the 'emerging markets' in East and South Asia, Latin America and later Russia became favourite hunting grounds of institutional investors in rich countries. There was a brief panic after the Mexican crisis in 1995 but it was quickly forgotten and huge inflows of portfolio and direct investment into emerging markets continued until the East Asian crisis erupted in the summer of 1996. This led to a retreat away from emerging markets which became an exodus after the collapse of the Russian economy in 1996. Almost every leading financial institution in the US and Europe including the so – called 'hedge fund's took a beating and scurried back to 'safe haven' investments such as US treasury bonds.

The negative impact of the financial crises in East Asia and Russia was compounded by problems of Japanese banks and a general slowdown in the world economy, particularly in Asia. During September and October, 1996, stock markets around the world were depressed and this factor reinforced the 'flight to safety' caused by the financial panic.

At the time of writing this chapter, the prospects for developing countries to raise significant funding in global capital markets look quite bleak. Eventually, as Asia including Japan recover from their financial crises[6] and pull themselves out of recession, the world economy will also recover and investor confidence in emerging markets will be restored. With the launch of the single currency and monetary union in Europe, the capital markets of the EMU countries are expected to become unified and a very large debt market in Euro is expected to emerge which will provide an attractive funding option for borrowers in developing countries. Exhibits 6.5 and 6.6 present some recent data on the amount of financing raised on the global capital markets including both debt and equity.

Indian entities began accessing external capital markets towards the end of the 1960's as the amount of concessional assistance became gradually inadequate to meet the increasing needs of the economy.[9]

The initial forays were very low – key. The pace accelerated somewhat around mid – 1960's, but even then, the authorities adopted a selective approach and permitted only a few select banks, all India financial institutions, and large public and private sector companies to access the market. Further liberalization took place as a part of the reform package initiated in 1991 and during 1993 – 94, there was a sharp increase in the amount of funds raised by corporate entities from the global debt and equity markets. The pace slowed down again towards the end of 1995, but the inflows remained at moderate levels. Subsequently, political uncertainties slowed down the pace of economic growth and the demand for external funding. The economic sanctions following the nuclear tests and the East Asian crisis soured investor sentiment and net inflows have remained at moderate levels till the time of writing. Exhibit 6.6 provides recent data on some items of foreign capital inflows into the Indian economy. By and large, India's borrowings have been by way of

syndicated bank loans, buyers' credits and lines of credits. Other instruments such as foreign and Eurobonds, EMTNs have been employed much less frequently though a number of companies made issues of Euro – convertible bonds after 1993. Prior to that, only apex financial institutions and the public sector giant ONGC had tapped the German, Swiss, Japanese and Eurodollar bond markets.

Throughout the 1960's, there was a steady improvement in the market's perception of the creditworthiness of Indian borrowers. This is manifested in the steady decline in the spreads they had to pay over LIBOR in the case of Euro loans. The 1990 – 91 crisis sent India's sovereign rating below investment grade and the foreign debt markets virtually dried up to be opened up again after 1993. Subsequent developments in India and the financial crisis elsewhere have kept India along with other emerging markets on the periphery of global capital markets.

**Exhibit 6.5 International Capital markets: financing Activity (Billion US Dollars)**

| Instrument/Borrower | 1994 | 1995 | 1996 | 1996 (Jan – Sept) |
|---|---|---|---|---|
| Securities and Committed Facilities | | | | |
| Bonds | 426.6 | 466.3 | 606.6 | 662.3 |
| Other Securities | 45.0 | 41.0 | 56.6 | 53.6 |
| Syndicated Loans | 236.2 | 360.2 | 345.2 | 269.0 |
| Other Debt Facilities | 4.9 | 3.6 | 4.5 | 2.6 |
| Uncommitted Borrowing Facilities | | | | |
| ECP Programmes | 30.6 | 55.9 | 61.3 | 31.1 |
| EMTN Programmes | 222.1 | 346.1 | 364.1 | 296.0 |
| Total | | | | |
| Of which | | | | |
| (a) OECD Area | 666.1 | 1165.1 | 1366.6 | 1164.6 |

| | | | | |
|---|---|---|---|---|
| (b) Non – OECD | 60.5 | 91.2 | 131.5 | 155.4 |
| (c) others[+] | 20.0 | 16.0 | 51.4 | 26.6 |

Source: Financial Market Trends, November 1996, OECD, Paris[+] 'Others': International Development Institutions.

The purpose of this section is to provide an overview of funding avenues in the global capital markets. The procedural aspects of actually tapping a market – acquiring the necessary clearances and approvals, preparation of various documents, investor contact and so forth – are usually quite elaborate. Issues related to accounting, reporting and taxation are quite complex and require specialist expertise. We will keep clear of these maters and concentrate on the basic features and cost – risk characteristics of the various instruments.

**Exhibit 6.6 Major Debt Instruments 1996 (US Dollars Billions)**

| Instrument | Amount Outstanding as of December 1996 | Issuance in 1996 Gross | Q4 Net |
|---|---|---|---|
| Euro CP | 132.9 | 96.4 | - 0.9 |
| Other Short – Term Paper | 61.6 | 35.6 | - 11.6 |
| Floating Rate Bonds | 693.4 | 49.0 | 16.2 |
| Straight Fixed Rate Bonds | 2940.3 | 166.5 | 66.6 |
| Equity Related Bonds | 205.5 | 5.5 | 0.9 |

Source: Quarterly Review: International Banking and Financial Market Developments Bank for International Settlements. March 1999. 'Q4' denotes Quarter 4 for bonds, gross issuance actually corresponds to 'announced issues'.

### 6.4.1 Syndicated Loans and other Banking Products

Starting sometime after the oil price crises of the 1960's, commercial banks in developed countries started making medium – term funding available to borrowers in developing countries. The trend continued until about mid – 1960's when loan defaults by Mexico and a few other

countries brought new lending virtually to a trickle. The market revived thereafter and continued to grow till the financial crises of 1996 – 96.

The most common form of international lending by commercial banks is the Syndicated Floating Rate Loan. This can be defined as a medium – to long term financing provided by several banks with common loan documentation with a variable interest rate. Since commercial banks' liabilities are mostly short – term, they like to minimize interest rate risk by having assets – loans – the interest rates on which are periodically reset in line with their funding costs. The most common pricing benchmark is the LIBOR (London Inter – Bank Offered Rate) in the relevant currency, and the loan document states interest rate as LIBOR plus a margin or 'spread' e.g. LIBOR + 1.5%. Exhibit 6.6 provides some recent data on international syndicated credit facilities by a number of borrowers.

**Exhibit 6.6 foreign Capital Inflows into the Indian Economy (Million US Dollars)**

| Year | External Commercial Borrowing (Net) | NRI Deposits | Portfolio Investment |
|---|---|---|---|
| 1990 – 91 | 2254 | 1536 | 6 |
| 1991 – 92 | 1463 | 290 | 4 |
| 1992 – 93 | - 366 | 2001 | 242 |
| 1993 – 94 | 665 | 1205 | 3649 |
| 1994 – 95 | 1124 | 162 | 3569 |
| 1995 – 96 | 1265 | 1103 | 2661 |
| 1996 – 96 | 2656 | 3350 | 3312 |
| 1996 – 96 | 4010 | 1125 | 1626 |
| 1996 – 99 (Estimates) | 2500 | 1000 | - |

Source: Monthly Review of the Indian Economy CMIE, February 1999.

A traditional syndicated loan is usually a floating rate loan with fixed maturity, a fixed draw – down period and a specified repayment schedule. A typical Euro credit would have maturity between five and ten years,

amortization in semi – annual installments, and interest rate reset every three or six months with reference to LIBOR.[10]

In some cases, when the parties – lenders and the borrower – do not wish to publicise the deal, standard practice is dispensed with and a credit is arranged on a private basis between the group of lending banks and the borrower. These are known as Club Loans [Joshi (1996)].

A revolving credit or term commitment is similar to the 'club loans' but it permits greater flexibility in the draw – down and repayment schedules allowing the borrower to repeatedly repay and redraw the loan or a portion thereof at its discretion or according to a formula [Melnik and Plaut, op.cit., Van den Berghe (1995)].

**Exhibit 6.8 Announced International Syndicated Credit Facilities (US Dollars Billion)**

| Country/Group | 1996 | 1996 | 1996 |
|---|---|---|---|
| All Countries | 900.9 | 1136.3 | 693.4 |
| Developed Countries | 699.6 | 966.3 | 623.0 |
| Development Countries | 62.6 | 106.3 | 56.1 |
| Brazil | 0.2 | 4.6 | 4.3 |
| South Africa | 4.0 | 6.0 | 0.6 |
| China | 6.3 | 10.6 | 5.4 |
| India | 3.3 | 4.1 | 0.9 |
| South Korea | 11.2 | 10.2 | 0.2 |

Source: Bank for International Settlements, See Exhibit 6.6.

In a standby facility, the borrower is not required to drawdown the loan during a fixed, pre – specified period. Instead, he pays a contingency fee until he decides to draw the loan at which time the interest begins to accrue. Syndicated credits can be structured to incorporate various options. As in the case of FRNs, a drop – lock feature converts the floating rate loan into a fixed rate loan if the benchmark index hits a

specified floor. A multi – currency option allows the borrower to switch the currency of denomination of the loan on a rollover date.

As a prudential business practice, banks do not wish to take on any more risks than the funding risk[11] and the credit risk of the borrower. Also they would like to minimize the probability that the borrower's credit risk changes for the worse during the life of the loan. To this end, loan documents contain covenants designed to protect lending banks from adverse changes in the environment or in the borrower's financial condition. Security in the form of government guarantee, bank guarantee or mortgage on assets is required for borrowers in developing countries like India.[12]

The covenants incorporated in a typical loan agreement can be categorized into three broad types. [Van den Berghe (1995)]

(a) Those which protect the banks against adverse regulatory changes or circumstances. Such changes typically lead to an increase in the lending banks' funding costs and are beyond the banks' control. They are called 'increase cost' or 'reserve clauses' Examples of such changes are higher reserve requirements against bank deposits or increase in withholding taxes imposed by the borrower's government on interest paid to non – resident lenders. Double taxation agreements may provide protection against such changes in taxes but these tend to be quite complicated and change over time. If any changes in taxation affect a specific loan, lending banks like to be compensated for any adverse effects. In such cases, the clause provides for compensation from the borrower and also allows the borrower to pre – pay the loan after fulfilling certain conditions.[13]

(b) Clauses which are designed to protect the lenders against the possibility of default by the borrower. If in the view of the lending banks, the borrower's financial circumstances have deteriorated

and may jeopardize the borrower's ability to service the loan, these clauses permit the bank to ask for immediate repayment of the loan or start legal proceedings leading to liquidation and bankruptcy. Included among these are the cross – default clause, the pari passu clause and the negative pledge.

The cross – default clause allows the banks to accelerate repayment or insist on repayment immediately if the borrower defaults on any obligation to some other creditor. The banks are guarding against the possibility that the other creditor will insist on repayment of its obligation immediately thereby making the borrower's position even worse. In the wake of defaults by some developing countries in early 1960's, such clauses were included in the loans extended to developing country governments, the 'other' creditor being a supra – national body such as the IMF.

The pari passu clause says that the particular loan must receive the same priority as any other obligation of the borrower. The borrower cannot grant any special privileges to some other creditors which it has not granted to the banks who have provided the loan.

The negative pledge prevents the borrower from pledging any assets a third party without offering the same collateral to the lending banks, except of course in existing liens or while pledging of newly acquired assets financed by a new loan.

(c) The third set of clauses are intended to reduce funding risk. The subject to availability clause provides for the possibility that the lending bank's access to funding in a particular currency or market may dry up. When a borrower has been given a multi – currency option, the lending banks may find that they are unable to provide funding in the currency of borrower's choice; the 'subject to availability' clause enables them to get out of the commitment by offering funding in another currency. The transferability clause

allows the banks to transfer their commitments by sale or otherwise to other lenders provide this does not increase the borrowing cost for the borrower.

The all – in cost of a loan consists of interest and a number of fees – management, participation agency underwriting (when the loan is underwritten by a bank or a group of banks), [14] legal and out – of – pocket expenses incurred by banks which have to be reimbursed by the borrower. Some of these fees, (e.g. management) are payable up – front while others, such as agency fees, are paid periodically and represent the administrative costs involved in distributing the payments among the participating banks. Interest payments and commitment fees are distributed among the participating banks in strict proportion to the amount of funds provided by each of them while in the case of management fees, the lead bank(s) kept the lion's share (up to 50%) and the rest is spread out among other participating banks. Spreads over LIBOR depend upon borrower's creditworthiness, size and term of the loan, [15] state of the market (e.g. the level of LIBOR, supply of non – bank deposits to the Euro banks) and the degree of competition for the loan.[16] Exhibit 6.9 gives some idea about average spreads and maturities for international bank loans.

A brief description of some of the procedural aspects of negotiating a syndicated loan can be found in specialized works on the subject such as Joshi (1996).

Apart from the Euromarkets, syndicated credits can be arranged in some of the national capital markets, too. These are the so – called 'foreign loans'. In the Japanese market, yen finance can be raised via bank loans. Syndication and documentation are less expensive than bond issues and the Ministry of Finance criteria are less demanding. Syndicated Euro DEM loans can be arranged from the German banks though this form of

financing is not very common. In the Swiss market, too, these are very rare and the Swiss National Bank (SNB) does not favour the use of CHF for Euro CHF credits. Some partial data from Indira Rajaraman (1992) indicate that Indian borrowers have accessed this funding route since 1960 for financing, ranging from as little as $4.2 million to $660 million with maturities ranging from as little as $4.2 million to $660 million with maturities ranging from 3 years to 15 years in case of floating rate loans. The mean spread over LIBOR which was as high as 106 basis points in 1960 had come down to a little over 15bp by 1969. subsequently, the trend was reversed and during the period 1990 – 93 the only known syndications were some short – term oil import finance facilities arranged for the Indian Oil Corporation at spreads considerably higher than the average paid during the 1960's [Joshi (1996)].

**Exhibit 6.9 Average Spreads and Maturity of International Bank**

Loans (Spreads: Basis Points: Maturity: Years/Months)

| | | | **Weighted Average Spreads** | |
|---|---|---|---|---|
| Borrower Group | 1994 | 1995 | 1996 | 1996 (Jan – Sep) |
| OECE Area | 59 | 43 | 50 | 56 |
| Non – OECE Borrows | 113 | 116 | 99 | 115 |
| | | | **Average Maturity** | |
| | 1994 | 1995 | 1996 | 1996(Jan – Sep) |
| OECD Area | 5/1 | 5/4 | 5/4 | 5/0 |
| Non – OECD Borrows | 5/4 | 4/10 | 5/0 | 5/2 |

Source: Financial market Trends, November 1996, OECD.

A funding device closely related to bank loans is Note Issuance Facility or NIF. The product also comes in other variations known as Revolving Underwriting Facility (RUF) and Multi Option Facility (MOF). Basically, a syndicate of banks gives a medium – term (5 to 6 years) commitment to provide floating rate financing upto a specified maximum amount if the borrower is unable to raise the funding by issuance of short – term notes (repeatedly rolled over) in the market, in a programme arranged by the banks. The banks agree to place the notes among investors at a cost not exceeding an agreed maximum or else provide the shortfall in the form of a floating rate bank loan at a margin over LIBOR corresponding to the agreed upon ceiling. The borrower pays a fee for setting up the facility – a commitment fee – plus a fee for placement of notes in the market.

For the banks, NIFs provide a way to earn a fee income without inflating their balance sheets; for the borrower, it represents a funding avenue cheaper than a traditional floating rate loan, provided its credit standing is of high quality.

NIFs made their appearance for the first time in 1961. Their growth has not been very impressive. Neither banks nor top quality borrowers have shown much interest in the product. For banks, the income from NIFs is smaller that from syndicated loans while well – rated borrowers have found that having a long – term backstop facility from a group of banks does not add much to the attractiveness of their paper in the market.

### 6.4.2 Bond Markets

Bonds can be defined as negotiable[16] debt instruments with original maturity in excess of one year. The domestic bond markets are dominated by the respective governments. For instance, the US treasury is the largest issuer of bonds in the world. When a non – resident issuer issues bonds in the domestic market of a country (currency), it is known as a Foreign Bond whereas a bond denominated in a currency, issued

outside the country of that currency is known as a Eurobond. When Reliance Industries issues a USD bond in the US capital market, it is a foreign dollar bond; if the bond issue is made in London, it is Eurodollar bond, if the bond issue is made in London, it is a Eurodollar bond. Public, registered issues of foreign bonds in the domestic markets of various countries have acquired trade names such as Yankee Bonds (USA), Bulldog Bonds (UK), Samurai Bonds (Japan), Matador Bonds (Spain) etc. Bonds may be registered or be in a bearer form. The procedure for transfer of ownership or exchange between bondholders are different for the two categories. Traditionally, Eurobonds are in the latter form while bonds issued in the US market are in the former, i.e registered.

The traditional bond is the straight bond. It is a debt instrument with a fixed maturity period, a fixed coupon which is a fixed periodic payment usually expressed as percentage of the face value, and repayment of the face value at maturity. This is known as bullet repayment of the principal. The market price at which such a security is bought by an investor, either in the primary market (a new issue) or in the secondary market (an existing issue made sometime in the past), is its purchase price, which could be different from its face value. When they are identical, the bond is said to be selling at par; when the face value is less than (more than) the market price, the bond is said to be trading at a premium (discount). The difference could arise because the coupon is different from the ruling rates of interest on bonds with equal perceived risk or because the market's perception of creditworthiness of the issuer is different. The yield to maturity is a somewhat flawed measure of return to the holder of the bond and is a combination of purchase price and the coupon. However, there are many concepts of yield. Coupon payments may be annual, semi – annual or of some other periodicity. Maturities can be upto 30 years. Bonds with maturities at the shorter end (4 – 10 years) are often called notes.

A very large number of variants of the straight bond have evolved over time to suit the varying needs of borrowers and investor. The familiar variants are:

- Floating Rate Notes (FRN) which, as its name implies, is a bond with varying coupon. Periodically (typically every six months), the interest rate payable for the next six months is set with reference to a market index such as LIBOR. In some cases, a ceiling may be put on the interest rate (capped FRNs), while in some cases, there may be a ceiling and a floor (collared FRNs).[16]
- Zero coupon bonds (called simply 'Zeros') which pay no coupon and Deep Discount Bonds which do pay a coupon but at a rate below the market rate for a corresponding straight bond. Bulk of the return to the investor is in the form of capital gains. For zero coupon bonds, it is entirely in the form of capital gains.
- Sinking fund bonds were a device, often used by small risky companies to assure the investors that they will get their money back. Instead of redeeming the entire issue at maturity, the issuer would redeem a fraction of the issue each year so that only a small amount remains to be redeemed at maturity.

Many bonds have embedded option features. The familiar ones are Callable bonds, Puttable bonds and convertible bonds. Each of these contains an option granted either by the issuer to the investor (convertibles, puttable) or vice – versa (callable). The value of the option is captured by adjusting the coupon which tends to be lower for convertibles and puttable bonds, and higher for a callable bond compared to a straight bond with identical features.

Some bonds contain embedded currency or commodity options. For instance, the coupon payments and/or the redemption amount may be linked to an exchange rate or the price or a commodity such as oil.

Redemption may be in any one of two or more currencies at the option of the investor, e.g. a bond with face value of USD 1,000, which will be redeemed at either USD 1,000, DEM 1,600 or GBP 600. Dual currency bonds have coupon payments in one currency and redemption in another. Once again, the coupon is adjusted to reflect the value of the option.

Warrants are an option sold with a bond which gives the holder the right to purchase a financial asset at a stated price. The asset may be a further bond, equity shares or a foreign currency. Currency warrants were particularly popular in the Euromarkets during the 1960's. The warrant may be permanently attached to the bond or detachable and separately trade – able. Initially, warrants were used by speculative issues as an added incentive to the investor to keep the interest cost within reasonable limits. Recently even high grade companies have issued warrants.[19]

The largest international bond market is the Eurobond market which is said to have originated in 1963 with an issue of Eurodollar bonds by Autostrade, an Italian borrower. Ever since, the market has grown enormously in size. It is still dominated by issuers from the OECD area. Supra – national institutions and developing country borrowers constitute the rest of the market. As to the currency composition of the issues, US dollar still accounts for the largest share, though over the years, its share has shown a declining trend. Eurobond markets in all currencies except the yen are quite free from any regulation by the respective governments. The Euroyen bond market, which really came into existence as late as 1964, is closely controlled and monitored by the Japanese Ministry of Finance.

Straight bonds in the Eurobond market are priced with reference to a benchmark, typically treasury issues. Thus a Eurodollar bond will be priced to yield a YTM (Yield – to Maturity) somewhat above US treasury

bonds of similar maturity; the spread depending upon the borrower's rating and market conditions. While formal rating such as S&P or Moody's is not absolutely mandatory for Eurobonds – 'name recognition' also being an important factor – it helps in placing the issue at terms attractive to the borrower. The straight bonds segment is accessible only to highly rated borrowers. The FRN segment and the segment comprising of convertibles and other types of option embedded bonds provide easier access to lesser rated issuers. The pricing of such issues reflects the value of the embedded options.

Many Eurobonds are listed on stock exchanges in Europe. This requires that certain financial reports be made available to the exchanges on a regular basis. However, secondary market trading in Eurobonds is almost entirely over – the counter by telephone between dealers. Quotes are available on the exchange where the issue is listed.

Floatation cost Eurobond issues are generally higher than costs associated with syndicated Eurocredits. In the appendix to this chapter, we have provided a brief description of the traditional underwriting procedure. More details can be found in Fisher (1966) and Joshi (1966).

Among the national capital markets, the US market is the largest in the world. It is complemented by the world's largest and most active derivatives markets, both OTC and exchange – traded. It provides a wise spectrum of funding avenues. It is in some ways a very strictly regulated market, but at the same time offers a lot of flexibility to potential borrowers in terms of structuring their financing activities.

From a non – resident borrower's point of view, the most prestigious funding avenue is public issue of Yankee Bonds. These are dollar denominated bonds issued by foreign borrowers. It is the largest and most active market in the world and potential borrowers must meet very stringent disclosure, dual rating and other listing requirements. Option

features like call and put can be incorporated and there are no restrictions on the size of the issue, maturity and so forth. Syndication structures and fees are flexible and borrowers who satisfy the registration requirements and rating norms can get very fine terms. Shelf registration is possible for selected borrowers. Under this facility, the issuer can register the necessary documentation in advance of the issue of securities.

Yankee bonds can also be offered under rule 144A of the SEC. these issues are exempt from elaborate registration and disclosure requirements but rating, while not mandatory, is helpful. Finally, low rated or unrated borrowers can make private placements. Higher yields have to be naturally offered and the secondary market is very limited. For more details, see Joshi (1996).

It is also possible to float bonds denominated in foreign currencies in the US market. In the past, the commonly used currencies have been the Australian dollar, the Canadian dollar, the New Zealand dollar and the ECU. These are almost always swapped into US dollars via a currency swap.

The Japanese market was tightly regulated until 1960. Thereafter, the government implemented a series of regulatory reforms designed to integrate the Japanese financial markets with the global markets. Foreign institutions were allowed entry and regulations on cross – border borrowing and investment were relaxed. Within a span of fifteen years, Japanese capital markets have developed enormously, both quantitatively and qualitatively.

Bond finance in yen available to foreign borrows includes in addition to the Euroyen segment, Samurai Bonds and Shibosai Bonds. Samurai bonds are publicly issued yen denominated bonds and like Yankee bonds, are the most prestigious funding vehicle. The Japanese Ministry of Finance

lays down the eligibility guidelines for potential foreign borrowers. These specify, among other things, the minimum rating, [20] size of the issue and maturity. Syndication and underwriting procedures are quite elaborate and so is the documentation. Hence floatation costs tend to be high. Pricing is done with reference to the Long Term Prime Rate (LTPR). Shibosai bonds are private placement bonds with distribution limited to institutions and banks. While eligibility criteria are less stringent, the MOF still controls the market in terms of rating, size and maturity of the issue.

In addition to these two, other vehicles are available to non – resident borrowers. Shogun Bonds are publicly floated bonds denominated in a foreign currency while Geisha Bonds are their private placement counterparts.

Indian entities have tapped the Japanese market to a considerable extent starting with the Shibosai issue made by IDBI in 1964. The strength of yen implies substantial exchange rate exposure for Indian borrowers who avail of yen finance. Correspondingly, the nominal interest rates are low. For details of bond issue procedures, the reader can consult Joshi (1996). Non – resident DEM bond issue in the German market are all structured as Euro bonds. These can be public issues or private placements depending upon the size of the issue and whether the issuer wishes the bonds to be listed on exchanges. After some activity in the late 1960s, Indian borrowers have not approached the German bond market.

The Swiss capital market also provide bond finance avenues. Swiss investors do not attach great importance to formal rating preferring to rely on their own assessment of the borrower's creditworthiness. They tend to be quite selective. Public Bonds floated through a prospectus, are fixed rate bullet redemption bonds and are normally used for large funding requirements in excess of Sfr100 million. Issue costs tend to be rather high. Unlisted Bonds (referred to as Notes and not bonds) are for

smaller financing and also for shorter maturities, sometimes as short as 16 months. They are not private placements since the issue is publicized as much as a public offering. Unlike other foreign bonds, these can be amortized with annual repayments of principal. For still smaller amounts (less than CHF10 million), Mini issues are available which are exempt from SNB approval. Convertible bonds or bonds with equity warrants also constitute a significant segment. India's recourse to the Swiss foreign bond market has been quite limited.

In addition to these, there are other smaller foreign bond markets. The UK market has developed the Bulldog Bond, a sterling denominated foreign bond, priced with reference to UK gilts. Fixed rate and floating rate bonds (FRNs) denominated in French franc as well as convertible bonds are available to non – resident borrowers in the French market. The Dutch market has Rembrandt Bonds, denominated in Dutch guilder. For details regarding the regulation and historical evolution of these markets see, among others, Joshi (1996).

Exhibit 6.10 presents data on the global bond market and its selected segments.

Exhibit 6.10 Euro and Foreign Bond Offerings (Billion US Dollars)

| | **1994** | **1995** | **1996** | **Jan – Sept 1996** |
|---|---|---|---|---|
| Eurobonds | 366.4 | 361.3 | 569.6 | 596.2 |
| Foreign Bonds | 60.2 | 96.0 | 119.0 | 64.1 |

| | | | | |
|---|---|---|---|---|
| Total | 426.6 | 466.3 | 606.6 | 662.3 |
| International Issues in Major Currencies | | | | |
| US Dollar | 149.4 | 144.4 | 266.6 | 296.4 |
| Yen | 66.3 | 64.5 | 41.2 | 25.9 |
| Deutschemark | 31.6 | 62.6 | 100.1 | 100.6 |
| Sterling | 30.4 | 21.6 | 51.6 | 55.3 |
| French Franc | 26.4 | 12.6 | 46.1 | 39.6 |
| Foreign Issues in Major Markets | | | | |
| United States | 15.0 | 32.4 | 40.5 | 32.4 |
| Switzerland | 20.0 | 26.1 | 25.0 | 16.6 |
| Japan | 11.2 | 16.0 | 35.5 | 14.4 |

***Source: Financial market Trends November 1996, OECD.***

Medium Term Notes (MTNs) represent a medium – term, non – underwritten, fixed interest rate source of funding. This form of funding originated in the US capital market and was introduced to the Euro market – Euro Medium term Notes (EMTNs) – during the 1960's. It was a part of the disintermediation process in which borrowers were approaching the investors directly rather than going through the bank loan route.

The main advantage of borrowing via an MTN or EMTN programme is its flexibility and much less onerous formalities of documentation compared to a bond issue. Documentation for a borrowing programme of a given size can be prepared once for all and then the borrower can issue notes in several tranches timing, each issue to take advantage of favorable 'windows of opportunity'. Each tranche may carry a different coupon[21] and have a different maturity date. Multi – currency option allows different tranches to be issued in different currencies. While dollar remains the most popular currency, EMTNs have been issued in other currencies including the ECU.

Euromarkets have also come up with Global MTNs (GMTNs) which are designed to tap both the American and other markets. A beginning has been made in floating rate EMTns.

The market is accessible only to issuers with good credit rating. So far, banks, supra – national institutions and sovereigns have been the predominant borrowers. Corporate borrowers have not used this market very much.

### 6.4.3 Short Term Financing

In this section, we will briefly describe some of the common short – term funding instruments such as commercial paper (CP), bankers' acceptances (Bas) and Certificates of Deposit (CDs). In addition, there are short – term bank loans ranging in maturity from overnight to one year.

Commercial Paper is a corporate short – term, unsecured promissory note issued on a discount to yield basis. [22] It can be regarded as a corporate equivalent of CD (Certificate of Deposit) which is an interbank instrument.

Commercial paper maturities generally do not exceed 260 days. Issuers usually roll over the issue and use the proceeds from the new issue to retire the old issue. The issue is normally placed through CP dealers or, in a few cases, large corporations have their own sales force. Commercial paper represents a cheap and flexible source of funds, especially for highly rated borrowers commercial can be cheaper than bank loans. [23] For investors, it is an attractive short – term investment opportunity compared to a time deposit with a bank. In addition to the high credit reputation of the borrowers, most CP programmes also require a back – up credit line from a commercial bank covering at least 50%, more often nearly 100% of the issue. While CPs are negotiable,

secondary markets tend to be not very active since most investors hold the paper to maturity.

Unites States has the largest and a long established dollar CP market. In recent years, it has dwarfed the markets for Certificates of Deposit and Bankers' Acceptances. It is used extensively by US corporations as well as some non – US corporations. The emergence of the Euro Commercial Paper (ECP) is much more recent. It evolved as a natural culmination of the Note Issuance Facility and developed rapidly in an environment of securitization and disintermediation of traditional banking. Investors in CP consist of money market funds, insurance companies, pension funds, other financial institutions and corporations with short – term cash surpluses.

In recent years, the growth in the number of new issues and issue volumes has slowed down in the ECP markets. Also, as a result of some defaults, investor concern about creditworthiness has increased dramatically. CP has also developed in the domestic segments of some European countries offering attractive funding opportunities to resident entities.

A Certificate of Deposit (CD) is a negotiable instrument evidencing a deposit with a bank. Unlike a traditional bank deposit which is non – transferable, a CD is a marketable instrument so that the investor can dispose it off in the secondary market when cash is needed. The final holder is paid the face value on maturity along with the interest. CDs are issued in large denominations – USD 100,000 or equivalent or higher – and are used by commercial banks as short – term funding instruments. Occasionally, CDs with maturity exceeding one year are issued. When the maturity is less than a year, interest is paid along with redemption of principal; for maturity longer than a year, interest may be paid semi – annually.

Euro CDs are issued mainly in London by banks. Interest on CDs with maturity exceeding a year is paid annually and not semi – annually. There are floating rate CDs with maturities normally ranging from 16 months to five years on which interest rate is periodically reset, indexed to LIBOR, Federal Reserve CD composite rate, Treasury Bill rate and so forth.

Bankers' Acceptances (BAs) is an instrument widely used in the US money market to finance domestic as well as international trade. In a typical international trade transaction, the seller (exporter) draws a time or usance draft on the buyer's (importer's) bank. On completing the shipment, the exporter hands over the shipping documents and the letter of credit issued by the importer's bank to its (exporter's) bank. The exporter gets paid the discounted value of the draft. The exporter's bank presents the draft to the importer's bank which stamps it as 'accepted'. Thus banker's acceptance is created. The exporter's bank may hold the draft in its portfolio, ask the importer's bank to rediscount it or sell it as a money market instrument. The investor might be a money market mutual fund. It is possible to draw BAs without a formal pre – authorization like a letter of credit as in this example.

In addition to these securitized instruments, short – term bank loans are also available. The Eurocurrencies market is essentially an interbank deposit and loans market. Loans ranging in maturity from overnight to one year can be arranged with minimal formalities. Interest rates are indexed to LIBOR.

In the US money market, Repurchase Obligations (REPOS) are used by securities dealers to finance their holdings of securities. This is a form of collateralized short – term borrowing in which the borrower 'sells' securities to the lender with an agreement to 'buy' them back at a later time. Hence the name 'Repurchase Obligations'. The repurchase price is

the same as the original buying price, but the seller (borrower) pays interest in addition to buying back the securities.[24] the duration for the borrowing may be as short as overnight or as long as upto a year. The form are called 'overnight repos'; longer duration repos are 'term repos'. The interest rate is determined by the demand – supply conditions. This concludes our brief survey of major short – term funding instruments. It must be stressed that what we have described are the basic prototypes. A bewildering variety of specific combinations of the basic types with exotic risk management products thrown in are seen in the market and new ones will continue to evolve.

## 6.5 INTERNATIONAL EQUITY FINANCING

The international new issues equity market with globally syndicated offerings emerged during the 1960's and grew rapidly until the stock market crash of October, 1966. While some emerging stock markets remained bullish despite the crash, institutional investors reduced their exposure to equities in general during 1966 and 1969.[25] The trend turned upward again in the nineties particularly for emerging markets which saw a tremendous increase in inflows of portfolio capital from developed country investors until the bubble burst in the summer of 1996 with the Asian financial crisis.

The initial thrust came from the desire on the part of institutional investors to diversify their portfolios globally in search of both higher return and risk reduction. Financial deregulation and elimination of exchange controls in a number of developed countries at the beginning of 1960's permitted large institutional investors to increase their exposure to foreign equities. Cross – border diversification was initially confined to OECD markets. Subsequently as the emerging markets opened up, institutional investors in developed countries shifted their attention to

these markets and continued to do so until the financial collapse of East Asia in 1996 followed by Russia in 1996.

Exhibit 6.11 presents some recent data on international equity issues by selected industrial and developing countries and regions. There has been a substantial increase in global equity financing particularly after 1991. Equity investment by foreign investors into a country can occur in one or more of three ways. Foreign investors can directly purchase shares in the stock market of the country, e.g. investment by FIIS in the Indian stock market. Or, companies from that country can issue shares (or depository receipts) in the stock markets of other countries. Finally, indirect purchases can be made through a mutual fund which may be a specific country fund or a multi – country regional fund.

The extent of risk reduction through cross – border portfolio diversification continues to be an area of active research. Consider a US – based institutional investor who wishes to invest in India. Suppose its portfolio currently consists of the S&P 500 market portfolio of US stocks and it is planning to invest in an Indian market portfolio say the BSE Sensex. The expected return on the combined portfolio upon:

(a) The expected returns on S&P 500 and the Sensex.

(b) The fractions of total portfolio allocated to the two countries.

(c) The INR/USD exchange rate.

**Exhibit 6.11 Announced International Equity by Nationality of Issuer (In Billions of US Dollars)**

| Country/Group | 1996 | 1996 | 1996 |
|---|---|---|---|
| All Countries | 62.4 | 116.5 | 124.2 |
| Developed Countries | 60.0 | 65.4 | 111.5 |
| United States | 6.1 | 6.9 | 16.1 |
| United Kingdom | 6.4 | 11.6 | 14.3 |
| Japan | 0.6 | 1.9 | 10.1 |
| Germany | 6.6 | 6.0 | 6.5 |
| Developing | 13.6 | 23.4 | 6.3 |

| | | | |
|---|---|---|---|
| countries | | | |
| Brazil | 0.4 | 2.4 | 0.1 |
| South Africa | 0.6 | 1.1 | 0.6 |
| China | 2.1 | 9.1 | 1.1 |
| India | 1.3 | 1.0 | 0.1 |
| South Korea | 1.2 | 0.6 | 0.5 |

***Source: Bank for International Settlements. See Exhibit 6.6.***

The risk of the combined portfolio – measured by the variance of the return – depends upon

(i) The variances of S&P 500 and Sensex portfolios and their weights in the aggregate portfolio.

(ii) The correlation between the two market portfolios – Indian and US.

(iii) The variance of the INR/USD exchange rate.

(iv) The correlations of the exchange rate with S&P 500 and Sensex.

If the rupee returns from the Sensex exceed the rate of depreciation of the rupee against the dollar, the combined portfolio would have higher expected dollar return than the S&P 500 portfolio. Will diversification necessarily reduce the risk too? Potential for risk reduction arises from the fact that the BSE Sensex is likely to have a very low correlation with S&P 500, particularly if the business cycles in India and the US are significantly out of phase with each other. However there are additional sources of risk in the combined portfolio. First, there is the exchange rate risk. Second, there is the covariance risk between the exchange rate and the local market, i.e. the possibility that a weak rupee is associated with a stagnant Indian stock market. [26] Finally, empirically it is observe that developing countries' stock markets are by and large more volatile than the markets in developed countries so that the variance of return on Sensex would be much larger than the variance of the returns on S&P 500.

On balance, it is a priori not certain that cross – border diversification would result in risk reduction. It remains an open issue. Some empirical studies do seem to indicate that such diversification does improve the risk – return tradeoff compared to portfolios confined to a single country.

When the portfolio contains assets from many countries, portfolio risk is determined by the variances of the returns on each country's market portfolios, their pairwise correlations, variances of the exchange rates (with the investor's home currency as the reference currency), correlations among the exchange rates and correlations among the exchange rates and country returns.

The most well – known model for valuation of stocks is the Capital Asset Pricing Model (CAPM) attributed to Sharp – Lintner – Mossin. According to this model, the required rate of return on a stock in excess of the risk – free return, is determined by the stock's Beta which is a measure of the stock's systematic risk, i.e. its correlation with the 'market portfolio' and the excess return on the market portfolio. The CAPM can be extended to a multi – country framework. Such an extension assumes that global capital markets are fully integrated, i.e. there are no legal and informational barriers to cross – border equity investments. The model then explains asset returns in terms of a World market Portfolio and exchange rate risk. The empirical validity and usefulness of this approach depends upon the validity of the assumption of fully integrated markets and an appropriate proxy for the world market portfolio. Empirically, it has been found that world's capital markets are neither fully integrated nor fully segmented. We explore this briefly in Chapter 9. For further details, see Apte (1996).

### 6.5.1 The Depository Receipts Mechanism

As mentioned above, the volume of new equity issues in the international markets increased dramatically between 1963 and 1966 and again after

1969. The 1990's saw a growing interest in the emerging markets. From the side of the issuers, the driving force was the desire to tap low cost sources of financing, broaden the shareholder base, acquire a springboard for international activities such as acquisitions and generally improve access to long term funding. From the point of view of investors, the primary motive has been diversification.

From the issuer's point of view, the major considerations are the price at which the issue can be placed, costs of issue and factors related to taxation such as withholding tax which can affect the attractiveness of the issue to investors.

As we have seen above, if the international markets were integrated, a given stock would be priced identically by all investors and there would be no advantage in choosing one market over another apart from cost of issue considerations. However, with segmented markets, the price that can be obtained would vary from one market to another. Countries with high saving rates such as Japan and those like Switzerland with access to others' investible funds would normally have low cost of equity.[26] However, some of these markets may not be readily accessible except to very high quality issuers. When the issue size is large, the issuer may consider a simultaneous offering in two or more markets. [26] Such issues are known as Euroequities.

Issue costs are an important consideration. in addition to the underwriting fees (which may be in the 3 – 5% range), there are substantial costs involved in preparing for an equity issue particularly for developing country issuers unknown to developed country investors. Generally speaking, issue costs tend to be lower in large domestic markets such as the US and Japan.

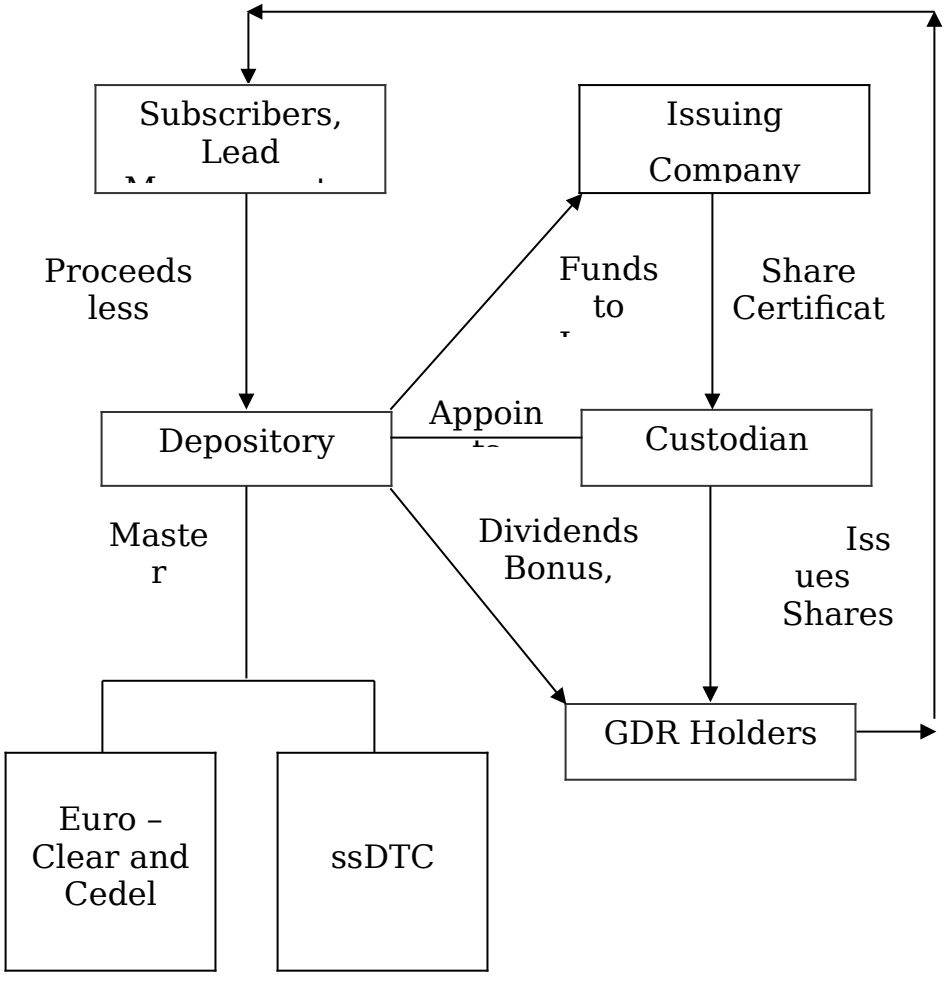
During the late 1960's, a number of European and Japanese companies were listed on foreign stock exchanges such as New York and London.

Shares of many firms are traded indirectly in the form of depository receipts. In this mechanism, the shares issued by a firm are held by a depository, [29] usually a large international bank, which receives dividends, reports etc. and issues claims against these shares. These claims are called depository receipts with each receipt being a claim on a specified number of shares. The depository receipts are denominated in a convertible currency – usually US dollars. The depository receipts may be listed and traded on major stock exchanges or may trade in the OTC market. The issuer firm pays dividends in its home currency which is converted into dollars by the depository and distributed to the holders of depository receipts. This way the issuing firm avoids listing fees and onerous disclosure and reporting requirements which would be obligatory if it were to be directly listed on the stock exchange. This mechanism originated in the US – the so called American Depository Receipts or ADRs. Recent years have seen the emergence of European Depository Receipts (EDRs) and Global Depository Receipts (GDRs) which can be used to tap multiple markets with a single instrument. Transactions in depository receipts are settled by means of computerized book transfers in international clearing systems such as EUROCLEAR and CEDEL.

After a hesitant start in 1992, following the experience of the first ever GDR issue by an Indian corporate, [30] a fairly large number of Indian companies took advantage of the improved market outlook to raise equity capital in international markets. During the period from April 1992 to 1994, almost thirty companies are estimated to have raised a total of nearly US$3 billion through GDR issues. The fiscal year 1993 – 94 in particular saw a spate of offerings. The fever abated thereafter for a couple of years. There appeared to be a mild revival in 1996 which died away again with the collapse in Asia. The structure of a typical GDR issue is shown in Exhibit 6.12.

From the point of view of the issuer, GDRs represent a nonvoting stock with a distinct identity which do not exhibit in its books.[31] There is no exchange risk since dividends are paid by the issuer in its home currency. The device allows the issuer to broaden its capital base by tapping large foreign equity markets. The risk is that the price of GDRs may drop sharply after issue due to problems in the local markets and damage the issuer's reputation which may harm future issues. From the investors' point of view, they achieve portfolio diversification while acquiring an instrument which is denominated in a convertible currency and is traded on developed stock markets. Of course the investors bear exchange risk and all the other risks borne by an equity holder (dividend uncertainty, capital loss). There are also taxes such as withholding taxes on dividends and taxes on capital gains.

**Exhibit 6.12 The Depository Receipts Mechanism**



For instance, the Indian government imposes a 10% witholding tax on dividends and a 65% maximum marginal capital gains tax on short term capital gains (tax on long term capital gains is only 10% thus encouraging the investor to hold on to the stock).[34]

A major problem and concern with international equity issues is that of flowback, i.e. the investors will sell the shares back in the home stock market of the issuing firm[35] authorities of some countries have imposed a minimum lock – in period during which the foreign investors cannot unload the shares in the domestic market.[36]

Withholding taxes on dividends paid to nonresidents reduce the attractiveness of the asset to foreign shareholders and consequently raises the cost to the issuer. Some giant multinationals have used the device of a finance subsidiary located in a tax haven country like the Bahamas to issue shares in the international markets. The usefulness and feasibility of this vehicle depends upon the tax laws and other regulations in the issuer's home country.

During 1993 – 94, GDR issues were a very popular device for many large Indian companies. Yields in developing country markets were rather low and many Indian issues offered attractive returns along with diversification benefits. The economic liberalisation policy of the government made Indian issues an attractive investment vehicle for foreign investors. In subsequent years however, a variety of problems with the workings of the Indian capital markets – lack of adequate custodial and depository services, long settlement periods, delivery and payment delays, suspicions of price rigging etc. – led to the wearing off of investor enthusiasm. Added to these factors was increasing political uncertainty as the elections were approaching. From roughly mid – 1994,

to nearly the end of 1995, market for Indian GDR issues remained lukewarm. There was some revival of investor interest thereafter but the Asian crisis in 1996 drove investors away from all emerging markets.

### *Check Your Progress – 2*

1. List the three funding avenues in global capital markets?

_____

_____

2. What are the variants of the straight bond evolved over time?

_____

_____

3. List some of the common short term funding instruments?

_____

_____

4. Explain about the depositary receipts mechanism?

_____

_____

5. Write a short notes on international equity financing?

_____

_____

6. Write a short notes on commercial paper?

_____

_____

## 6.6 SUMMMARY AND CONCLUSION

The international financing decision has several dimensions, which must be weighed against each other before choosing a particular mode of funding. The all – in cost of funding and the various risks remain the

guiding principles but regulatory issues and accessibility often take precedence over cost and risk considerations.

Estimation of cost of funding requires that several scenarios pertaining to the evolution of interest rates and exchange rates should be analyzed. Risk must be viewed from a portfolio perspective, i.e. as overall risk profile of the firm's entire mix of assets, liabilities and cash flows rather than the risk associated with a particular funding choice.

Syndicated bank loans and bonds are the dominant debt financing avenues. Both come in a variety of form with several options packaged with the basic funding. The risk profiles of many of such 'structured' products can be quite complex and require careful analysis.

Since the beginning of the 1990's, equity financing on global markets became accessible to firms in developing countries. Portfolio investments by foreign investors in the stock markets of developing countries and the depository receipts mechanism have been the dominant form of equity financing by firms in emerging markets. However, the activity has virtually come to a halt following the Asian and Russian crises. Revival of investor interest must await recovery in the Japanese economy and financial restructuring in the rest of Asia.

## 6.7 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

### CYP - 1

1. Refer to section 6.2

2. In evaluating a particular borrowing alternative, the following parameters have to be examined under alternative scenarios.
   a. The all – in cost of a particular funding instrument. The term 'all – in' means that the cost to be included is not just the interest but all other fees and expenses.

b. Interest rate and currency exposure arising from using a particular financing vehicle. Floating rate borrowing or short – term borrowing repeatedly rolled over exposes the firm to interest rate fluctuations. In the latter case, even the spread the firm will have to pay over the market index becomes uncertain. On the other hand, a long – term fixed rate borrowing without a call option locks the firm into a given funding cost so that the firm is unable to take advantage of falling rates. Funding in a foreign currency exposes the firm to all forms of currency exposure – transactions, translation and operating.

3. Refer to section 6.3.1

**CYP – 2**

1.

- Syndicated Loans and other Banking Products
- Bond Markets
- Short Term Financing

2. The variants of straight bonds are:

  - Floating Rate Notes (FRN)
  - Zero coupon bonds (called simply 'Zeros') and Deep Discount Bonds
  - Sinking fund bonds

3. Some of the common short – term funding instruments are:

i. commercial paper (CP),
ii. bankers' acceptances (Bas) and
iii. Certificates of Deposit (CDs).

In addition, there are short – term bank loans ranging in maturity from overnight to one year.

4. Refer to section 6.5.1

5. Refer to section 6.5
6. Refer to section 6.4.3

## 6.8 Model Examination Questions

1. Summarize the various considerations that enter into the decision to choose the currency, market and vehicle for long – term borrowing.
2. What are the crucial aspects in negotiating a syndicated bank loan?
3. What factors does one need to consider while investing internationally? Distinguish between the characteristics of segmented and integrated capital markets.
4. What factors aid in making the international capital markets more integrated? Explain the importance of emerging capital markets in international investing.
5. The spot exchange rates on 19 X 6 and 19 X 6 were Rs 36.53 and Rs 40.53 per USD respectively. If the percentage return on the American securities is:

   a. -50% b. -25% c. 25% d. 50%

   Over the previous year, then compute the net return to san Indian Investor.
6. The risk free rate of return is 6% and the market portfolio's rate of return is 25% The security's beta is 1.15 and the variance of its returns is 20%. The Indian Re has been depreciating relative to the USD at the rate of 5% p.a. say, with a variance of 15%. Compute the return and total risk the US investor can expect from this security, assuming that the correction between the returns on the security and the exchange rate is 0.25.

# UNIT 7: THE MANAGEMENT OF FOREIGN EXCHANGE RISK

## Contents

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7.8 Controlling Corporate Treasury Trading Risks

7.9 Summary and Conclusions

7.10 Answers to Check Your Progress Questions

7.11 Model Examination Questions

## 7.0 AIMS AND OBJECTIVES

At the end of the unit the student will have learned:

- what exchange risk does the firm face, and what methods are available to measure currency exposure?
- what hedging or exchange risk management strategy should the firm employ? And
- finally, which of the various tools and techniques of the foreign exchange market should be employed: debt and assets; forwards and futures; and options.

## 7.1 INTRODUCTION

This unit on foreign exchange exposure stats with explaining what is an Exchange Risk then it tries answer the question Should Firms Manage Foreign Exchange Risk? Latter parts of the unit explain concepts such as Economic Exposure, Purchasing Power Parity and the International Fisher Effect and the ways to identify an exposure. The final parts of the unit tell about how to Manage Economic Exposure and provides with the various Tools and Techniques for the Management of Foreign Exchange Risk. At the end it further explains specifically how to control corporate treasury trading risks.

## 7.2 WHAT IS EXCHANGE RISK?

Exchange risk is simple in concept: a potential gain or loss that occurs as a result of an exchange rate change. For example, if an individual owns a share in Hitachi, the Japanese company, he or she will lose if the value of the yen drops.

Yet from this simple question several more arise. First, whose gain or loss? Clearly not just those of a subsidiary, for they may be offset by positions taken elsewhere in the firm. And not just gains or losses on current transactions, for the firm's value consists of anticipated future cash flows as well as currently contracted ones. What counts, modern finance tells us, is shareholder value; yet the impact of any given currency change on shareholder value is difficult to assess, so proxies have to be used. The academic evidence linking exchange rate changes to stock prices is weak.

Moreover the shareholder who has a diversified portfolio may find that the negative effect of exchange rate changes on one firm is offset by gains in other firms; in other words, that exchange risk is diversifiable. If it is, than perhaps it's a non-risk.

Finally, risk is not risk if it is anticipated. In most currencies there are futures or forward exchange contracts whose prices give firms an indication of where the market expects currencies to go. And these contracts offer the ability to lock in the anticipated change. So perhaps a better concept of exchange risk is *unanticipated* exchange rate changes.

These and other issues justify a closer look at this area of international financial management.

## 7.3 SHOULD FIRMS MANAGE FOREIGN EXCHANGE RISK?

Many firms refrain from active management of their foreign exchange exposure, even though they understand that exchange rate fluctuations can affect their earnings and value. They make this decision for a number of reasons.

First, management does not understand it. They consider any use of risk management tools, such as forwards, futures and options, as speculative. Or they argue that such financial manipulations lie outside the firm's field of expertise. "We are in the business of manufacturing slot machines, and we should not be gambling on currencies." Perhaps they are right to fear abuses of hedging techniques, but refusing to use forwards and other instruments may expose the firm to substantial speculative risks.

Second, they claim that exposure cannot be measured. They are right -- currency exposure is complex and can seldom be gauged with precision. But as in many business situations, imprecision should not be taken as an excuse for indecision.

Third, they say that the firm *is* hedged. All transactions such as imports or exports are covered, and foreign subsidiaries finance in local currencies. This ignores the fact that the bulk of the firm's value comes from

transactions not yet completed, so that transactions hedging is a very incomplete strategy.

Fourth, they say that the firm does not have any exchange risk because it does all its business in dollars (or yen, or whatever the home currency is). But a moment's thought will make it evident that even if you invoice German customers in dollars, when the mark drops your prices will have to adjust or you'll be undercut by local competitors. So revenues are influenced by currency changes.

Finally, they assert that the balance sheet is hedged on an accounting basis--especially when the "functional currency" is held to be the dollar. The misleading signals that balance sheet exposure measure can give are documented in later sections.

But is there any *economic* justification for a "do nothing" strategy?

Modern principles of the theory of finance suggest *prima facie* that the management of corporate foreign exchange exposure may neither be an important nor a legitimate concern. It has been argued, in the tradition of the Modigliani-Miller Theorem, that the firm cannot improve shareholder value by financial manipulations: specifically, investors themselves can hedge corporate exchange exposure by taking out forward contracts in accordance with their ownership in a firm. Managers do not serve them by second-guessing what risks shareholders want to hedge.

One counter-argument is that transaction costs are typically greater for individual investors than firms. Yet there are deeper reasons why foreign exchange risk should be managed at the firm level. As will be shown in the material that follows, the assessment of exposure to exchange rate fluctuations requires detailed estimates of the susceptibility of net cash flows to unexpected exchange rate changes (Dufey and Srinivasulu, 1973).

Operating managers can make such estimates with much more precision than shareholders who typically lack the detailed knowledge of competition, markets, and the relevant technologies. Furthermore, in all but the most perfect financial markets, the firm has considerable advantages over investors in obtaining relatively inexpensive debt at home and abroad, taking maximum advantage of interest subsidies and minimizing the effect of taxes and political risk.

Another line of reasoning suggests that foreign exchange risk management does not matter because of certain equilibrium conditions in international markets for both financial and real assets. These conditions include the relationship between prices of goods in different markets, better known as Purchasing Power Parity (PPP), and between interest rates and exchange rates, usually referred to as the International Fisher Effect (see next section).

However, deviations from PPP and IFE can persist for considerable periods of time, especially at the level of the individual firm. The resulting variability of net cash flow is of significance as it can subject the firm to the costs of *financial distress*, or even default. Modern research in finance supports the reasoning that earnings fluctuations that threaten the firm's continued viability absorb management and creditors' time, entail out-of-pocket costs such as legal fees, and create a variety of operating and investment problems, including underinvestment in R&D. The same argument supports the importance of corporate exchange risk management against the claim that in equity markets it is only systematic risk that matters. To the extent that foreign exchange risk represents unsystematic risk, it can, of course, be diversified away -- provided again, that investors have the same quality of information about the firm as management -- a condition not likely to prevail in practice.

This reasoning is buttressed by the likely effect that exchange risk has on *taxes* paid by the firm. It is generally agreed that leverage shields the firm from taxes, because interest is tax deductible whereas dividends are not. But the extent to which a firm can increase leverage is limited by the risk and costs of bankruptcy. A riskier firm, perhaps one that does not hedge exchange risk, cannot borrow as much. It follows that anything that reduces the probability of bankruptcy allows the firm to take on greater leverage, and so pay less taxes for a given operating cash flow. If foreign exchange hedging reduces taxes, shareholders benefit from hedging.

However, there is one task that the firm cannot perform for shareholders: to the extent that individuals face unique exchange risk as a result of their different expenditure patterns, they must themselves devise appropriate hedging strategies. Corporate management of foreign exchange risk in the traditional sense is only able to protect expected *nominal* returns in the reference currency (Eaker, 1971).

## 7.4 ECONOMIC EXPOSURE, PURCHASING POWER PARITY AND THE INTERNATIONAL FISHER EFFECT

Exchange rates, interest rates and inflation rates are linked to one another through a classical set of relationships which have import for the nature of corporate foreign exchange risk. These relationships are: (1) the *purchasing power parity* theory, which describes the linkage between relative inflation rates and exchange rates; (2) the *international Fisher effect*, which ties interest rate differences to exchange rate expectations; and (3) the *unbiased forward rate theory*, which relates the forward exchange rate to exchange rate expectations. These relationships, along with two other key "parity" linkages, are illustrated in Figure 1.

The **Purchasing Power Parity** (PPP) theory can be stated in different ways, but the most common representation links the changes in exchange rates to those in relative price indices in two countries.

Rate of change of exchange rate = Difference in inflation rates

The relationship is derived from the basic idea that, in the absence of trade restrictions changes in the exchange rate mirror changes in the relative price levels in the two countries. At the same time, under conditions of free trade, prices of similar commodities cannot differ between two countries, because arbitragers will take advantage of such situations until price differences are eliminated. This "Law of One Price" leads logically to the idea that what is true of one commodity should be true of the economy as a whole--the price level in two countries should be linked through the exchange rate--and hence to the notion that exchange rate changes are tied to inflation rate differences.

The **International Fisher Effect** (IFE) states that the interest rate differential will exist only if the exchange rate is expected to change in such a way that the advantage of the higher interest rate is offset by the loss on the foreign exchange transactions.

This International Fisher Effect can be written as follows:

The expected rate of change of the exchange rate = The interest rate differential

In practical terms the IFE implies that while an investor in a low-interest country can convert his funds into the currency of the high-interest country and get paid a higher rate, his gain (the interest rate differential)

will be offset by his expected loss because of foreign exchange rate changes.

The **Unbiased Forward Rate Theory** asserts that the forward exchange rate is the best, and an unbiased, estimate of the expected future spot exchange rate. The theory is grounded in the efficient markets theory, and is widely assumed and widely disputed as a precise explanation.

The "expected" rate is only an average but the theory of efficient markets tells us that it is an *unbiased* expectation--that there is an equal probability of the actual rate being above or below the expected value.

The unbiased forward rate theory can be stated simply:

The expected exchange rate = The forward exchange rate

Now we can summarize the impact of unexpected exchange rate changes on the internationally involved firm by drawing on these parity conditions. Given sufficient time, competitive forces and arbitrage will neutralize the impact of exchange rate changes on the returns to assets; due to the relationship between rates of devaluation and inflation differentials, these factors will also neutralize the impact of the changes on the value of the firm This is simply the principle of Purchasing Power Parity and the Law of One Price operating at the level of the firm. On the liability side, the cost of debt tends to adjust as debt is repriced at the end of the contractual period, reflecting (revised) expected exchange rate changes. And returns on equity will also reflect required rates of return; in a competitive market these will be influenced by expected exchange rate changes. Finally the unbiased forward rate theory suggests that locking in the forward exchange rate offers the same expected return as remaining exposed to the ups and downs of the currency -- on average, it can be expected to err as much above as below the forward rate.

In the long run, it would seem that a firm operating in this setting will not experience net exchange losses or gains. However, because of contractual, or, more importantly, strategic commitments, these equilibrium conditions rarely hold in the short and medium term. Therefore the essence of foreign exchange exposure, and, significantly, its management, are made relevant by these "temporary deviations."

## *Check Your Progress – 1*

1. What is an exchange risk?

_____

_____

2. List the reasons why the firms refrain from managing foreign exchange exposure?

_____

_____

3. Explain briefly about purchasing power parity?

_____

_____

4. Write about an economic exposure?

_____

_____

## 7.5 IDENTIFYING EXPOSURE

The first step in management of corporate foreign exchange risk is to acknowledge that such risk does exist and that managing it is in the interest of the firm and its shareholders. The next step, however, is much more difficult: the identification of the nature and magnitude of foreign exchange exposure. In other words, identifying what is at risk, and in what way.

The focus here is on the exposure of non-financial corporations, or rather the value of their assets. This reminder is necessary because most commonly accepted notions of foreign exchange risk hedging deal with assets, i.e., they are pertinent to (simple) financial institutions where the bulk of the assets consists of (paper) assets that have with contractually fixed returns, i.e., fixed income claims, not equities. Clearly, such timece your assets in the currency in which they are denominated" applies in general to banks and similar firms. Nonfinancial business firms, on the other hand, have, as a rule, only a relatively small proportion of their total assets in the form of receivables and other financial claims. Their core assets consist of inventories, equipment, special purpose buildings and other tangible assets, often closely related to technological capabilities that give them earnings power and thus value. Unfortunately, real assets (as compared to paper assets) are not labelled with currency signs that make foreign exchange exposure analysis easy. Most importantly, the location of an asset in a country is -- as we shall see -- an all too fallible indicator of their foreign exchange exposure.

The task of gauging the impact of exchange rate changes on an enterprise begins with measuring its *exposure*, that is, the amount, or value, at risk. This issue has been clouded by the fact that financial results for an enterprise tend to be compiled by methods based on the principles of accrual accounting. Unfortunately, this approach yields data that frequently differ from those relevant for business decision-making, namely future cash flows and their associated risk profiles. As a result, considerable efforts are expended -- both by decision makers as well as students of exchange risk -- to reconcile the differences between the point-in-time effects of exchange rate changes on an enterprise in terms of accounting data, referred to as *accounting* or *translation exposure*, and the ongoing cash flow effects which are referred to as *economic exposure*. Both concepts have their grounding in the fundamental concept of

*transactions exposure*. The relationship between the three concepts is illustrated in the Exhibit 2. While exposure concepts have been aptly analyzed elsewhere in this *Handbook*, some basic concepts are repeated here to make the present chapter self contained.

4 (a) Exposure in a simple transaction.

The typical illustration of transaction exposure involves an export or import contract giving rise to a foreign currency receivable or payable. On the surface, when the exchange rate changes, the value of this export or import transaction will be affected in terms of the domestic currency. However, when analyzed carefully, it becomes apparent that the exchange risk results from a financial investment (the foreign currency receivable) or a foreign currency liability (the loan from a supplier) that is purely incidental to the underlying export or import transaction; it could have arisen in and of itself through independent foreign borrowing and lending. Thus, what is involved here are simply foreign currency assets and liabilities, whose value is contractually fixed in nominal terms.

While this traditional analysis of transactions exposure is correct in a narrow, formal sense, it is really relevant for financial institutions, only. With returns from financial assets and liabilities being fixed in nominal terms, they can be shielded from losses with relative ease through cash payments in advance (with appropriate discounts), through the factoring of receivables, or via the use of forward exchange contracts, unless unexpected exchange rate changes have a systematic effect on credit risk.7 However, the essential assets of nonfinancial firms have *noncontractual* returns, i.e. revenue and cost streams from the production and sale of their goods and services which can respond to exchange rate changes in very different ways. Consequently, they are characterized by foreign exchange exposure very different from that of firms with contractual returns.

*MEASURES OF ACCOUNTING EXPOSURE*

| | Current/ Noncurrent | Monetary/ Nonmonetary | Temporal | Current |
|---|---|---|---|---|
| ***ASSETS*** | | | | |
| Cash | C | C | C | C |
| Marketable Securities (At Market Value) | C | C | C | C |
| Accounts Receivable | C | C | C | C |
| Inventory (At Cost) | C | H | H | C |
| Fixed Assets | H | H | H | C |
| ***LIABILITIES*** | | | | |
| Current Liabilities | C | C | C | C |
| Long Term Debt | H | C | C | C |
| Equity | Residual Adjustment | Residual Adjustment | Residual Adjustment | Residual Adjustment |

**Note:** In the case of Income Statements, sales revenues and interest are generally translated at the average historical exchange rate that prevailed during the period; depreciation is translated at the appropriate historical exchange rate. Some of the general and administrative expenses as well as cost-of-goods-sold are translated at historical exchange rates, others at current rates.

"C" = Assets and liabilities are translated at the current rate, or rate prevailing on the date of the balance sheet.

"H" = Assets and liabilities are translated at the historical rate.

4 (b) Accounting exposure.

The concept of accounting exposure arises from the need to translate accounts that are denominated in foreign currencies into the home currency of the reporting entity. Most commonly the problem arises when an enterprise has foreign affiliates keeping books in the respective local currency. For purposes of consolidation these accounts must somehow be *translated* into the reporting currency of the parent company. In doing this, a decision must be made as to the exchange rate that is to be used for the translation of the various accounts. While income statements of foreign affiliates are typically translated at a periodic *average* rate, balance sheets pose a more serious challenge.

To a certain extent this difficulty is revealed by the struggle of the accounting profession to agree on appropriate translation rules and the treatment of the resulting gains and losses. A comparative historical analysis of translation rules may best illustrate the issues at hand. Over time, U.S. companies have followed essentially four types of translation methods, summarized in Exhibit 3. These four methods differ with respect to the presumed impact of exchange rate changes on the value of individual categories of assets and liabilities. Accordingly, each method can be identified by the way in which it separates assets and liabilities into those that are "exposed" and are, therefore, translated at the current rate, i.e., the rate prevailing on the date of the balance sheet, and those whose value is deemed to remain unchanged, and which are, therefore, translated at the historical rate.

The *current/noncurrent* method of translation divides assets and liabilities into current and noncurrent categories, using maturity as the

distinguishing criterion; only the former are presumed to change in value when the local currency appreciates or depreciates vis-à-vis the home currency. Supporting this method is the economic rationale that foreign exchange rates are essentially fixed but subject to occasional adjustments that tend to correct themselves in time. This assumption reflected reality to some extent, particularly with respect to industrialized countries during the period of the Bretton Woods system. However, with subsequent changes in the international financial environment, this translation method has become outmoded; only in a few countries is it still being used.

Under the *monetary/nonmonetary* method all items explicitly defined in terms of monetary units are translated at the current exchange rate, regardless of their maturity. Nonmonetary items in the balance sheet, such as tangible assets, are translated at the historical exchange rate. The underlying assumption here is that the local currency value of such assets increases (decreases) immediately after a devaluation (revaluation) to a degree that compensates fully for the exchange rate change. This is equivalent of what is known in economics as the Law of One Price, with instantaneous adjustment.

A similar but more sophisticated translation approach supports the so-called *temporal* method. Here, the exchange rate used to translate balance sheet items depends on the valuation method used for a particular item in the balance sheet. Thus, if an item is carried on the balance sheet of the affiliate at its current value, it is to be translated using the current exchange rate. Alternatively, items carried at historical cost are to be translated at the historical exchange rate. As a result, this method synchronizes the time dimension of valuation with the method of translation. As long as foreign affiliates compile balance sheets under traditional historical cost principles, the temporal method gives essentially the same results as the monetary/nonmonetary method. However, when

"current value accounting" is used, that is, when accounts are adjusted for inflation, then the temporal method calls for the use of the current exchange rate throughout the balance sheet.

The temporal method provided the conceptual base for the Financial Accounting Standard Board's Standard 7 (FAS 7), which came into effect in 1976 for all U.S.-based companies and those non-U.S. companies that had to follow U.S. accounting principles in order to raise funds in the public markets of the United States.

The temporal method points to a more general issue: the relationship between translation and valuation methods for accounting purposes. When methods of valuation provide results that do not reflect economic reality, translation will fail to remedy that deficiency, but will tend to make the distortion very apparent. To illustrate this point: companies with real estate holdings abroad financed by local currency mortgages found that under FAS 7 their earnings were subject to considerable translation losses and gains. This came about because the value of their assets remained constant, as they were carried on the books at historical cost and translated at historical exchange rates, while the value of their local currency liabilities increased or decreased with every twitch of the exchange rate between reporting dates.

In contrast, U.S. companies whose foreign affiliates produced internationally traded goods (minerals or oil, for example) felt very comfortable valuing their assets on a dollar basis. Indeed, this later category of companies were the ones that did not like the transition to the current rate method at all. Here, all assets and liabilities are translated at the exchange rate prevailing on the reporting date. They found the underlying assumption that the value of all assets (denominated in the local currency of the given foreign affiliate) would change in direct

proportion to the exchange rate change did not reflect the economic realities of their business.

In order to accommodate the conflicting requirements of companies in different situations and still maintain a semblance of conformity and comparability, at the end of 1971 the Financial Accounting Standards Board issued Standard 52, replacing Standard 7. **FAS 52**, as it is commonly referred to, uses the current/current method as the basic translation rule. At the same time it mitigates the consequences by allowing companies to move translation losses directly to a special subaccount in the net worth section of the balance sheet, instead of adjusting current income. This latter provision may be viewed as a mere gimmick without much substance, providing at best a signalling function, indicating to users of accounting information that translation gains and losses are of a nature different from items normally found in income statements.

A more significant innovation of FAS 52 is the "functional" currency concept, which gives a company the opportunity to identify the primary economic environment and select the appropriate (functional) currency for each of the corporation's foreign entities. This approach reflects the official recognition by the accounting profession that the *location* of an entity does not necessarily indicate the currency relevant for a particular business. Thus FAS 52 represents an attempt to take into account the fact that exchange rate changes affect different companies in different ways, and that rigid and general rules treating different circumstances in the same manner will provide misleading information.

In order to adjust to the diversity of real life FAS 52 had to become quite complex. The following provides a brief road map to the logic of that standard.

In applying FAS 52 a company and its accountants must make two decisions in sequence. First, they must determine the functional currency of the entity whose accounts are to be consolidated. For all practical purposes, the choice here is between local currency and the U.S. dollar. In essence, there are a number of specific criteria which provide guidelines for this determination. As usual, extreme cases are relatively easily classified: a foreign affiliate engaged in retailing local goods and services will have the local currency as its functional currency, while a "border plant" that receives the majority of its inputs from abroad and ships the bulk of the output outside of the host country will have the dollar as its functional currency. If the functional currency is the dollar, foreign currency items on its balance sheet will have to be restated into dollars and any gains and losses are moved through the income statement, just as under FAS 7. If, on the other hand, the functional currency is determined to be the local currency, a second issue arises: whether or not the entity operates in a high inflation environment. High inflation countries are defined as those whose cumulative three-year inflation rate exceeds 100 percent. In that case, essentially the same principles as in FAS 7 are followed. In the case where the cumulative inflation rate falls short of 100 percent, the foreign affiliate's books are to be translated using the current exchange rate for all items, and any gains or losses are to go directly as a charge or credit to the equity accounts.

FAS 52 has a number of other fairly complex provisions regarding the treatment of hedge contracts, the definition of transactional gains and losses, and the accounting for intercompany transactions.

In essence, FAS 52 allows management much more flexibility to present the impact of exchange rate variations in accordance with perceived economic reality; by the same token, it provides greater scope for

manipulation of reported earnings and it reduces comparability of financial data for different firms.

### 4 (d) Critique of the Accounting Model of Exposure

Even with the increased flexibility of FAS 52, users of accounting information must be aware that there are three system sources of error that can mislead those responsible for exchange risk management (Adler, 1972):

1. Accounting data do not capture all commitments of the firm that give rise to exchange risk.
2. Because of the historical cost principle, accounting values of assets and liabilities do not reflect the respective contribution to total expected net cash flow of the firm.
3. Translation rules do not distinguish between expected and unexpected exchange rate changes.

Regarding the first point, it must be recognized that normally, commitments entered into by the firm in terms of foreign exchange, a purchase or a sales contract, for example, will not be booked until the merchandise has been shipped. At best, such obligations are shown as contingent liabilities. More importantly, accounting data reveals very little about the ability of the firm to change costs, prices and markets quickly. Alternatively, the firm may be committed by strategic decisions such as investment in plant and facilities. Such "commitments" are important criteria in determining the existence and magnitude of exchange risk.

The second point surfaced in our discussion of the temporal method: whenever asset values differ from market values, translation--however sophisticated--will not redress this original shortcoming. Thus, many of the perceived problems of FAS 7 had their roots not so much in translation, but in the fact that in an environment of inflation and exchange rate

changes, the lack of current value accounting frustrates the best translation efforts.

Finally, translation rules do not take account of the fact that exchange rate changes have two components: (1) *expected* changes that are already reflected in the prices of assets and the costs of liabilities (relative interest rates); and (2) the *real goods and services*, the basic rationale for corporate foreign exchange exposure management is to shield net cash flows, and thus the value of the enterprise, from unanticipated exchange rate changes.

This thumbnail sketch of the economic foreign exchange exposure concept has a number of significant implications, some of which seem to be at variance with frequently used ideas in the popular literature and apparent practices in business firms. Specifically, there are implications regarding (1) the question of whether exchange risk originates from monetary or nonmonetary transactions, (2) a reevaluation of traditional perspectives such as "transactions risk," and (3) the role of forecasting exchange rates in the context of corporate foreign exchange risk management.

### 4 (f) Contractual versus Noncontractual Returns

An assessment of the nature of the firm's assets and liabilities and their respective cash flows shows that some are contractual, i.e. fixed in nominal, monetary terms. Such returns, earnings from fixed interest securities and receivables, for example, and the negative returns on various liabilities are relatively easy to analyze with respect to exchange rate changes: when they are denominated in terms of foreign currency, their terminal value changes directly in proportion to the exchange rate change. Thus, with respect to financial items, the firm is concerned only about *net* assets or liabilities denominated in foreign currency, to the extent that maturities (actually, "durations" of asset classes) are matched.

What is much more difficult, however, is to gauge the impact of an exchange rate change on assets with noncontractual returns. While conventional discussions of exchange risk focus almost exclusively on financial assets, for trading and manufacturing firms at least, such assets are relatively less important than others. Indeed, equipment, real estate, buildings and inventories make the decisive contribution to the total cash flow of those firms. (Indeed companies frequently sell financial assets to banks, factors, or "captive" finance companies in order to leave banking to bankers and instead focus on the management of core assets!) And returns on such assets are affected in quite complex ways by changes in exchange rates. The most essential consideration is how the prices and costs of the firm will react in response to an unexpected exchange rate change. For example, if prices and costs react immediately and fully to offset exchange rate changes, the firm's cash flows are not exposed to exchange risk since they will not be affected in terms of the base currency.

Example of the Effect of Devaluation on Inventory

Assume the French subsidiary of a U.S. corp. has an inventory destined for sale to Germany. Exchange rates are as follows:

*before devaluation 1 FF = .15 $ = .30 DM*

*after devaluation 1 FF = .12 $ = .20 DM*

| Selling price in Germany | Economic Value of Inventory | Accounting Value (FIFO) in |
|---|---|---|

| Assumed "pass-through" | DM | | FFr | | US$ | | France | | USA | |
|---|---|---|---|---|---|---|---|---|---|---|
| (in percent) | Before | After | Before | After | Before | After | Before | After | Before | After |
| 0 | 150 | 150 | 5001 | 7502 | 75 | 90 | 5003 | 5003 | 75 | 60 |
| 50 | 150 | 125 | 500 | 625 | 75 | 75 | 500 | 500 | 75 | 60 |
| 100 | 150 | 100 | 500 | 500 | 75 | 60 | 50 | 500 | 75 | 60 |

Thus, the value of noncontractual assets is not affected.

***WHAT DOES THE EFFECT OF EXCHANGE RATE CHANGES ON OPERATIONAL CASH FLOWS DEPEND ON?***

1. VOLUME EFFECTS (compensate for changes in profit margins)

2. PRICING FLEXIBILITY (change in margins to offset effect of exchange rate change)

3. DIVERSIFICATION of markets for inputs and outputs

4. PRODUCTION AND SALES FLEXIBILITY (ability to shift markets and sources quickly)

Inventories may serve as a good illustration of this proposition. The value of an inventory in a foreign subsidiary is determined not only by changes in the exchange rate, but also by a subsequent price change of the product--to the extent that the underlying *cause* of this price change is the exchange rate change. Thus, the dollar value of an inventory destined for export may increase when the currency of the destination country appreciates, provided its local currency prices do not decrease by the full percentage of the appreciation. Exhibit 4 provides a numerical illustration.

The effect on the local currency price depends, in part, on competition in the market. The behavior of foreign and local competitors, in turn,

depends on capacity utilization, market share objectives, likelihood of cost adjustments and a host of other factors. Of course, firms are not only interested in the value change or the behavior of cash flows of a single asset, but rather in the behavior of all cash flows. Again, price and cost adjustments need to be analyzed. For example, a firm that requires raw materials from abroad for production will usually find its stream of cash outlays going up when its local currency depreciates against foreign currencies. Yet the depreciation may cause foreign suppliers to lower prices in terms of foreign currencies for the purpose of maintaining market share.

### *WHAT IS ECONOMIC EXPOSURE?*

PDVSA, the Venezuelan state-owned oil company, recently set up an oil refinery near Rotterdam, The Netherlands for shipment to Germany and other continental European countries. The firm planned to invoice its clients in ECU, the official currency unit of the European Community. The treasurer is considering sources of long term financing. In the past all long term finance has been provided by the parent company, but working capital required to pay local salaries and expenses has been financed in Dutch guilders. The treasurer is not sure whether the short term debt should be hedged, or what currency to issue long term debt in.

This is an example of a situation where the definition of exposure has a direct impact on the firm's hedging decisions.

*Translation exposure* has to do with the *location of the assets*, which in this case would be a totally misleading measure of the effect of exchange rate changes on the value of the unit. After all, the oil comes from Venezuela and is shipped to Germany: its temporary resting place, be it a refinery in Rotterdam or a tanker en route to Germany, has no import. Both provide value added, but neither determine the currency of revenues. So financing should definitely not be done in Dutch guilders.

*Transactions exposure* has to do with the *currency of denomination* of assets like accounts receivable or payable. Once sales to Germany have been made and invoicing in ECU has taken place, PDVSA-Netherlands has contractual, ECU-denominated assets that should be financed or hedged with ECU. For future sales, however, PDVSA-Netherlands does *not* have exposure to the

ECU. This is because the currency of determination is the U.S. dollar.

*Economic exposure* is tied to the *currency of determination* of revenues and costs. Since the world market price of oil is dollars, this is the effective currency in which PDVSA's future sales to Germany are made. If the ECU rises against the dollar, PDVSA must adjust its ECU price down to match those of competitors like Aramco. If the dollar rises against the ECU, PDVSA can and should raise prices to keep the dollar price the same, since competitors would do likewise. Clearly the currency of determination is influenced by the currency in which competitors denominate prices.

### 4 (g) Currency of denomination versus currency of determination

One of the central concepts of modern international corporate finance is the distinction between the currency in which cash flows are *denominated* and the currency that *determines* the size of the cash flows. In the example in the previous section, it does not matter whether, as a matter of business practice, the firm may contract, be invoiced in, and pay for each individual shipment in its own local currency. If foreign exporters do not provide price concessions, the cash outflow of the importer behaves just like a foreign currency cash flow; even though payments are made in local currency, they occur in greater amounts. As a result, the cash flow, even while *denominated* in local currency, is *determined* by the relative value of the foreign currency. The functional currency concept introduced in FAS 52 is similar to the "currency of determination" -- but not exactly. The currency of determination refers to revenue and operating expense flows, respectively; the functional currency concept pertains to an entity as a whole, and is, therefore, less precise.

To complicate things further, the *currency of recording*, that is, the currency in which the accounting records are kept, is yet another matter. For example, any debt contracted by the firm in foreign currency will always be recorded in the currency of the country where the corporate entity is *located*. However, the value of its legal obligation is established in

the currency in which the contract is denominated. An example of the importance of these distinctions may be found in Exhibit 5.

It is possible, therefore, that a firm selling in export markets may record assets and liabilities in its local currency and invoice periodic shipments in a foreign currency and yet, if prices in the market are dominated by transactions in a third country, the cash flows received may behave as if they were in that third currency. To illustrate: a Brazilian firm selling coffee to West Germany may keep its records in cruzeiros, invoice in German marks, and have DM-denominated receivables, and physically collect DM cash flow, only to find that its revenue stream behaves as if it were in U.S. dollars! This occurs because DM-prices for each consecutive shipment are adjusted to reflect world market prices which, in turn, tend to be determined in U.S. dollars. The significance of this distinction is that the currency of denomination is (relatively) readily subject to management discretion, through the choice of invoicing currency. Prices and cash flows, however, are determined by competitive conditions which are beyond the immediate control of the firm.

Yet an additional dimension of exchange risk involves the element of *time*. In the very short run, virtually all local currency prices for real goods and services (although not necessarily for financial assets) remain unchanged after an unexpected exchange rate change. However, over a longer period of time, prices and costs move inversely to spot rate changes; the tendency is for Purchasing Power Parity and the Law of One Price to hold.

In reality, this price adjustment process takes place over a great variety of time patterns. These patterns depend not only on the products involved, but also on market structure, the nature of competition, general business conditions, government policies such as price controls, and a number of other factors. Considerable work has been done on the phenomenon of "pass-through" of price changes caused by (unexpected) exchange rate

changes. And yet, because all the factors that determine the extent and speed of pass-through are very firm-specific and can be analyzed only on a case-by-case basis at the level of the operating entity of the firm (or strategic business unit), generalizations remain difficult to make. Exhibit 6 summarizes the firm-specific effects of exchange rate changes on operating cash flows.

Conceptually, though, it is important to determine the time frame within which the firm cannot react to (unexpected) rate changes by (1) raising prices; (2) changing markets for inputs and outputs; and/or (3) adjusting production and sales volumes. Sometimes, at least one of these reactions is possible within a relatively short time; at other times the firm is "locked-in" through contractual or strategic commitments extending considerably into the future. Indeed, those firms which are free to react instantaneously and fully to adverse (unexpected) rate changes are not subject to exchange risk.

A further implication of the time-frame element is that exchange risk stems from the firm's position when its cash flows are, for a significant period, exposed to (unexpected) exchange rate changes, rather than the risk resulting from any specific international involvement. Thus, companies engaged purely in domestic transactions but who have dominant foreign competitors may feel the effect of exchange rate changes in their cash flows as much or even more than some firms that are actively engaged in exports, imports, or foreign direct investment.

## 7.6 MANAGING ECONOMIC EXPOSURE

5 (a) Economic Effects of Unanticipated Exchange Rate Changes on Cash Flows. From this analytical framework, some practical implications emerge for the assessment of economic exposure. First of all, the firm must project its cost and revenue streams over a planning horizon that

represents the period of time during which the firm is "locked-in," or constrained from reacting to (unexpected) exchange rate changes. It must then assess the impact of a deviation of the actual exchange rate from the rate used in the projection of costs and revenues.

### *STEPS IN MANAGING ECONOMIC EXPOSURE*

1. Estimation of planning horizon as determined by reaction period.

2. Determination of expected future spot rate.

3. Estimation of expected revenue and cost streams, given the expected spot rate.

4. Estimation of effect on revenue and expense streams for unexpected exchange rate changes.

5. Choice of appropriate currency for debt denomination.

6. Estimation of necessary amount of foreign currency debt.

7. Determination of average interest period of debt.

7. Selection between direct or indirect debt denomination.

9. Decision on trade-off between arbitrage gains vs. exchange risk stemming from exposure in markets where rates are distorted by controls.

10. Decision about "residual" risk: consider adjusting business strategy.

Subsequently, the effects on the various cash flows of the firm must be netted over product lines and markets to account for diversification effects where gains and losses could cancel out, wholly or in part. The remaining net loss or gain is the subject of economic exposure management. For a multiunit, multiproduct, multinational corporation the net exposure may not be very large at all because of the many offsetting effects.7 By contrast, enterprises that have invested in the development of one or two major foreign markets are typically subject to considerable fluctuations of

their net cash flows, regardless of whether they invoice in their own or in the foreign currency.

For practical purposes, three questions capture the extent of a company's foreign exchange exposure.

1. How quickly can the firm adjust prices to offset the impact of an unexpected exchange rate change on profit margins?

2. How quickly can the firm change sources for inputs and markets for outputs? Or, alternatively, how diversified are a company's factor and product markets?

3. To what extent do volume changes, associated with unexpected exchange rate changes, have an impact on the value of assets?

Normally, the executives within business firms who can supply the best estimates on these issues tend to be those directly involved with purchasing, marketing, and production. Finance managers who focus exclusively on credit and foreign exchange markets may easily miss the essence of corporate foreign exchange risk.

**5 (b) Financial versus operating strategies for hedging.**

When operating (cash) inflows and (contractual) outflows from liabilities are affected by exchange rate changes, the general principle of prudent exchange risk management is: any effect on cash inflows and outflows should cancel out as much as possible. This can be achieved by maneuvering assets, liabilities or both. When should operations -- the asset side -- be used?

We have demonstrated that exchange rate changes can have tremendous effects on operating cash flows. Does it not therefore make sense to adjust operations to hedge against these effects? Many companies, such as

Japanese auto producers, are now seeking flexibility in production location, in part to be able to respond to large and persistent exchange rate changes that make production much cheaper in one location than another. Among the operating policies are the shifting of markets for output, sources of supply, product-lines, and production facilities as a defensive reaction to adverse exchange rate changes. Put differently, deviations from purchasing power parity provide profit opportunities for the operations-flexible firm. This philosophy is epitomized in the following quotation.

It has often been joked at Philips that in order to take advantage of currency movements, it would be a good idea to put our factories aboard a supertanker, which could put down anchor wherever exchange rates enable the company to function most efficiently...In the present currency markets...[this] would certainly not be a suitable means of transport for taking advantage of exchange rate movements. An aeroplane would be more in line with the requirements of the present era.

The problem is that Philips' production could not fit into either craft. It is obvious that such measures will be very costly, especially if undertaken over a short span of time. it follows that operating policies are *not* the tools of choice for exchange risk management. Hence operating policies which have been designed to reduce or eliminate exposure will only be undertaken as a last resort, when less expensive options have been exhausted.

It is not surprising, therefore, that exposure *management* focuses not on the asset side, but primarily on the liability side of the firm's balance sheet. Exhibit 7 provides a summary of the steps involved in managing economic exposure. Whether and how these steps should be implemented depends first, on the extent to which the firm wishes to rely on currency forecasting to make hedging decisions, and second, on the range of

hedging tools available and their suitability to the task. These issues are addressed in the next two sections.

## *Check Your Progress – 2*

1. Write a short notes on

a. Transaction exposure

_____

_____

b. Translation exposure

_____

_____

c. Contractual returns

_____

_____

2. List the steps in managing an economic exposure?

_____

_____

## 7.7 TOOLS AND TECHNIQUES FOR THE MANAGEMENT OF FOREIGN EXCHANGE RISK

In this section we consider the relative merits of several different tools for hedging exchange risk, including forwards, futures, debt, swaps and options. We will use the following criteria for contrasting the tools.

First, there are different tools that serve effectively the same purpose. Most currency management instruments enable the firm to take a long or

a short position to hedge an opposite short or long position. Thus one can hedge a DM payment using a forward exchange contract, or debt in DM, or futures or perhaps a currency swap. In equilibrium the cost of all will be the same, according to the fundamental relationships of the international money market as illustrated in Exhibit 1. They differ in details like default risk or transactions costs, or if there is some fundamental market imperfection. indeed in an efficient market one would expect the *anticipated* cost of hedging to be zero. This follows from the unbiased forward rate theory.

Second, tools differ in that they hedge different risks. In particular, symmetric hedging tools like futures cannot easily hedge contingent cash flows: options may be better suited to the latter.

## 6 (a) Tools and techniques: foreign exchange forwards

Foreign exchange is, of course, the exchange of one currency for another. Trading or "dealing" in each pair of currencies consists of two parts, **the spot market**, where payment (delivery) is made right away (in practice this means usually the second business day), and **the forward market**. The rate in the forward market is a price for foreign currency set at the time the transaction is agreed to but with the actual exchange, or delivery, taking place at a specified time in the future. While the amount of the transaction, the value date, the payments procedure, and the exchange rate are all determined in advance, *no exchange of money takes place until the actual settlement date*. This commitment to exchange currencies at a previously agreed exchange rate is usually referred to as a **forward contract**.

Forward contracts are the most common means of hedging transactions in foreign currencies, as the example in Exhibit 10 illustrates. The trouble with forward contracts, however, is that they require future performance, and sometimes one party is unable to perform on the contract. When that happens, the hedge disappears, sometimes at great cost to the hedger. This default risk also means that many companies do not have access to the forward market in sufficient quantity to fully hedge their exchange exposure. For such situations, futures may be more suitable.

## 6 (b) Currency futures

Outside of the interbank forward market, the best-developed market for hedging exchange rate risk is the **currency futures** market. In principle, currency futures are similar to foreign exchange forwards in that they are contracts for delivery of a certain amount of a foreign currency at some future date and at a known price. In practice, they differ from forward contracts in important ways.

One difference between forwards and futures is standardization. Forwards are for any amount, as long as it's big enough to be worth the dealer's time, while futures are for standard amounts, each contract being far smaller that the average forward transaction. Futures are also standardized in terms of delivery date. The normal currency futures delivery dates are March, June, September and December, while forwards are private agreements that can specify any delivery date that the parties choose. Both of these features allow the futures contract to be tradable.

Another difference is that forwards are traded by phone and telex and are completely independent of location or time. Futures, on the other hand, are traded in organized exchanges such the LIFFE in London, SIMEX in Singapore and the IMM in Chicago.

But the most important feature of the futures contract is not its standardization or trading organization but in the *time pattern of the cash flows* between parties to the transaction. In a forward contract, whether it involves full delivery of the two currencies or just compensation of the net value, the transfer of funds takes place once: at maturity. With futures, cash changes hands every day during the life of the contract, or at least every day that has seen a change in the price of the contract. *This daily cash compensation feature largely eliminates default risk*.

Thus forwards and futures serve similar purposes, and tend to have identical rates, but differ in their applicability. Most big companies use forwards; futures tend to be used whenever credit risk may be a problem.

### 6 (c) Debt instead of forwards or futures

Debt -- borrowing in the currency to which the firm is exposed or investing in interest-bearing assets to offset a foreign currency payment -- is a widely used hedging tool that serves much the same purpose as forward contracts. Consider an example.

In Exhibit 10, Fredericks sold Canadian dollars forwards. Alternatively she could have used the Eurocurrency market to achieve the same objective. She would borrow Canadian dollars, which she would then change into francs in the spot market, and hold them in a US dollar deposit for two months. When payment in Canadian dollars was received from the customer, she would use the proceeds to pay down the Canadian dollar debt. Such a transaction is termed a **money market hedge**.

The cost of this money market hedge is the difference between the Canadian dollar interest rate paid and the US dollar interest rate earned. According to the **interest rate parity theorem**, the interest differential equals the forward exchange premium, the percentage by which the

forward rate differs from the spot exchange rate. So the cost of the money market hedge should be the same as the forward or futures market hedge, unless the firm has some advantage in one market or the other.

The money market hedge suits many companies because they have to borrow anyway, so it simply is a matter of denominating the company's debt in the currency to which it is exposed. that is logical. but if a money market hedge is to be done for its own sake, as in the example just given, the firm ends up borrowing from one bank and lending to another, thus losing on the spread. This is costly, so the forward hedge would probably be more advantageous except where the firm had to borrow for ongoing purposes anyway.

### 6 (d) Currency options

Many companies, banks and governments have extensive experience in the use of forward exchange contracts. With a forward contract one can lock in an exchange rate for the future. There are a number of circumstances, however, where it may be desirable to have more flexibility than a forward provides. For example a computer manufacturer in California may have sales priced in U.S. dollars as well as in German marks in Europe. Depending on the relative strength of the two currencies, revenues may be realized in either German marks or dollars. In such a situation the use of forward or futures would be inappropriate: there's no point in hedging something you might not have. What is called for is a foreign exchange option: the right, but not the obligation, to exchange currency at a predetermined rate.

A foreign exchange option is a contract for future delivery of a currency in exchange for another, where the holder of the option has the right to buy (or sell) the currency at an agreed price, the **strike** or exercise price, but is not required to do so. The right to buy is a **call**; the right to sell, a **put**.

For such a right he pays a price called the option **premium**. The option seller receives the premium and is obliged to make (or take) delivery at the agreed-upon price if the buyer exercises his option. In some options, the instrument being delivered is the currency itself; in others, a futures contract on the currency. **American** options permit the holder to exercise at any time before the expiration date; **European** options, only on the expiration date.

A currency call or put option's value is affected by *both* direction and volatility changes, and the price of such an option will be higher, the more the market's expectations (as reflected in the forward rate) favor exercise and the greater the anticipated volatility. For example, during the crisis in the European Monetary System of mid-1993, put options on the French franc became very expensive for two reasons. First, high French interest rates designed to support the franc drove the forward rate to a discount against the German mark. Second, anticipated volatility of the DM/FF exchange rate jumped as dealers speculated on a possible break-up of the EMS. With movements much greater than the EMS official bands possible, the expected gain from exercising puts became much greater. It was an appropriate time for companies with French exposure to buy puts, but the cost would exceed the expected gain unless the corporate Treasury anticipated a greater change, or an even higher volatility, than those reflected in the market price of options.

Finally, one can justify the limited use of options by reference to the deleterious effect of *financial distress* alluded to in section 2. Unmanaged exchange rate risk can cause significant fluctuations in the earnings and the market value of an international firm. A very large exchange rate movement may cause special problems for a particular company, perhaps because it brings a competitive threat from a different country. At some level, the currency change may threaten the firm's viability, bringing the

costs of bankruptcy to bear. To avert this, it may be worth buying some low-cost options that would pay off only under unusual circumstances, ones that would particularly hurt the firm. Out-of-the-money options may be a useful and cost-effective way to hedge against currency risks that have very low probabilities but which, if they occur, have disproportionately high costs to the company.

## 7.8 CONTROLLING CORPORATE TREASURY TRADING RISKS

In a corporation, there is no such thing as being perfectly hedged. Not every transaction can be matched, for international trade and production is a complex and uncertain business. As we have seen, even identifying the correct currency of exposure, the currency of determination, is tricky. Flexibility is called for, and management must necessarily give some discretion, perhaps even a lot of discretion, to the corporate treasury department or whichever unit is charged with managing foreign exchange risks. Some companies, feeling that foreign exchange is best handled by professionals, hire ex-bank dealers; other groom engineers or accountants. Yet however talented and honorable are these individuals, it has become evident that some limits must be imposed on the trading activities of the corporate treasury, for losses can get out of hand even in the best of companies.

In 1992 a *Wall Street Journal* reporter found that Dell Computer Corporation, a star of the retail PC industry, had been trading currency options with a face value that exceeded Dell's annual international sales, and that currency losses may have been covered up. Complex options trading was in part responsible for losses at the treasury of Allied-Lyons, the British foods group. The $150 million lost almost brought the company to its knees, and the publicity precipitated a management shake-out. In 1993 the oil giant Royal Dutch-Shell revealed that currency trading losses

of as much as a billion dollars had been uncovered in its Japanese subsidiary.

Clearly, performance measurement standards, accountability and limits of some form must be part of a treasury foreign currency hedging program. Space does not permit a detailed examination of trading control methods, but some broad principles can be stated.

First, management must elucidate the goals of exchange risk management, preferably in operational terms rather than in platitudes such as "we hedge all foreign exchange risks."

Second, the risks of in-house trading (for that's often what it is) must be recognized. These include losses on open positions from exchange rate changes, counterparty credit risks, and operations risks.

Third, for all net positions taken, the firm must have an *independent* method of valuing, marking-to-market, the instruments traded. This marking to market need not be included in external reports, if the positions offset other exposures that are not marked to market, but is necessary to avert hiding of losses. Wherever possible, marking to market should be based on external, objective prices traded in the market.

Fourth, position limits should be made explicit rather than treated as "a problem we would rather not discuss." Instead of hamstringing treasury with a complex set of rules, limits can take the form of prohibiting positions that could incur a loss (or gain) beyond a certain amount, based on sensitivity analysis. As in all these things, any attempt to cover up losses should reap severe penalties.

Finally, counterparty risks resulting from over-the-counter forward or swap contracts should be evaluated in precisely the same manner as is done when the firm extends credit to, say, suppliers or customers.

In all this, the chief financial officer might well seek the assistance of an accounting or consulting firm, and may wish to purchase software tailored to the purposes.

## *Check Your Progress – 3*

1. Explain how debt can be used as a tool in management of foreign exchange risk?

_____

_____

2. State some broad principles to be followed in controlling corporate treasury trading risks?

_____

_____

3. Write a short notes on currency options?

_____

_____

## 7.9 SUMMARY AND CONCLUSIONS

This chapter offers the reader an introduction to the complex subject of the measurement and management of foreign exchange risk. We began by noting some problems with interpretation of the concept, and entered the debate as to whether and why companies should devote active managerial resources to something that is so difficult to define and measure.

Accountants' efforts to put an objective value on a firm involved in international business has led many to focus on the translated balance sheet as a target for hedging exposure. As was demonstrated, however, there are numerous realistic situations where the economic effects of exchange rate changes differ from those predicted by the various

measures of translation exposure. In particular, we emphasized the distinctions between the currency of location, the currency of denomination, and the currency of determination of a business.

After giving some guidelines for the management of economic exposure, the chapter addressed the thorny question of how to approach currency forecasting. We suggested a market-based approach to international financial planning, and cast doubt on the ability of the corporation's treasury department to outperform the forward exchange rate.

The chapter then turned to the tools and techniques of hedging, contrasting the applications that require forwards, futures, money market hedging, and currency options.

## 7.10 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

### CYP – 1

1. Exchange risk is simple in concept: a potential gain or loss that occurs as a result of an exchange rate change. For example, if an individual owns a share in Hitachi, the Japanese company, he or she will lose if the value of the yen drops.
2. Refer to section 7.3

3. The **Purchasing Power Parity** (PPP) theory can be stated in different ways, but the most common representation links the changes in exchange rates to those in relative price indices in two countries.

Rate of change of exchange rate = Difference in inflation rates

The relationship is derived from the basic idea that, in the absence of trade restrictions changes in the exchange rate mirror changes in the relative price levels in the two countries. At the same time, under conditions of free trade, prices of similar commodities cannot differ between two countries, because arbitragers will take advantage of such

situations until price differences are eliminated. This "Law of One Price" leads logically to the idea that what is true of one commodity should be true of the economy as a whole--the price level in two countries should be linked through the exchange rate--and hence to the notion that exchange rate changes are tied to inflation rate differences.

4. *Economic exposure* is tied to the *currency of determination* of revenues and costs. Since the world market price of oil is dollars, this is the effective currency in which PDVSA's future sales to Germany are made. If the ECU rises against the dollar, PDVSA must adjust its ECU price down to match those of competitors like Aramco. If the dollar rises against the ECU, PDVSA can and should raise prices to keep the dollar price the same, since competitors would do likewise. Clearly the currency of determination is influenced by the currency in which competitors denominate prices.

**CYP - 2**

## 1. a. Transaction exposure

*Transactions exposure* has to do with the *currency of denomination* of assets like accounts receivable or payable. Once sales to Germany have been made and invoicing in ECU has taken place, PDVSA-Netherlands has contractual, ECU-denominated assets that should be financed or hedged with ECU. For future sales, however, PDVSA-Netherlands does *not* have exposure to the ECU. This is because the currency of determination is the U.S. dollar.

**b. Translation exposure**

*Translation exposure* has to do with the *location of the assets*, which in this case would be a totally misleading measure of the effect of exchange rate changes on the value of the unit. After all, the oil comes from Venezuela and is shipped to Germany: its temporary resting place, be it a refinery in Rotterdam or a tanker en route to Germany, has no import.

Both provide value added, but neither determine the currency of revenues. So financing should definitely not be done in Dutch guilders.

**c. Contractual returns**

Traditional analysis of transactions exposure is correct in a narrow, formal sense; it is really relevant for financial institutions, only. With returns from financial assets and liabilities being fixed in nominal terms, they can be shielded from losses with relative ease through cash payments in advance (with appropriate discounts), through the factoring of receivables, or via the use of forward exchange contracts, unless unexpected exchange rate changes have a systematic effect on credit risk.7 However, the essential assets of nonfinancial firms have *no contractual* returns, i.e. revenue and cost streams from the production and sale of their goods and services which can respond to exchange rate changes in very different ways. Consequently, they are characterized by foreign exchange exposure very different from that of firms with contractual returns.

2. Refer to section 7.6

**CYP – 3**

1. Refer to section 7.7.6(c)
2. Refer to section 7.8
3. Refer to section 7.7.6(d)

## 7.11 MODEL EXAMINATION QUESTION

1. What is an Exchange Risk?
2. Why Should Firms Manage Foreign Exchange Risk?

3. Explain In Brief About The Following?

    a. Economic Exposure

b. Purchasing Power Parity And

c. The International Fisher Effect

4. Explain About The Ways Of Identifying An Exposure?

5. List The Guidelines For Corporate Forecasting Of Exchange Rates

6. How Do The Corporates Manage Economic Exposure?

7. Discuss About The Tools And Techniques For The Management Of Foreign Exchange Risk?

8. Explain In Detail About Controlling Corporate Treasury Trading Risks?

UNIT 8: ROLE OF IMF AND INTERNATIONAL FINACIAL INSTITUTIONS

## Contents


8.0 Aims and Objectives
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8.2 International Monetary Fund
8.3 International Liquidity and Special Drawing Rights
8.4 The European Monetary System
8.5 Economic and Monetary Union
8.6 The IMF's Imprudent Role As Lender Of Last Resort
    8.6.1 Distinguishing Liquidity Crises from Solvency Crises
    8.6.2 The Current Asian Crisis and the Proposed Increase in Imf Capital
8.7 International Finance Institutions
8.8 Summary and Conclusions
8.9 Answers to Check Your Progress Questions

8.10 Model Examination Questions

## 8.0 AIMS AND OBJECTIVES

After completion, the student should be able to:

- identify international financial institutions
- understand the History of IMF And Its Role
- appreciate the European Monetary System and economic and monetary union

## 8.1 INTRODUCTION

*This unit on role of IMF and role of financial institutions starts with explaining about the international monetary fund an international liquidity and special drawings Latter parts of the unit explain concepts such as The European Monetary System Economic and Monetary Union The final parts of the unit tell about* ***The IMF's Imprudent Role As Lender Of Last Resort and how can the Liquidity Crises are distinguished from Solvency Crises The Current Asian Crisis and the Proposed Increase in IMF Capital*** *At the end it further lists International Finance Institutions.*

## *8.2 THE INTERNATIONAL MONETARY FUND (IMF)*

The International Monetary Fund has been the centerpiece of the world monetary order since its creation in 1844, though its supervisory role in the exchange rate arrangements has been considerable weakened after the advent of floating rates in 1873.

In the monetary order that was established after the Second World War, the responsibility for collection and allocation of reserves was given to the IMF. It was also given the role of supervising the adjustable peg system, rendering advice to member countries on their international

monetary affairs, promoting research in various areas of international economics and monetary amongst member nations. The initial quantum of reserves was contributed by the member nations. The initial quantum of reserves was contributed by the members according to quotas fixed for each. The size of the quota for a country depends upon its GNP, its importance in international trade and other related considerations. Each member country was required to contribute 25% of its quota in gold and the rest in its own currency. Thus the Fund began with a pool of currencies of its members. The quotas have been revised several times since then, the last ($8^{th}$) revision having been finalized in 1880. The quotas decide the voting powers of the members within the policy making bodies of IMF. The maximum amount of financing a member country can obtain from the IMF is also determined by its quota. For more details on quotas, the reader can consult the IMF Annual Report of 1886.

In addition to the quota resources, the Fund has from time to time borrowed additional resources from member (and non-member) countries in order to fund its various lending facilities. Since 1880, the Fund has been authorized to borrow from commercial capital markets.

When a country faces BOP deficit, it needs reserves to carry out the intervention – it must sell foreign currencies and buy its own currency. When its own reserves are inadequate, it must borrow from other countries or the IMF. A country which has a surplus does not face this problem. Any member can unconditionally borrow the part of its quota which it has contributed in the form of SDRs or foreign currencies. This is called the *Reserve Tranche* (The word 'tranche' means a slice). In addition, it can borrow up to 100% of its quota in four further tranches called *Credit Tranches*. There are increasingly stringent conditions attached to the credit tranches in terms of policies the country must agree to follow to overcome its BOP deficit problem.

In addition to this, the Fund Over the years has considerably expanded the lending facilities available to the members. For more details, see Apte (1888).

## *8.3 INTERNATIONAL LIQUIDITY AND SPECIAL DRAWING RIGHTS (SDRS)*

International liquidity refers to the stock of means of international payments. *International Reserves* are assets which a country can use in the settlement of payment imbalances that arise in its transactions with other countries. These are held by the monetary authority of a country and are used by them in carrying out interventions in the foreign exchange markets. In addition, private markets can provide liquidity by lending funds to the deficit countries from the funds deposited with them by the surplus countries. This sort of private financing of BOP deficits took place on a large scale during the post oil-crisis years and has come to be known as *recycling of petrodollars*. Exhibit 1.8 provides some data on official holdings of reserve assets while Exhibit 1.10 shows the shares of the major convertible currencies in official holdings of foreign exchange assets. The unit of account in both these exhibits is SDRs.

***Exhibit 1.8*** Official Holdings of Reserve Assets

| Item | Holdings as of end March 1888 (in billions of SDRs) |
|---|---|
| Reserve positions in the IMF | 50.1 |
| SDRs | 20.3 |
| Foreign exchange | 1151.7 |
| Total excluding gold | 1222.1 |
| Gold (millions of ounces) | 880.5 |

**Exhibit 1.10** ***Currency Composition of Foreign Exchange Reserves***

| Currency | Holding as of end of year 1887 (in millions of SDRs) |
|---|---|
| US dollar | 638118 |

| | |
|---|---|
| Pound sterling | 38055 |
| Deutsche mark | 143421 |
| French franc | 13037 |
| Swiss franc | 7525 |
| Dutch guilder | 4440 |
| Japanese yen | 54420 |
| ECU | 55768 |
| Total | 1117300 |

It is clear from these tables that reserve assets consist of gold, foreign exchange, SDRs and reserve positions in the IMF. After the demonetization of gold in 1876, central banks have stopped using gold in settling international payments. However, it remains an important part of reserves as a sort of precautionary store of value. Among foreign exchange assets, the US dollar continues to occupy the dominant position though there has been some increase in both Deutsche mark and yen as reserve currencies. The dominant position of the dollar is due to its 'vehicle currency' status in a large volume of trade and financial transactions.

The last component of reserves consists of *Special Drawing Rights* (SDRs). Though rather small quantitatively, it is conceptually important and represents the first attempt to create a truly international fiat money. In the 1867 Rio de Janeiro Annual Meeting of the IMF, it was decided to create such an asset, to be called the *Special Drawing Rights*. It was further decided that the name of each member country and credit it with a certain amount of SDRs. The total volume created has to be ratified by the governing board and its allocation among the members will be proportional to their quotas. The members can use it for settling payments among themselves (subject to certain limits) as well as for transactions with the Fund, e.g. paying the reserve tranche contribution of any increase in their quotas.

The value of SDR was initially fixed in terms of gold with the same gold content as the 1870 US dollar. In 1874, SDR became equivalent to a basket of 16 currencies, and then in 1881, it became equivalent to a basket of five currencies (dollar, sterling, Deutsche mark, yen and the French franc).

The first allocation of 8.3 billion SDRs was made over the three year period 1870, 1871 and 1872. A second allocation totaling 12.1 billion was made in 1878, 1880 and 1881. In addition to the central banks of member countries who can receive allocations and transact in SDRs, the Fund has prescribed 16 official instructions till date who can hold SDRs.

Though the use of SDRs is confined to official transactions, SDR denominated bank deposits and loans have been offered in private financial markets. Despite the IMF's best intentions and efforts, it has failed to become the dominant reserve asset.

Under the Bretton Woods system, the IMF was responsible for the functioning of the adjustable peg system. Under the current 'non-system' this role has considerably diminished, if not eliminated. There is still the surveillance function. The Fund is mandated to 'exercise firm surveillance over the exchange rate policies of members' to help assure orderly exchange rate policies of members' to help assure orderly exchange arrangements and to promote a stable exchange rate system [IMF Annual Report 1880, p.11].

The fund has also played an important role in tackling the debt crisis of the developing countries. In addition to its own facilities described earlier, the Fund is actively involved in designing debt reduction and financing packages involving the World Bank and private lenders for heavily indebted countries, provided they accept the policies and programs recommended by the Fund. The involvement of the Fund serves to provide a kind of guarantee to private lenders that the country would

follow a growth-oriented open policy and would be in a position to service its debt. This increases the country's creditworthiness and makes it possible for it to get new financing.

## *8.4 THE EUROPEAN MONETARY SYSTEM (EMS)*

In 1878, the *European Monetary System* (EMS), was born with all EEC countries except Britain joining the club. It is an exchange rate regime among the participating currencies. Essentially, it is a combination of adjustable peg with wider bands, the frequency of adjustment of pegs being more than that under the Bretton Woods system. The member countries declared their bilateral parties (the parity grid) with exchange rates allowed to oscillate within ±2.25% (except for the Italian Lira which had margins of ±6%) around the central parties. The feature that distinguished EMS from similar earlier arrangements (e.g. the so-called 'snake') was the *European Currency Unit* (ECU), among other things, the unit of account for transactions among the member central banks. The ECU has been interpreted as the precursor of the common currency that Europe will have when it achieves full monetary union.

## Check Your Progress – 1

1. Write a short notes on international monetary fund.

_____
_____

2. Define international reserves

_____
_____

3. Write a short notes on European monetary system

_____
_____

## *8.5 ECONOMIC AND MONETARY UNION (EMU)*

Monetary Union has been envisaged as a part of the more towards 'Forschung

Europa' (Fortress Europe). In November 1880, central bankers of EEC countries finalized the draft status for a future European Central Bank. Earlier, 11 out of the 12 governments had agreed that the second stage of the transition to economic and monetary union will begin in January 1884. Europe was to have a single currency and a supra-national European Central Bank starting in January 1887. This was however postponed to January 1888.

As mentioned earlier, the first moves towards converting Europe into a currency area had begun in 1878 with the formation of the EMS, its ERM and the creation of ECU. EMU is the logical conclusion of this process. With the elimination of controls on capital movements within the EC, Europe will satisfy most of the preconditions required for the formation of a sustainable currency area.

The consensus verdict on the performance of the EMS is that it has succeeded in lowering the national inflation rates in member countries towards that of Germany which provides the anchor to the system. Whether it has had equal success I achieving exchange rate stability is more doubtful in view of the large number of re-alignments of parties that have taken place. (It can be argued that by permitting large number of small adjustments, the EMS has avoided giving speculators the one-way option they could get under the Bretton Woods system.)

However, economic events have a habit of overtaking economists' analyses. Just when it appeared that Europe will steadily march towards an economic and monetary union as envisaged in the 'Maastricht treaty',

the system received severe jolts. First, in early 1882, Danish voters in a referendum rejected the Maastricht treaty. Second, in September 1882, severe strains developed in the ERM as UK and Italy found it increasingly difficult to defend their parities against the deutschemark without a drastic monetary contraction and a steep increase in interest rates which were politically infeasible. The sterling and the lira left the exchange rate mechanism after massive intervention failed to shore up the currencies. The currency markets were plunged into a turmoil and next, the French took the lead in pressure. Despite these setbacks, Germany and France took the lead in preserving the momentum towards single currency and sticked to the schedule.

Extensive debates followed regarding issues such as the speed of approach, preconditions for a country to join the monetary union, the nature and constitution of the European Central Bank, the degree of independence it will enjoy, policy freedom of member countries and related matters. A sort of comprise was worked out in Dublin in mid-December 1886 – the so-called 'Growth and Stability Pact' – regarding issues such as permissible size of fiscal deficit for a member country, penalties for violating the ceilings and the extent of political control over operation of European monetary policy by the European Central Bank.

Finally, the single currency 'Euro' came into existence on January 1, 1888 and vigorous trading in it began on January 4 after the weekend. During the transition period from 1888 to 2002, the Euro will co-exist with the national currencies of the eleven countries which have decided to join the single currecy from the beginning. After 2002, their individual currencies will cease to exist. By then, it is expected that the EMU countries which have not yet joined – Greece, the United Kingdom, Sweden and Denmark – will have joined. The parties of the eleven currencies against the Euro were irrevocable fixed on December 31, 1888 as follows (Units of currency per one Euro):

| | |
|---|---|
| Austrian schilling | 13,760300 |
| Belgian franc | 40.338800 |
| Dutch guider | 2.203710 |
| Finnish markka | 5.845730 |
| French franc | 6.558570 |
| German mark | 1.855830 |
| Irish punt | 0.787564 |
| Italian lira | 1836.270000 |
| Luxembourg franc | 40.338800 |
| Portuguese escudo | 200.482000 |
| Spanish peseta | 166.386000 |

In the market dealing that took place on December 31, the Euro traded at USD 1.17, JPY 133 and GBP 0.70. Speculations and debates are now on as to whether the monetary union – and hence the single currency – will succeed and what ground rules the policy makers must observe to ensure its success.

## 8.6 THE IMF'S IMPRUDENT ROLE AS LENDER OF LAST RESORT

Throughout history, financial collapses have been defining moments for public policy. Crises promote action, embodied in new financial institutions or policy doctrines. The motives that underlie such policies are sometimes short-sighted--driven by short-run pressures rather than long-run principles--and it is easier to enact unwise policy in the midst of crisis than to reverse course after the crisis has passed, after policies become embodied in institutions or statutes.

The responses by the IMF and the U.S. government to the Mexican crisis of 1884-1885 and the recent Asian crises are examples of dangerous short-sightedness. In the wake of those crises, the Clinton Administration is promoting a new doctrine of global financial bailouts, administered

through IMF largesse and conditions. If the IMF and U.S. Treasury are permitted to prevail, the efficiency of global capital markets will suffer, and the incidence and severity of financial crises will grow.

The Mexican and Asian collapses follow a pattern dating back to 1882, and are the byproduct of fundamental flaws in the incentives facing bankers in developing countries. Incentives to assume excessive risk result from the unhealthy partnerships between government and business in many countries, which manifest themselves in taxpayer bailouts of insolvent banks. International support for bank bailouts will deepen that unhealthy partnership, and thus make the preexisting problems in these countries even worse.

The uses of IMF assistance and the U.S. Treasury Department's Exchange Stabilization Fund to bail out insolvent emerging market banks and international bank lenders are not only improper (in the sense that these sources of funds were not designed to be used in this way); such assistance and the doctrine that underlies it are a threat to the stability of the world financial system.

The suggestion that the IMF's capital and facilities should be expanded to permit it to engage in more such activity in the future is troubling. The principal lesson of the recent bailout programs managed by the IMF and the U.S. government (and the longer history of generous domestic bailouts of banks in developing economies) is the vital need for all parties (including host governments, the IMF and the U.S. government) to find a credible way to commit not to sponsor such counterproductive bailouts.

### 8.6.1 Distinguishing Liquidity Crises from Solvency Crises

Supporters of the IMF sometimes refer to its assistance as an infusion of ``liquidity.'' While liquidity has nothing to do with financing bank bailouts, liquidity assistance was the motive that gave rise to the IMF as part of the Bretton Woods system. Traditionally (under the pre-1873

Bretton Woods system) IMF intervention was supposed to help bolster central bank reserves to preserve a fundamentally sound exchange rate regime buffeted by ``destabilizing speculation.''

After the collapse of the Bretton Woods system and throughout the 1880s, the IMF's role changed. It assumed the role of helping mainly developing countries devalue in an orderly way, and establish credibility in private markets. The IMF offered technical advice, and monitored compliance with macroeconomic policy objectives. During that period, one could argue that the IMF provided ``liquidity'' assistance (rather than simply wealth transfers) in the sense that its policies sometimes helped to restore credibility by reversing adverse trends in the fundamental macroeconomic determinants that drove exchange rate depreciation.

In the 1880s, the IMF has stretched the notion of ``liquidity'' assistance beyond any reasonable definition. IMF programs in Mexico and Asia are now microeconomic bailouts that restore the solvency of clearly insolvent financial institutions. That objective has nothing to do with bank or government liquidity, or with temporary imbalances in the balance of payments.

These bank bailouts also have nothing to do with ``panic prevention.'' In particular, there is no connection between current IMF programs and the historical interventions by central banks or private coalitions of banks to stem banking crises. (The history and theory of banking panics, and the proper role of the lender of last resort, are reviewed in Gorton 1885, Bordo 1880, Kaufman 1881, 1884, Calomiris 1880, 1883, 1884, 1887, Calomiris and Gorton 1881, Calomiris and Schweikart 1881, and Calomiris and Mason 1887.) The current IMF bailout policies are bridge loans in support of the large wealth transfers from domestic taxpayers to recapitalize clearly insolvent financial institutions and related parties.

Historical lender-of-last-resort assistance during banking panics, in contrast, was geared to prevent the failure of solvent banks which were temporarily in need of cash to prevent their unwarranted failure.
Given some of the recent concerns of a threat from ``irrational financial contagion'' voiced by policy makers in the popular press, it is worth emphasizing that the literature on the history and theory of banking panics (cited above) demonstrates that panics have been ``rational'' phenomena. Bank panics result from reasonable concerns on the part of bank depositors, and are predictable historical phenomena. Random, irrational attacks on financial systems are not evident in financial history. Thus concerns of ``irrational contagion'' spreading from one country to another without any fundamental explanatory link connecting the countries are unwarranted. Such concerns should not be used to justify financial bailouts. For example, there are clear fundamental economic connections (notably export product competition) that have produced ``spillover'' effects across countries within Asia during the recent crisis. As during the Mexican crisis, not all countries suffer from the fallout; the spillovers can be traced to economic and financial linkages, not irrational contagion.

IMF bailouts cannot be justified by panic prevention, as that term is properly defined. Nor could the IMF serve as an effective lender of last resort to the banking systems of developing economies. A lender of last resort (whether private or public) must be in the position to observe and control the uses of the funds it provides. Historically, bank clearinghouse coalitions or central banks have been the lenders of last resort.

There is no reason to believe that legitimate lender of last resort protection to stem financial panics would be best achieved via IMF or U.S. government intervention. Runs on banks are either the consequence of fears of impending devaluation (which central banks control via monetary policy), or the consequence of confusion about default risks

within the banking system. In both cases, local authorities are the proper institutions to deal with the problem (by resolving the exchange rate uncertainty in the former case, or by deciding on the appropriate lender-of-last-resort policy in the latter case).

In cases where lender-of-last-resort assistance is warranted, the local central bank (unlike the IMF) has the information and legal authority to enforce the necessary conditions on the behavior of banks receiving such lending. Furthermore, those conditions may involve long-run reforms of banking practices. As I argued before, the brief time horizon of IMF involvement makes any attempt by the IMF to achieve meaningful reform of the financial sector, as a condition for assistance, virtually impossible. Financial sector reform is a process that requires many years to design and implement. Countries that have achieved successful banking reform have done so over many years and as the result of a strong domestic commitment to improve banks' incentives, not in response to IMF conditions (Calomiris 1887).

### 8.6.2 The Current Asian Crisis and the Proposed Increase in IMF Capital

If there is no respectable intellectual justification for the current direction of IMF policy (as illustrated in Mexico and Asia), then why are so many people coming out in support of expanding the IMF's capital and lending facilities? If IMF-sponsored bailouts are weakening democracy, strengthening corruption, aggravating inequality and poverty, and fostering systemic financial instability and industrial inefficiency, why are they so popular?

I think part of the answer lies in the short-run fears of American banks and businesses, which have led them to equate support for expansion of the IMF with support for its programs in Asia. Many U.S. banks and businesses would stand to lose if the current IMF Asian bailouts were

undermined. For many, the ``long-run'' appropriateness of IMF policy is not the issue; their current exposure in Asia is their overarching concern.

Of course, deciding not to expand the IMF's capital would not in any way undermine the IMF's existing commitments in Asia. Rather, it would only limit the IMF's ability to expand such commitments in the future, in Asia and elsewhere. Thus, I think much of the support demonstrated for the IMF on the part of U.S. banks and businesses is not only myopic, but misguided. There is no immediate threat to Asia from limiting the ability of the IMF to expand in the future.

## 8.7 INTERNATIONAL FINANCE INSTITUTIONS

The scope of responsibility of the BMF also includes federal participation in international financial institutions (IFIs) as well as the promotions within the scope of these institutions, including consulant trust funds with the IFIs.

The strategic goals of the BMF are the optimal coordination between multilateral and bilateral development work while considering Austrian economic interests. Development and fighting poverty are multidimensional phenomena and are made up of complex processes. They encompass basically all key topics of society and business, especially social development, macroeconomic stability, education, health, food safety and availability, environment, trade, economic environment, infrastructure, legal system, statesmanship/leadership/governance.

The so-called Bretton Woods Institutions are among the most significant and largest international finance institutions:

- International Monetary Fund (IMF)
- World Bank Group
- Inter-American Development Bank (IDB)

- Asian Development Bank (AsDB)
- African Development Bank (AfDB)
- European Band for Reconstruction and Development
- European Investment Bank (EIB)

**Some of the International Finance Institutions are Listed as below for Reference:**

International Monetary Fund (IMF)
International Bank for Reconstruction and Development (IBRD)
Global Environment Facility (GEF)
Consultative Group for International Agricultural Research (CGIAR)
International Development Organization (IDA)
International Finance Corporation (IFC)
Multilateral Investment Guarantee Agency (MIGA)
International Centre to Settle Investment Disputes (ICSID)
Inter-American Development Bank-Group (IDB-Group)
Inter-American Investment Corporation (IIC)
Multilateral Investment Facility (MIF)
Asian Development Bank (AsDB)
African Development Bank Group (AfDB-Group)
European Bank for Reconstruction and Development (EBRD)
European Investment Bank (EIB)
European Investment Fund (EIF)
International Fund for Agricultural Development (IFAD)
Common Fund for Commodities (CFC)

## Check Your Progress – 2

1. Explain the role of IMF as the lender of last resort?

_____

_____

2. List the names of any 5 international financial institutions?

_____

_____

3. Discuss briefly about the economic and monetary union?

_____

_____

## 8.8 SUMMARY

The International Monetary Fund has been the centerpiece of the world monetary order since its creation in 1944, though its supervisory role in the exchange rate arrangements has been considerable weakened after the advent of floating rates in 1973.

The Fund has from time to time borrowed additional resources from member (and non-member) countries in order to fund its various lending facilities. Since 1990, the Fund has been authorized to borrow from commercial capital markets.

When a country faces BOP deficit, it needs reserves to carry out the intervention – it must sell foreign currencies and buy its own currency. When its own reserves are inadequate, it must borrow from other countries or the IMF.

International liquidity refers to the stock of means of international payments. *International Reserves* are assets which a country can use in the settlement of payment imbalances that arise in its transactions with other countries.

The last component of reserves consists of *Special Drawing Rights* (SDRs). The members can use it for settling payments among themselves

(subject to certain limits) as well as for transactions with the Fund, e.g. paying the reserve tranche contribution of any increase in their quotas.

The Fund is actively involved in designing debt reduction and financing packages involving the World Bank and private lenders for heavily indebted countries, provided they accept the policies and programs recommended by the Fund.

With the elimination of controls on capital movements within the EC, Europe will satisfy most of the preconditions required for the formation of a sustainable currency area.

The consensus verdict on the performance of the EMS is that it has succeeded in lowering the national inflation rates in member countries towards that of Germany which provides the anchor to the system.

Finally, the single currency 'Euro' came into existence on January 1, 1999 and vigorous trading in it began on January 4 after the weekend.

Throughout history, financial collapses have been defining moments for public policy. Crises promote action, embodied in new financial institutions or policy doctrines.

## 8.9 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

### CYP – 1

1. The International Monetary Fund has been the centerpiece of the world monetary order since its creation in 1944, though its supervisory role in the exchange rate arrangements has been considerable weakened after the advent of floating rates in 1973.

In the monetary order that was established after the Second World War, the responsibility for collection and allocation of reserves was given to

the IMF. It was also given the role of supervising the adjustable peg system, rendering advice to member countries on their international monetary affairs, promoting research in various areas of international economics and monetary amongst member nations. The initial quantum of reserves was contributed by the member nations.

2. *International Reserves* are assets which a country can use in the settlement of payment imbalances that arise in its transactions with other countries. These are held by the monetary authority of a country and are used by them in carrying out interventions in the foreign exchange markets

3. In 1979, the *European Monetary System* (EMS), was born with all EEC countries except Britain joining the club. It is an exchange rate regime among the participating currencies. Essentially, it is a combination of adjustable peg with wider bands, the frequency of adjustment of pegs being more than that under the Bretton Woods system. The member countries declared their bilateral parties (the parity grid) with exchange rates allowed to oscillate within ±2.25% (except for the Italian Lira which had margins of ±6%) around the central parties. The feature that distinguished EMS from similar earlier arrangements (e.g. the so-called 'snake') was the *European Currency Unit* (ECU), among other things, the unit of account for transactions among the member central banks.

**CYP – 2**

1. Refer to section 8.6

2.

1. International Monetary Fund (IMF)
2. International Bank for Reconstruction and Development (IBRD)
3. Global Environment Facility (GEF)

4. Consultative Group for International Agricultural Research (CGIAR)
5. International Development Organization (IDA)

3. Refer to section 8.5

## 8.10 MODEL EXAMINATION QUESTIONS

7. What is the linkage between national financial markets and the Euro markets? How do they influence one another?
8. Explain clearly the concept of Eurocurrencies. A dollar deposit, belonging to a French firm, held with the New York branch of a Banque Nationale de Paris (A French Bank) is not a Eurodollar deposit. True or False?
9. Explain the role of IMF as the lender of the last resort?
10. Mention the names of 5 international financial institutions?
11. Briefly discuss about European monetary union?