AN INTRODUCTION TO

INTERNATIONAL INVE$TMENTS

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Marmara University



İstanbul - 1999

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MARMARA ÜNİVERSİTESİ YAYINEVİ

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to my mother
and
in memory of
my father

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PREFACE

The principal function of financial markets is to transfer funds from one market participant to another. The most important financial centers such as London, New-York, Tokyo attract both investors and borrowers from abroad. Therefore, such markets are considered as international markets as well as domestic markets.

Involving financing and investing activities abroad requires that at least one of the parties involved must deal in a currency that is foreign to him/her. Consequently, the foreign exchange markets are the basic element of the international financial system.

After the collapse of the Bretton-Woods system in 1973 the international financial system started a period of floating exchange rates. Since then, foreign exchange risk management became an important aspect to financial managers of international and multinational companies, international bankers and international investors. The other reason why the international finance became a most important and complex subject for financial managers and international investors is high growth rate of the international trade during the second half of the century due to the deregulation or liberalization of international flows of goods and capital.

This book is intended to give the basic and practical knowledge of international investments for individual as well as institutional investors. Besides, this book is specifically designed for students who have taken introductory finance and wish to learn the new exciting developments in the rapidly expanding field of international finance. This book has evolved over a number of years while I have been teaching international investments at the Institute of Banking and Insurance of Marmara University.

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I wish to express my gratitude to all my students wherever now they may be, to my colloquia Doç. Dr. Münir Şakrak for his very efficient help on text design in preparing the final product for printing and to Prof. Dr. Osman Altuğ for his support and encouragement.

My final word is for my wife, Katharina, who provided valuable proofreading assistance, and moral support and encouragement that have made this book a shared labor of love.

İstanbul

Doç. Dr. Gürel Konuralp

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1. THE INTERNATIONAL FINANCIAL SYSTEM

1.1. The Elements of the International Financial System

Financial markets are the channels through which funds flow from one market participant to another. They facilitate trade between buyers and sellers of financial assets or allow the traders to exchange one set of financial characteristics for another one in the same way that the commodity markets permit the exchange of goods. Financial markets, in the mean time, allow individuals and institutions to trade loanable funds. They can choose the set of financial assets that best fits their objectives. Typically, there are three types of participants in the financial markets; borrowers, lenders and intermediaries. Borrowers are in the market to gain some investable funds, lenders (investors) are in the market to accumulate wealth and the intermediaries earn a return by packing financial assets for borrowers and lenders.

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Investors or borrowers are sometimes forced to use foreign financial markets to meet their objectives because of inadequate domestic markets, or often they choose themselves to transact in a foreign financial market because of lower cost of financing or lower risk to be taken. Investors are also encouraged to invest abroad by the fact that they can have more attractive combinations of risk, return, maturity, and liquidity. The growing internationalization of financial markets allows the investors and borrowers to search for capital or investment opportunities oversees.

As a result, the principal functions of a financial market are to transfer current purchasing power from lenders to borrowers in exchange for the promise of greater future purchasing power, and allocate those funds among the potential users on the basis of risk-adjusted returns. Most of the domestic financial markets attract both investors and borrowers from abroad. These markets are therefore at the same time international financial markets where foreigners can both borrow and lend money.

International financial markets can develop where political stability and minimal government intervention exist. The most important international financial centers are London, New-York and Tokyo. There are other international financial markets which are important, although they are unimportant domestic markets, such as Switzerland, Luxembourg, Singapore, Hong-Kong, and the Bahamas. These markets usually serve as financial intermediaries between nonresident investors and nonresident borrowers.

The unique characteristic of financing and investing abroad is that at least one of the parties involved (sometimes both parties) must be dealing in a currency that is foreign to him/her. The consequence of this situation is that the foreign exchange market is the basic element of the international financial system. The second characteristic that makes a domestic transaction different from an international transaction is that the participants of the market are operating outside of their national boundaries. These elements of the

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international financial system are shown in the below Exhibit (Giddy,1983,p.5).

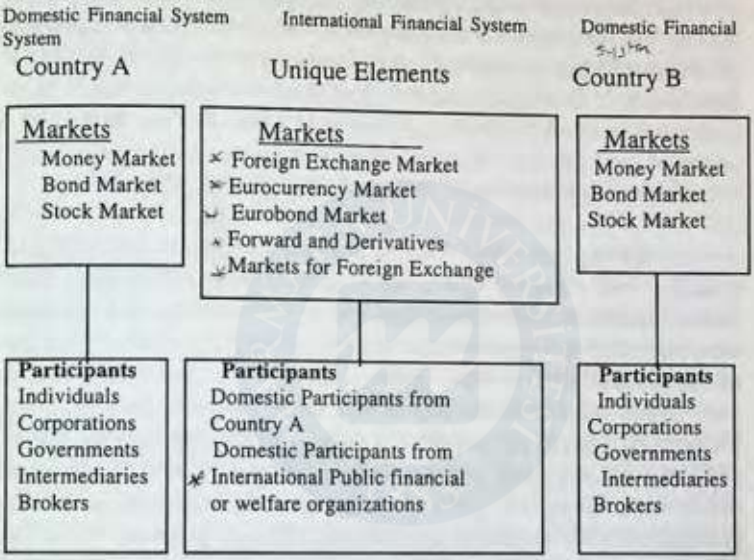

Figure 1- The Elements of The International Financial System

1.2. The History of the International Financial System

We would like to give a brief historical background of the international financial system starting from the gold standard which is the one and the first of the four principal types of financial systems we have experienced (Gold Standard, Bretton Woods Standard, Flexible Exchange Rates, and cooperative Interventions). Before the gold was found in Transvaal and California in the middle of the nineteenth century, a variety of physical commodities had been used as international standard, including salt, sea shells, and some metals such as bronze and silver.

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The Gold Standard, 1870-1914 : Before the First World War, gold was the international means of payment and each country was assessing their currency value according to its gold value. This system has been used successfully for almost half a century because of the unconditional guarantee to convert paper money for gold at a fixed price. This standard made it very easy to exchange the foreign currencies in exact proportion to their gold value. For example, if one ounce of gold bullion was worth ten FF in France and four $ in the US, the exchange rate was 2,5 FF per $ US, or 0.4 $ US per FF.

During the First World war the credibility of the gold standard was eroded since the governments abandoned their commitment to convert paper money into gold and imposed currency controls. After the First World War, there was a period of flexible exchange rates (1918-1926) during many of the countries suffered from hyperinflation. In the end of the war in 1919 the exchange rate between German Mark and the US dollar was about 14 DM/$, but in 1923 the exchange rate was 4 trillion marks per US dollars. Most of the countries began using the exchange rates for their own good. For example, France devalued the franc in 1926 in order to stimulate their exports. But, this caused big problems to Britain and the pound sterling. France started to accept only gold in their foreign trade in 1928, and no more foreign currency. In 1931, the French government decided not to accept pound sterling any more and exchanged existing sterling holdings for gold. There was not much to do for Britain except to make the sterling inconvertible into gold. The other countries followed the British experience and made their national currencies inconvertible into gold. Only the US dollar was left that was convertible into gold by 1934.

Bretton Woods and The International Monetary Fund IMF, 1944-1973: In order to prevent the international financial system from another breakdown, various nations came together in July 1944 at Bretton Woods which is a small ski town in the White Mountains of New Hampshire. The Bretton Woods Agreement committed member countries to keep exchange rates either constant or fluctuate only within narrow boundaries (plus or minus 1%) in order to prevent

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nations from changing exchange rates for competitive advantages. A new institution, the International Monetary Fund (IMF) was established under the Bretton Woods Agreement to maintain rates of exchange among participating countries. The Central Banks of member countries would buy or sell US dollars and other national currencies to keep market exchange rates within the 1% band around par value.

The US agreed to buy or sell gold with the price of $35 per ounce. Thus, the US dollar was pegged to gold and other currency values pegged to the dollar since the principle reserve currency was the US dollar. The requirement of this system was that the US had to maintain a reserve of gold, and the other member countries had to maintain a reserve of dollars. This was the most important weakness of the system such that in order for the stock of currency reserves to grow along with world trade, the US (the provider of reserves) had to run balance of payments deficits. The more reserve country deficits occur, the more the holders of dollars doubted the ability of the US to convert dollars into gold at the official price. This paradox, which is called Triffin paradox (Robert Triffin, a Yale economist) led the Bretton Woods system to demise. France began to exchange their reserve dollars for gold in 1962, because not only the uncertainty of the future value of dollar but also they were unhappy about the seigniorage gains accruing to the US as a result of the dollar's keystone role under the system. Soon after France, the other members of the system started to run on gold. Two actions were undertaken by the member countries in response to this run on gold, one in 1968 and the second one in 1970. Firstly, a two-tier gold-pricing-system was established at a March meeting in Washington D.C. in 1968, wherein the official price of gold remained at $35 per ounce, but the private-market price of gold was to be allowed to find its own level. Secondly, the IMF allocated Special Drawing Rights (SDRs) in 1970. The SDRs were book entries that are credited to be used by the member countries to satisfy balance-of-payments deficits.

However, balance-of-trade deficits continued to plague the US and consequently the US suspended the dollar's convertibility

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into gold on August 15, 1971 in response to a huge trade deficit. A 10% surcharge was placed on all imports and a program of wage and price controls was introduced. And, in December 1971, the ten largest member countries were called for a meeting at the Smithsonian Institution in Washington D.C.. As a result of the Smithsonian Agreement the US devalued the dollar about 8% against other currencies and consequently raised the price of gold to $38 per ounce. In addition, the band around the new parity values were expanded to 2.25% on either side. But, the devaluation of dollar was insufficient to restore the balance of the international payments. In February 1973, the dollar devalued again and the price of gold was raised from $38 to $42.22 per ounce. The next month the Smithsonian Agreement was no longer applicable and most of the major currencies were floating.

Floating Exchange Rate System,1973-1985: After the fall of the Bretton Woods and Smithsonian agreements many leading countries adopted floating exchange-rate system although the official ratification came in April 1978. The IMF accepted the new system of floating exchange rates and gold was officially demonetized. Some part of the IMF's gold holdings was sold and some part of it was returned to the member countries.

In 1970's the industrialized countries enjoyed high interest rates on loans in developing countries such as Mexico, Brazil, and Argentina. Since most of the loans were made to governments or were guaranteed by governments, there was no fear of default. But, the bankers did not take into consideration that most of the loans were denominated in US dollars. The belief of "countries don't go bankrupt, only companies go bankrupt" was strong, but the financial history showed that countries can go bankrupt in terms of US dollars because of the difficulties to acquire dollars (the Dollar appreciated between 1980-85 and almost doubled its value against the major currencies on the world) to meet debt-service payments for the debtor countries. Mexico, in August 1982 announced that it could not meet scheduled payments on its external debt. The third-world debt crisis became more severe within one year after that announcement

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since 47 debtor countries were negotiating to reschedule their payments with the creditors. Three years after the Mexican announcement of August 1982, by mid-1985 the debt payments were postponed to the latter half of the 1980s.

Cooperative Intervention, 1985 and Beyond: There were quite different arguments about the appreciation of the dollar at the first half of the 1980s. Some economists claim that this run up in the value of the dollar was the result of the dollar denominated bond purchases by Japanese, German and the other foreign investors that resulted in a huge demand for the dollar. Others argued that since the flexible exchange rate system results in a balanced balance of payments, any capital-account surplus requires a matching current account deficit so that this in turn pushed the value of the dollar up. On the other hand, the US administration considered this situation as a sign of confidence in the US economy and claimed that if exchange rates were seriously out of line the free market would take care of it.

In 1985 in the Plaza hotel in New-York (Plaza Agreement) the Group of Five (France, West Germany, Japan, the UK and the US) decided to push the dollar value down by foreign-exchange-market intervention. Indeed, the following years the US dollar lost its previous gains (more than 30%) against the other major currencies. But, the decline was so rapid that US started focusing on how to prevent the dollar value from falling further. In 1987 in the Louvre Accord in Paris, the G-7 countries came together and decided to cooperate on exchange rate matters in order to achieve stability. The managed float or dirty float system emerged from the meeting. After these cooperative arrangements of the Plaza Agreement and the Louvre Accord, the financial system can be characterized as a system of floating exchange rates with constraints. Today, there is more associated or shared economic power in the international financial system which can be categorized into three groups: the US and Canada in the North America, Germany, Britain, France, Italy in Europe and Japan (G-7 Countries).(For a detailed information on the history of financial systems look: Levi, Maurice D. *International Finance*, C.9)

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1.3. Globalization of Financial Markets

The term of "Globalization" is used for the integration of financial markets throughout the world into one international financial market. *The Economist,* in its 1992 survey of the world economy, provides a useful explanation of globalization: "The term can happily accommodate all manner of things: expanding international trade, the growth of multinational business, the rise in international joint ventures and increasing interdependence through capital flows-to name but a few." This explanation gives the factors that have led to the financial markets being integrated.

Most of the developments that occurred during the 1980s have effected the globalization of financial markets. We can summarize some of the developments as follows;

- Deregulation or liberalization of markets
- Technological advances
- EU integration
- Eastern European enterprise.

In 1974, the US took the important measure to remove restrictions on capital outflows, this movement being followed by the UK and Japan in 1979 with the removal of the British and Japanese exchange controls on capital outflows. During the 1980s, some deregulatory events took place. One of them was the removal of interest rate ceilings in US that allow financial institutions to attract more foreign deposits by raising interest rates. The other important deregulatory event was the removal of barriers to entry previously imposed on foreign financial institutions, which resulted in more cross-border transactions. European countries caught up with the liberalization of capital flows movements in the 1980s beginning with Germany in 1981 that lifted the restrictions on purchases by nonresidents of some money market instruments and fixed income securities with a maturity of less than two years. France followed in 1984 with the abolishment of the 25% withholding tax on dividend earnings for nonresidents.

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Technological advances have increased the integration of the world financial markets. The advanced telecommunication systems and computer technology link all the market participants throughout the world, and as a result of this, the participants can monitor global markets and orders can be executed within seconds.

The creation of the EU's unified or common market has been a process of many years. Major steps taken in the late 1960s were the removal of import tariffs and the establishment of the common agricultural policy. In 1987, with the Single European Act which consists of nearly 300 measures, the EU aimed at further unification of the EU markets through the removal of non-tariff barriers. These measures fell into three principal areas:

- the liberalization of international capital movements
- the abolition of cross border restrictions on the provision of financial services, and
- the removal of obstructions to the free movements of goods and services.

This process was completed for most of the European countries on July 1, 1990. With the further liberalization and integration of EU financial markets, a better allocation of savings and investment is expected with higher real returns to savers, smaller spreads between borrowing and lending rates, a lower cost of capital to firms and better hedging possibilities against a variety of risk.(Annaert,Konuralp,p2)

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2. *THE ECONOMICS OF THE INTERNATIONAL ENVIRONMENT*

International investment by private and institutional investors has become a common phenomenon in the world economy. The benefits of risk diversification and the fact that foreign markets often perform better than the domestic market support this development. Notwithstanding the potential benefits conducting successfully an international investment strategy is not a simple matter. As there are differences in institutions, trading practices and financial traditions, often reflecting differences in cultures, an international investor, therefore, must obtain information from various sources and be able to interpret this information in a correct way.

All international investments have one common element that distinguishes them from investments in the domestic market, i.e. the currency used in the foreign market usually differs from the home currency. The volatile character of the major currencies since the collapse of the Bretton Woods System in 1973 adds another important dimension to the international investment process since

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returns on foreign investments eventually must be translated from foreign to domestic currencies. Despite the liberalization of financial markets, the translation of the returns on foreign investments from foreign to domestic currencies usually has been hampered by exchange rate restrictions of governments relating to the maturity and amount of money that can be raised as well as the extra costs such as special taxes on those funds. Foreign returns are also indirectly effected by exchange rate changes through their effect on asset prices.

In this book the various components of the international market structure will be presented. Although the focus will be on the more practical side of international investment, we need first of all to understand how foreign exchange rates, interest rates, and inflation rates are interrelated.

We will analyze the relationships between exchange rates, interest rates and inflation rates by using the international parity conditions, linking domestic and foreign monetary variables.

The variables concerned can be defined as follows;

Spot Rate, (S): The spot rate for a currency is the price for the purchase or sale of this currency against another one. Spot means that the transaction will be settled into two working days. For example, a sale of dollars against DM made on Monday will be settled latest on Wednesday.

Forward Rate, (F): The forward rate for a currency is the price at which this currency can be purchased or sold for delivery on a future specified date. The settlement procedures are the same with the spot transactions once the forward rate has been agreed upon between the two parties.

There is a little difference, called the forward margin, between the spot rate and the forward rate for a currency. If the currency is at a premium the forward rate will be higher than the spot

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rate, or if the currency is at a discount the forward rate will be lower than the spot rate.

Interest Rate, (R): The interest rate is the rate of interest given for a period of time. It is usually given as an annualized rate. Interest rates change according to the length of the period and the currency involved in the transaction.

Inflation rate, (I): The inflation rate is the rate of consumer price increase for a time period. It is usually given as an annualized rate as the interest rate.

The theoretical parity relations of international finance are;

1. Purchasing Power Parity (PPP)
2. International Fisher effect (IFE)
3. Foreign Exchange Expectation (FEE)
4. Interest Rate Parity (IRP)

2.1. Purchasing Power Parity (PPP)

This relation says that spot exchange rates between two currencies must reflect the inflation rates differentials between those countries. According to the relation, internationally traded goods must have the same price (Law of One Price). If the prices of goods increase in one country compared to those in another country (higher inflation rates), then the currency of that country must depreciate at the same rate as the inflation rate in order to maintain the same real price for the same goods into both countries (no trade restrictions are assumed). Otherwise, the countries with the higher inflation rates will be less competitive relative to those with the lower inflation rates in the international markets.

The PPP relation can be formulated as follows :

$$S_1 / S_0 = (1 + I_F) / (1 + I_D)$$

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Where, S_0 = The spot exchange rate at the beginning of the period.
S_1 = The spot exchange rate at the end of the period.
I_F = The inflation rate, over the period, in the foreign country.
I_D = The inflation rate, over the period, in the domestic country.

The first order linear approximation of the above mentioned equation is :

$$(S_1 / S_0) - 1 = (S_1 - S_0) / (S_0) \cong I_F - I_D$$

This equation shows that the exchange rate differential between two countries is equal to the inflation rate differential between those countries.

This relation implies that, if it holds, the real returns on financial assets will be identical for investors from any country. However, this relation may not hold on the short term, for several reasons: future inflation and future exchange rates are uncertain, goods can not be transferred instantaneously from one country to another, shipping costs are considered as part of the importation cost, and the import restrictions by governments forbid the goods as being internationally traded goods. Consequently, there is ample room for the international investor to improve the performance of the portfolio.

2.2. *International Fisher Effect (IFE)*

The international "Fisher Effect" states that the difference between the interest rates of two currencies should equal the expected rate of change of the exchange rate for a specified time period.

The Fisher effect can be formulated as follows;

$$(1 + R_F) / (1 + R_D) = (1 + \iota_F) / (1 + \iota_D) \, . \, (1 + E(I_F)) / (1 + E(I_D))$$

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Where;

R_F : The nominal interest rate in the foreign country
R_D: The nominal interest rate in the domestic country
ι_F : The real interest rate in the foreign country
ι_D : The real interest rate in the domestic country
$E(I_F)$: The expected inflation rate in the foreign country
$E(I_D)$: The expected inflation rate in the domestic country

or the first order linear approximation of the above mentioned equation is,

$$R_F - R_D \cong (\iota_F - \iota_D) + (E(I_F) - E(I_D))$$

One can easily see from the linear approximation that the nominal interest rates difference between two countries is equal to the sum of the real interest rates difference and expected inflation rates difference between these two countries. As a result, this relation states that the real interest rates are equal in two countries. Only the nominal interest rates should be different because of the different inflation rate expectation in two countries.

If there is a difference between the real interest rates in two countries than the arbitrage opportunity will occur for the international capital flows until the real interest rates are equal between those countries.

If this relation does not hold, there will be a riskless arbitrage opportunity between two currencies. For example, if we knew for sure that the spot exchange rate at the end of the period will be less than the forward rate quoted at present time, we could buy the currency that will appreciate on the forward market now and sell it at the end of the period on the spot exchange market, resulting in a net profit position without taking any risk. This riskless arbitrage opportunity continues until the forward exchange rate is equal to the expected spot rate for the end of the period.

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2.3. *Foreign Exchange Expectation (FEE)*

This relation states that the forward exchange rate is equal to the expected value of the spot exchange rate at the present time.

$$F = E(S_1)$$

Where, F : The forward rate quoted at the present time,
$E(S_1)$: The expected spot rate for the end of the period at the present time.

If this relation does not hold there will be a riskless arbitrage opportunity between two countries. For example, if we knew for sure that the spot exchange rate at the end of the period will be less than the forward rate quoted at present time, we could buy the currency that will appreciate on the forward market now and then sell it at the end of period on the spot exchange market resulting a net profit position without taking any risk. This riskless arbitrage opportunity continuos until the forward exchange rate is equal to the expected spot rate for the end of the period.

If we subtract S_0 on both sides of equation $F = E(S_1)$ and divide by S_0, we obtain;

$$(F - S_0) / S_0 = E((S_1 - S_0) / S_0) \quad \text{or}$$

$$(F / S_0) - 1 = (E(S_1) / S_0) - 1$$

The above mentioned formula says that the forward discount or premium which is the left hand side of the formula, is equal to the expected exchange rate movement.

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2.4. *Interest Rate Parity (IRP)*

This relation states that, different from the FEE relation, the nominal interest rate differential between two countries should be equal to the forward discount or premium.

This relation can be formulated as follows;

$$(F / S_0) = (1 + R_F) / (1 + R_D)$$

or the first-order linear approximation ,

$$(F / S_0) - 1 = (F - S_0) / S_0 = (R_F - R_D) / (1 + R_D) \cong R_F - R_D$$

If this relation does not hold, then the riskless arbitrage opportunity will occur until the nominal interest rate difference between two countries is equal to the forward discount or premium.

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3. *FOREIGN EXCHANGE MARKET*

The currencies of different countries are exchanged for each other on the foreign exchange market. Foreign exchange is simply the money of a foreign country. The basic aim of this market is to facilitate international trade and investment. The foreign exchange market is a market where the participants are connected to each other by computer terminals, telephones, fax machines, teletex and other types of telecommunication channels. Opposite to the stock exchange market that operates as a physical place, foreign exchange market traders work in the offices of banks and brokerage firms around the world.

There are mainly two kinds of foreign exchange markets. One of them is called the "interbank market" where the banks buy or sell foreign currency between themselves, whereas the other one is called the "commercial market" where firms (exporters, importers, MNC's), individuals (speculators, brokers, portfolio managers, tourists) buy or sell foreign currency.

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Suppose that an American firm wishes to buy some wine from France. The French firm asks FF55.000 for 100 cases of wine which is $10.000 at an exchange rate of FF5.50/$. The American firm wants to pay in dollars, whereas the French firm wants to be paid in French franc: this is where the foreign exchange market comes in. If the contract between the two firms was denominated in French franc, the American firm would have to buy FF55.000 from its bank; if the contract was denominated in dollars, the French firm would sell $10.000 to its bank. In both cases, the French export of wine to the United States requires that one firm buys French franc for dollars from the banking system.

Suppose the contract is in French franc. Then on the maturity, to pay for the wine, the American firm will go to the foreign exchange department of its bank, say bank X in New York, to buy the necessary French francs. American firm will pay bank X $10.000 and receive in exchange FF55.000 to be send to a French bank, say bank Y in Paris. Figure 1.1 schematically shows the transactions.

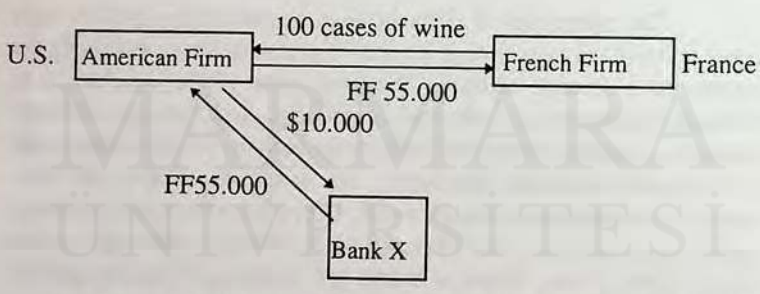

Figure 2- Transactions involved in U.S. importing

Where did Bank X get the FF 55.000 it sold to the American firm? This brings us to the second role of the foreign exchange market, the interbank market. If Bank X doesn't have the necessary amount, it will get them from other banks. It may buy them from another American bank that finds itself with more French francs than

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necessary for its business. Or Bank X could buy the French francs from a French bank, say Bank Y in Paris.

Bank Y will like to sell French francs for dollars in order to be able to service the needs of its own French customers who require dollars to buy goods and services or assets from the United States. Suppose a French importing firm signed a contract in dollars to buy some machinery valued $10.000 from an American exporting firm. In this case, French importing firm will like to buy $10.000 from its bank, Bank Y. Figure 3 shows the related transactions in commodity and foreign exchange markets.

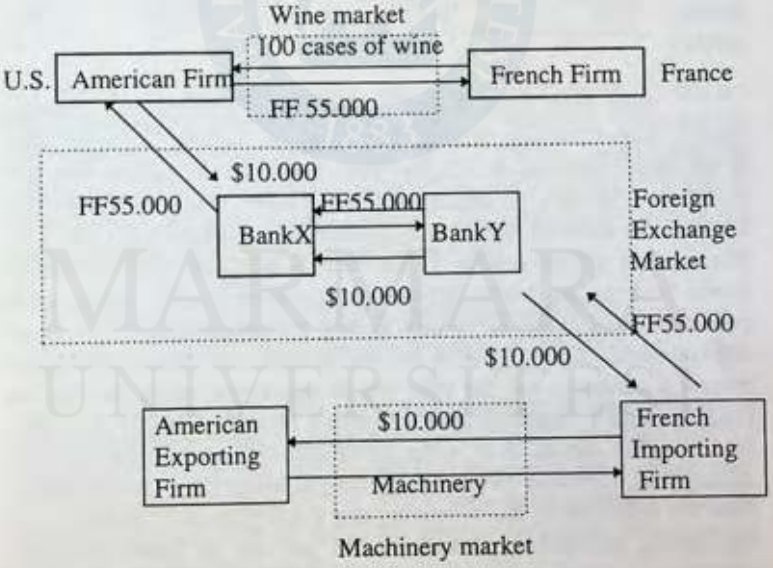

Figure 3- International Trade and Foreign Exchange Market

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The major foreign exchange markets around the world are Tokyo, Hong Kong, Singapore in the Far East; Bahrain used to be an important center for the Middle East; London, Frankfurt, Zurich and Paris for Europe; and New-York, Los Angeles, for America. Since the major financial markets' business hours overlap around the world, the foreign exchange market works 24 hours. Figure 1.3 shows the main markets and the trading hours according to the Greenwich mean time.

MARKET CENTER	Tokyo Hong Kong Singapore	Bahrain Kuwait Dubai	London Frankfurt Zurich	New York	Chicogo	San Francisco Los Angeles
TRADING HOURS (GMT)	00.30 09.30	05.30 14.00	08.00 16.30	13.00 21.30	15.00 22.30	17.30 02.00

Four main types of deal can be held in the foreign exchange market, namely buying, selling, borrowing or lending. The main aim of the dealer is to sell at a higher price than what he paid to buy the currency. The aim is similar when a dealer lends currency: the lending rate must be higher than the borrowing rate of that currency. The lending and borrowing in the foreign exchange market usually works between the banks, defined as inter-bank market. Banks give quotation most in the same way as they give quotation to buy or to sell currencies. The bid rate is the rate at which the bank is willing to borrow a currency, and the offer rate is the rate at which the bank is ready to lend a currency. The difference between the bid and offer rate is called spread as it is the difference between the buying and selling rate. The only difference is that the bid price is always lower than the offer rate in the borrowing and lending market. However, in the buying and selling market, the bid rate can be lower or higher than the ask (offer) rate according to the quotation system used.

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3.1. *Basic Principles of Foreign Exchange Quotations*

3.1.1. Spot Quotation

Understanding foreign exchange prices (quotes) depends on some fundamental knowledge such as direct and indirect quotations.

In most countries exchange rates are quoted directly, meaning that foreign currency is taken as one unit and the equivalent is given in domestic currency. For instance, in Germany one US dollar is worth X units of DM and in the USA one DM is worth X cents (or dollars).

e.g. US$ 1 = DM 1.5170 when quoted in Germany,
DM 1 = US$ 0.6592 when quoted in the USA.

In the United Kingdom, Australia, New Zealand, Ireland and in the USA for Canadian Dollars and for domestic purposes the indirect quotation system is used. In this system, opposite to the direct quotation, the domestic currency is taken as one unit and its equivalent is given in foreign currency. For instance in London one pound sterling is worth X units of US dollars.

e.g. PS 1 = US $ 1.5565 when quoted in the UK.
US$ 1= C $ 1.3274 when quoted in the USA.

Banks usually give a two way quotation in the market. The first rate represents the "buying rate" or "bid price" at which they are ready to buy a currency, the second rate represents the "selling rate" or "offer price", "ask price" at which they are prepared to sell the currency. Assume that the following foreign exchange quotations are given for the Deutsche mark:

	Bid	Ask
Spot	DM 1.5564/$	DM 1.5574/$

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This means that the bank is willing to buy dollars at DM 1.5564/$ and is willing to sell dollars at DM 1.5574/$. The difference between the bid and ask price will be the profit of the bank, since usually they do not charge any commission on the currency transactions. The basic rule is that the bank buys cheaply and sells expensively. Traditionally, quotations are given with abbreviations and bid price comes before the ask price. Normally, the quotation mention above will be given as 1.5564-74 on the screen or even 64-74 on the telephone assuming that the first digits be known for the counterpart.

3.1.2. Forward Quotation

Forward quotations are given by taking the spot exchange rates as base and adding or subtracting the forward differential which is called "swap rate". This differential normally reflects the difference in interest rates between two currencies. For instance, the forward rate between DM and the US$ will depend on the difference between the interest rate on DM and the interest rate on the US$. According to the interest developments on both currencies the forward differential will be either a premium or a discount from the spot rate. In order to calculate the forward rate, if direct quotation is used, a premium will be added to the spot rate, a discount will be subtracted from the spot rate. Vice versa in the case of indirect quotation.

	Bid	Ask	Spread
Spot	DM 1.5564/$	DM 1.5574/$	0.0010
Swap Rate	0.0125	0.0120	0.0005
Forward Rate (one month)	1.5689	1.5694	0.0005

The basic rule is that if the bid points are higher than the ask (offer) points of the swap rate, meaning that the base currency ($) is

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at a premium, the points must be added to the spot rate. If the bid points are less than the ask points, meaning that the base currency ($) is at a discount, the points must be subtracted from the spot rate.

In the above example, the quotation is direct in Germany, since the bid price of the swap rate 0.0125 is higher than the ask price of 0.0120 meaning that the one month forward dollar is at a premium in Germany, the swap rate must be added to spot rate.

If we calculate the premium (or discount) as an annualized percentage deviation from the spot rate, we find:

Forward Premium(discount) = ((F - S) / S) x (12/ Forward contract length in months)

=((1.5689-1.5564)/1.5564) x (12/1)= 0.09637,

meaning that the one month forward US$ is selling at a 9.6 % premium.

If indirect quotation is used, the formula to calculate the premium or discount as an annualized percentage becomes:

Forward Premium(discount)= ((S - F) / F) x (12/ Forward contract length in months)

3.1.3. Cross Rates

Since all major currencies are quoted against the US$, and when one needs to work in two currencies not including the US$, cross rates should be calculated from the dollar quotations. For example, a customer in France who needs to pay his supplier in Germany, will wish to sell FF and buy DM from the foreign exchange market. In this case, the DM/ FF rate will need to be calculated from the quoted rates of US$/DM AND US$/FF.

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Assume that below quotations are given by the bank to the French customer:

	Bid	Ask
US$/DM	1.6930	1.6940
US$/FF	5.7685	5.7698

The cross rate between the DM and the FF will be calculated as follows,

If 1.6930 DM is equal 5.7698 FF,
then 1 DM will be worth (x) FF.

Therefore, (x)= 5.7698/ 1.6930 = 3.4080 or 1 DM = 3.4080 FF, being the buying of DM for the customer or the selling rate of DM for the bank.

If 1.6940 DM is equal 5.7685 FF,
then 1 DM will be worth (x) FF.

Therefore, (x)= 5.7685/ 1.6940 = 3.4053 or 1 DM = 3.4053 FF, being the selling rate of DM from the customer's point of view and the buying rate of DM from the bank's point of view.

The resulting quotation by the bank is;

	Bid	Ask
DM/FF	3.4053	3.4080

Forward cross rates are calculated in the same way as spot cross rates. Assume that the swap rates are given as follows;

	Bid	Ask		Bid	Ask
US$/DM	1.6930	1.6940	US$/FF	5.7685	5.7698
3 month prm.	0.0125	0.0120	3 month disc.	0.0115	0.0120
3 month F rate	1.7055	1.7060	3 month F rate	5.7570	5.7578

The calculation of DM/FF cross rates will be as follows;

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DM/FF bid price = 5.7570/ 1.7060 = 3.3746
DM/FF ask price = 5.7578/ 1.7055 = 3.3760

The resulting quotation by the bank is;

	Bid	Ask
DM/FF 3 month forward	3.3746	3.3760

3.2. Types of Foreign Exchange Transactions

3.2.1. Spot Transactions

As mentioned before, spot transactions should the latest be completed on the second following business day after the trading date. Two business days are given to the banks to allow them enough time for the settlement arrangements to be made. The principle in the foreign exchange markets is that the settlement of both sides of a contract should take place on the same working day. If the two banks that are trading do not have the same holiday days then the settlement would have to be postponed until the first appropriate date. For example, if spot trading takes place on Friday, say between a London bank and a US bank, and British pound is being traded, normally the settlement date would be after the two business days of the trading date which is Tuesday. But, if that Tuesday is a holiday in Britain, then the settlement will take place on Wednesday. The other possible situation is that the trading date between a London bank and a US bank is Friday and Monday is a holiday day in one of the centers. In this case, two business days after the trading day of Friday will be Tuesday in one center and Wednesday in the other center. The principle to be applied in such a situation is that the calling part of the trade would accept the counterpart's settlement date. Thus, if the US bank called to London bank, the London bank's settlement date would be applied, while if the London bank called to the US bank, The US bank's settlement date would be applied (Grabbe,1986).

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The Clearing House Inter-bank Payments System (CHIPS) in New York or the Worldwide Inter-bank Financial Telecommunications (SWIFT) in Brussels help to settle most of the transactions in the money markets throughout the world with their highly sophisticated computerized systems.

In the foreign exchange market usually no cash actually changes hands on the settlement date. When a purchase made on a currency, the buyer in practice will have the right to a credit balance at the amount of purchase in his bank account or a debit in his bank account when he sells the currency. Thus, the currencies never leave countries. Assume that a German importer requires US$ 5 million for payment to the American exporter. He receives quotation from the bank, say that US$/DM 1.6940, then, the German importer's account will be debited for the equivalent DM amount at the agreed exchange rate which is DM 8.470.000 and at the same time the American exporter's account will be credited by US$ 5 million.

3.2.2. Forward Transactions

A forward transaction is a transaction between a bank and its customer to deliver a certain amount in one currency in exchange for a certain amount in another currency at an agreed rate of exchange at a specified future time. The exchange rate is agreed at the time the contract is taken out but no cash is exchanged. The parties makes delivery on the maturity date. The usual contract lengths are one month, two, three and six months or even twelve months. "Odd day" transactions apart from the conventional periods are also be done.

The settlement date for a forward contract is the date of the spot settlement but in the end of the maturity. For example, a one month forward contract is made on October 9, the settlement date of a spot transaction on that day is October 11, then the settlement date of one month forward contract would be November 11. The another rule for the settlement date of a forward contract is the "end-end" rule. When the spot settlement date of the forward transaction comes

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to the last business day of the month in which the contract is made, then the settlement date of the forward contract also comes to the last business day of the appropriate month. For example, if the spot settlement date for a contract made today is October 29 and this is the last business day of the month, then the settlement day of a one-month forward contract made today will be the last business day of November whether it is 29 or not.

There is another style of forward contract which allows to make payment or to take delivery of the foreign currency at any time during an option period. This type of contracts are called "option forward contracts". The most common used option periods are the beginning of the month (the first ten days of the month), the middle of the month (from eleventh until the twentieth of the month), the end of the month (from twenty-first until the thirty-first of the month). However, more specific option periods can be arranged on the request of the customer. Naturally, to enter this kind of forward contract is more expensive than an ordinary fixed forward contract since it is unknown whether the exercise will take place in the beginning or in end of the option period.

Not all of the currencies have forward transactions on the foreign exchange markets. Most of the transactions take place in between the hard currencies such as US$, DM, British pound, Japanese yen, Swiss franc, French franc...etc.

3.2.3. Swap Transactions

In the foreign exchange market, a swap transaction involves a purchase (sale) of a foreign exchange in the spot market combined with a simultaneous sale (purchase) in the forward market "spot against forward". Since this transaction is arranged as a single transaction by the bank, the trader (could be another bank) does not incur any foreign exchange risk. The trader knows the difference between the spot and forward rates when the transaction is entered into, the risk of any change of the foreign exchange rate is taken by

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the bank. To enter such a swap transaction in the foreign exchange market has several reasons. One reason could be to convert one currency temporarily into another currency. The other reason could be to hedge a forward contract written by the bank to a customer against foreign exchange risk. Or, an arbitrageur who wants to take advantage of the interest rate differential between two currencies could enter in a swap transaction in order to take no exchange risk on his position. For example, assume the following quotations are given for FF and US$.

Spot exchange rate	FF 5.7175 /US$
One-year forward rate	FF 5.7975 /US$
One-year interest rates	
French franc	16 %
U.S. dollar	12 %

An arbitrageur can use this riskless profit opportunity, not even invest any capital, by entering into a swap transaction with simultaneous borrowing and lending. The mechanism as it follows; borrow dollars at 12%, convert them immediately into French franc at the spot rate of 5.7175 FF/US$, and invest the proceedings at 16%. The arbitrageur makes a profit of 4% on the borrowing and lending position but takes the risk of unfavorable foreign exchange rate changes such as a large depreciation of the French franc. In order to eliminate this risk, the arbitrageur can simultaneously enter in a swap transaction by purchasing a one-year forward contract at the rate of 5.7975 FF/US$, which is known now. By doing this, he/she fixes the exchange rates at the time he/she borrowed the dollars. Consequently, whatever changes occur in the rate of foreign exchange, he/she knows for sure how much profit will be realized at maturity.

The net gain on the position will be 2.6% for the arbitrageur since he/she gains 4% on the interest rate differential but loses 1.4% {(5.7175 - 5.7975) / 5.5175= - 0.014} on the one-year forward contract. This gain of 1.4% is certain at time zero when the

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arbitrageur entered into a simultaneous borrowing and lending transaction.

The more sophisticated swap transaction is called "forward against forward". The reason to enter in such a swap transaction is to have profit hoping that the premium or discount reflecting interest rate differentials will be in favor of the arbitrageur. For example, he/she may sell DM 10.000 forward for dollars for delivery in three months at 1.7125 DM/US$ and simultaneously purchase back DM 10.000 forward for delivery in two months at 1.7100 DM/US$ hoping that the foreign exchange rates will change favorably.

3.3. Participants of the Foreign Exchange Market

The foreign exchange market consists of two tiers, the inter-bank or wholesale market, and the client or retail market (Eiteman/Stonehill,p.90). Four types of major participants can be categorized whom operate within these two tiers:

1. Banks and Non-bank Foreign Exchange Dealers
2. Companies and Individuals
3. Central Banks and Treasuries
4. Speculators

Banks work in both the wholesale and retail markets. Even they often behave as a "market maker". Their profit comes from buying the currency with a bid price and selling it with relatively higher ask price. The spread between the bid and ask price depends on the volatility of that currency, the size of the contract, the location of the market, the volume of transactions in the currency and the quality of the counterpart.

Companies, especially multinationals, enter to the exchange markets in order to protect the home currency value of foreign currency denominated assets and liabilities on their balance sheet. Export and import companies seek covering the risk of any loss on

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their orders or contracts denominated in foreign currencies. International portfolio investors enter to the market with the same reason, that is to hedge foreign exchange risk.

Central banks and treasuries use the market to stabilize the value of their currency or to maintain accurate foreign exchange reserves. Central banks and treasuries differ from the other participants since their aim is not to have profit on the transaction but to influence the foreign exchange rates for the sake of their citizens.

Speculators seek to earn a profit from the exchange rate fluctuations. They take the risk of miscalculations. On the other hand, arbitrageurs enter to the market in order to have a risk-free profit from the differences in interest rates between countries or simultaneous price differences in different markets.

3.4. Forecasting Foreign Exchange Rate Movements

The current international monetary system may be characterized by three types of conditions: fixed, managed, and freely floating exchange rates. Forecasting foreign exchange rate movements, therefore, is not an easy matter since there is no particular general theory that fits in all the conditions. In the fixed exchange rate system forecasting the exchange rates could be easier if the participants knew the government intervention. The important thing is to guess when this intervention will occur and on which amount. Under the managed floating rate system, the fluctuation of the foreign exchange rates according to the basic laws of supply and demand is artificially prevented from happening. In this system usually the government policies are not announced in advance, this makes the forecasting of foreign exchange rates difficult. Under the freely floating exchange rate system the foreign exchange rates fluctuate in accordance with supply and demand since the foreign exchange market is, as its name implies, "a market". When the currency is in short supply or high demand its value will rise; if it is in surplus of supply or lack of demand its value will fall. But the

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prices also respond to the expectations of the participants. If the participants think the value of the currency will fall, they will sell it hoping that to buy it back cheaper and make profit on the transaction. According to the number of the participants an oversupply on the currency will develop and its price will fall. Since the central bank will intervene to correct this situation, the participants will take only a very short term position.

Forecasting the movements of the exchange rates in this environment consists of three basic steps. The first step is to exam the balance of payments, the rate of inflation, and the trade flows of the country. The second step is to examine the level of the foreign exchange reserves of the central bank. The third step is to predict the policy of the economic actors such as governments and their attempts at internal deflation, intervention, exchange controls and devaluation (Ensor and Antl, p.180).

The classic theory of international trade says that every country produces goods and services in which they have a comparative advantage, and they trade with other countries in order to have different goods and services. Every determinant that effects the demand for a country's international trade may alter the price of the currency of that country in the foreign exchange market. These determinants can be cheap labor, different consumer tastes, trade barriers, or the growth rate of national income. As mentioned before, the theory of purchasing power parity helps to explain international trade flows. According to the theory all goods must have one price in every country, "the law of one price". If there is a difference the trade flows will correct it, and the people will be able to buy the same products with the same price in various places.

In addition to the trade flows, financial determinants such as interest rates and inflation rates motivate international capital flows. If the interest rates are higher in one country relative to another, international funds will flow, for a short term, to that country with higher interest rates unless the real rate of return is negative. If the inflation rate of a country is higher relative to another, the prices of

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goods and services become expensive and domestic buyers tend to switch from domestic goods to imported goods. This situation will cause the exchange rate to fall relative to the currency of the country with lower inflation rate. We can identify three types of international capital flows effecting a currency's exchange rate: (Kidwell, Peterson and Blacwell, p.309)

1. Speculative capital flows,
2. Investment capital flows,
3. and, Political capital flows.

When there is a speculative arbitrage opportunity usually central banks will intervene to correct the value of the currency. Even in the case of no intervention, speculative capital flows may cause change on the exchange rates, when the expectations of the speculators are in a way that the exchange rate will be mispriced because of future changes in inflation and interest rates, or political economic conditions.

Short-term capital flows, as mentioned before, will occur when the real (inflation adjusted) interest rates are higher in one country than another or when the theory of covered interest rate parity does not hold. In this case, short term capital inflows can come to the country in order to earn this higher interest rate. This flow to that currency may cause the value to rise. Long-term capital flows may depend on the country's attractiveness to the real or financial assets by international investors. Foreign direct investments usually increase when there is an expectation of high real rates of return on investment or favorable taxation. If those capital flows are large enough they may cause the value of the currency to appreciate since the demand of that currency becomes higher.

When there is a political instability in a country because of the fear of social disruption or war, the capital will tend to flow outside of that country. This can have an important impact on the exchange rates as well as on the economic development of the country.

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Since there are many determinants that can affect exchange rates, it is difficult to forecast exchange rates precisely. As a result, the participants of foreign exchange market use some techniques, such as forward contracts, foreign currency options and futures or through borrowings from money markets, to protect themselves against any risk to lose on the exchange rate changes. In the following chapters we will work on these techniques.

The naive forecast of a forward rate would be the spot exchange rate plus the interest rate differential of the currencies. The derivation of a forward rate from the spot rate is shown below:

Spot Exchange Rate	$ 1	=	FF 5.7175
Initial Amount of Deposit	$ 1	=	FF 5.7175
3month Interest Rate on a Year Base	8 %		12 %
Deposit Balance (after 3 months)	[$1+$1(0.08/4)] =$ 1.0200		[FF5.7175+FF5.7175(0.12/4)] =FF 5.8890
Forward Rate	5.8890/1.0200	=	FF 5.7735
Difference From Spot Rate			0.0560

The forward differential can also be estimated from the formula mentioned below:

$$Forwardpoints = \frac{Interestratedifferential}{\frac{mx100}{nxspotrate} + \frac{i}{spotrate}}$$

where; m = number of days basis
n = period of contract
I = interest rate

If we apply the example mentioned above to this formula;

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$$Forwardpoints = \frac{(12-8)}{\frac{(360x100)}{(90x5.7175)} + \frac{(12)}{(5.7175)}}$$

$$= \frac{4}{69.9606 + 2.0988}$$

$$= 0.0560$$

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4. *INTERNATIONAL MONEY MARKETS*

International investors should know which securities are available in the international financial markets. Securities are mainly classified as either money market or capital market instruments. The term of "money market" is used for short term or highly liquid financial instruments. Since the maturity is short, one year or less, and marketability is high, the risk that is taken by the investors at the money markets is not high. The term of "capital market", on the other hand, is used for long term or more risky financial instruments. In this chapter, we will discuss more in detail money markets and instruments firstly, and secondly, capital markets and instruments. Since our aim is not to make an exhaustive study, we will mainly deal with the instruments that are commonly used by the international and/or domestic investors. Whilst the instruments and markets differ in their legal structure and the degree of activity in the markets, there are considerable similarities between them. Of course, there are different instruments that are available for each currency or country around the world.

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4.1. Investing in the international Money Markets

There is a wide range of money market instruments which vary according to the issuing institution, term to maturity and other factors, but they have one thing in common; they are short-term assets that can be bought and sold quickly with a low transaction cost. Because of their high liquidity, money market instruments are convenient for funds available only for short periods of time. For example, a firm might have an idle cash temporarily. The firm can invest this idle cash in the money markets for a needed short time of period and earn some interest. Or, a firm or a bank might need some cash temporarily in order to meet its obligations, they can go to money markets to borrow short-term funds at the market rate of interest. This relationship can be seen in the chart exhibited below.

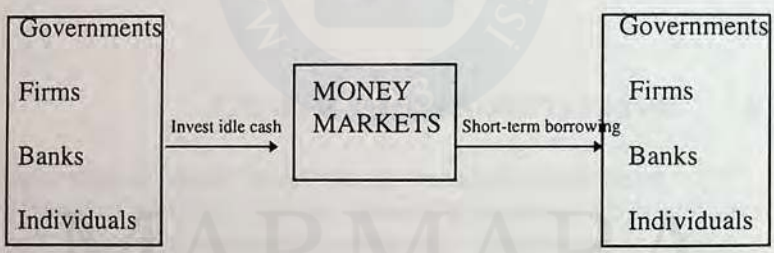

Figure 4- Money Markets System

Since it is very easy to reach the information about interest rates available on alternative instruments by reading daily financial newspapers or using the telephone, the money market is a highly competitive market. The interest rates differ among countries resulting from the domestic and/or international economic conditions. These differentials of interest rates, exchange rate movements, tax differences among countries and deregulation of financial markets encourage investors to invest money market instruments abroad. For example, market participants may decide to buy French franc denominated certificates of deposit (CDs) issued by a French bank, dollar CDs issued by a Belgian bank (called

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Eurodollar deposits), or commercial paper issued by a US multinational company.

The decision to invest abroad, as we mentioned before, poses some problems which are not the case in a domestic investment. We can summarize these problems into two questions:

1. How will you compare rates of return between domestic and foreign exchange denominated money market instruments?
2. How will you protect yourself against foreign exchange rate changes when you invest in foreign exchange denominated assets?

It is known that interest rates vary from country to country. Does it mean that to invest in a country with the highest interest rate is the most profitable investment? In order to answer this question we must take foreign exchange rate movements into consideration.

The rate of return on a foreign exchange denominated money market instrument depends on the interest rate of the instrument and the exchange rate movements between the domestic and foreign currencies.

$$r = \left(1 + i_f\right)\left(\frac{S^*}{S}\right) - 1$$

where, r is the rate of return, i_f is the interest rate on the foreign exchange denominated money market instrument, S is the spot rate between domestic and foreign currencies, and S* is the spot rate between domestic and foreign currencies at the end of the investment horizon. It is clear that the rate of return mostly depends on the S* which is unknown in the beginning of the investment horizon. However, the exchange rate risk can be hedged simply by entering into a forward contract , selling the foreign currency forward, at the beginning of the investment horizon. In this case the S* in the

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formula will be replaced by F which is known in the beginning of the investment horizon.

$$r = \left(1 + i_f\right)\left(\frac{F}{S}\right) - 1$$

Of course, if interest rate parity holds the advantage of a higher interest rate in a foreign exchange denominated asset will be offset by a forward discount on the forward rate because the premium (or discount) on the forward rate will represent the interest rate differential between countries. Thus, if interest rate parity holds, the rate of return on a foreign exchange denominated asset will be identical with the rate of return on a domestic money market investment. As we all know this parity condition does not hold because of some factors such as: transaction costs, costs of having and processing information, government intervention and regulation in the money markets and non-comparability of the money market instruments around the world.

The cost of investment in foreign exchange denominated assets is somewhat higher than the cost of investment in domestic assets. In a domestic investment there is only one transaction which is the buying of domestic asset. On the other hand, the cost of investing abroad mainly involves two kind of transactions cost. One is the cost of transacting in the foreign exchange market, and the second, cost of transacting in the securities market. For example, when a German resident invests in a Turkish Lira denominated money market asset, firstly he/she will need to buy TL, secondly he/she will purchase/sell the asset and thirdly he/she will sell the TL at the end of the term in order to convert the foreign currency (TL) into home currency (DM). The transaction cost of buying and selling foreign currency consists of bid and ask spread and the commission fee of the brokerage firm. The other transaction cost of buying TL denominated money market asset is the cost of buying and selling the asset itself.

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The other factor that generates divergence from interest parity condition is the cost of having and processing information. In the interest rate parity theorem, it is assumed that the investor has free access to all information available in the market. However, the availability and the cost of the information differ among countries, effecting the returns made in different countries. Nevertheless, This effect is not a considerable one since the recent technologic revolution has made information very cheap.

Government intervention is the third and most important factor that generates divergence from interest parity condition. Government intervention can be in all forms, such as: domestic interest rate ceilings, regulation of financial transactions, different tax treatment of various types of income, and foreign exchange controls. The use of these type of interventions by governments creates differentials between domestic and foreign rates of returns. For example, in order to prevent interest rates from rising above a certain level government applies interest rate ceilings. This will result in capital outflows abroad because of a higher rate of return on foreign exchange denominated assets.

The deviations from interest rate parity condition can also arise because of the differences in instruments issued in different money markets. This means that the instruments in the different local markets are not in the same category in regard to maturity, risk class, and liquidity. In particular, default risk and political risk are the major sources of deviations from interest rate parity condition. Default risk is defined as not being able to satisfy all the commitments which have been made by the issuer of the asset, such as: default on the payment of interests or repayment of the principal. Political risk arises from the sovereignty of a given country, such as: possibility of expropriation and the threat of an asset freeze.

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4.2. International Money Market Instruments

In the money market operations dealers and brokers play an important role. Brokers bring sellers and buyers together and ask commission in return. They never take position for themselves, they only provide a communications network that links market participants who are often unable to find counterparts and geographically far from each other. On the other hand, dealers take position for themselves by buying and selling money markets instruments for their own accounts. They make quotations on the bid and asked prices to each other, to individual or institutional investors, and to issuers of the instruments.

As we mentioned before, there are different instruments used for each currency and within each local money market around the world. Besides, there are different legal structures and a different degree of activity in every local money market. Whilst all these differences there are considerable similarities between them. This section will describe the most commonly used instruments in international money markets, namely Eurocurrency deposits and Eurocommercial papers.

There are very active inter-bank markets in most local money markets. In the international money markets the most active inter-bank market is the "Eurocurrency Markets". Eurocurrency markets began to develop after the Second World War. The Soviet Union and the Republic of China feared that their deposits in the USA might be blocked and decided to hold their dollars in London and Paris, rather than the banks in the USA. The market has developed further during the 1960s and 1970s with the US banking regulations which discouraged to leave the dollars on deposit with a US bank. Since these regulations prevented banks to pay interest on deposits of less than one month and to pay higher interest rates on longer term deposits than the other financial centers, it was more profitable to invest dollars elsewhere than US. Another reason of the expansion of eurocurrency markets is the growth of multinational companies. Since they are doing business in several countries, they

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are engaged to hold different currencies and invest them where the return is higher. The third reason is the rise of oil prices in the 1970s. The dollar surpluses of the oil producers were placed outside the USA because of US banking regulations and also for some political reasons.

4.2.1. Eurocurrency Deposits

The most popular Eurocurrency Deposit is the Eurodollar Deposit. Eurodollar represents dollar-denominated deposits in non-US banks or international banking facilities in US. Similarly, Eurocurrency deposits are deposits denominated in currencies other than those of the countries in which the deposits are located. Hence, a mark-denominated bank deposit in London or in New-York is a Euromark deposit, while a German mark deposit in Köln is not. There is no need to go to the different money markets to arrange this kind of transaction because of the multinational nature of the banks. For example, an American investor can arrange for investment or borrowing in the currency of his/her choice with a local bank in US. Mostly traded currencies include Austrian shilling, Belgian franc, Canadian dollar, Danish krone, French franc, German mark, Italian lira, Japanese yen, Netherlands guilder Norwegian krone, Spanish peseta, Swedish krone, Swiss franc, UK pound sterling, and US dollar. In some regional markets some other eurocurrencies exist, such as Saudi riyal denominated eurocurrency deposit in Bahrain.

Most of the deposits are time deposits at fixed interest rates, usually 30 or 90 days time deposits. Most of the deposits are made by other banks (inter-bank market), but many are made by governments, central banks and multinational companies, and some by wealthy individuals. Similar to the Fed funds market (USA banks borrow and lend in the Fed funds market) in the Eurodollar market the banks actively borrow and lend Euros among themselves. The difference between these markets is the maturity of the transactions. Most of the transactions in the market for Fed funds are on an overnight basis, whereas in the Eurodollar market deposits have longer periods.

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Since most of the deposits are time deposits with a fixed maturity date, depositors lose their liquidity. In order to eliminate the illiquidity of time deposits the banks invented the negotiable certificate of deposits, or CDs as short. There are some different forms of Eurocurrency CDs such as, variable rate CDs, Discount CDs, Yankee CDs. The most popular one is the fix-rate Eurodollar certificates of deposit. Many of the Euro CDs are issued through dealers and brokers who also make a secondary market for these securities. In this form of Eurocurrency instrument investors are adversely affected by rising interest rates, and issuers are adversely affected by decreasing interest rates. To reduce this interest rate risk the Floating Rate CDs have been introduced in the money markets in recent years (FRCDs). The interest rate of the FRCDs adjusts periodically to the London Inter-bank Offer Rate (LIBOR). This form of Eurocurrencies are more liquid than the form of time deposits, because the CDs are negotiable instruments that can be traded in a secondary market. If the owner wants his/her money back before the maturity date, he/she can sell it on the secondary market with its current value. The other difference from time deposits or ordinary CDs is that the FRCDs pay interest at periodic intervals, not just at maturity.

The banks use these Eurodollar Deposits to provide loans to other companies who need US dollars (Eurodollar loans). Since Eurodollar Deposits are not subject to reserve requirements or/and deposit-insurance requirements, the banks can lend out 100% of the deposits. Consequently, the spread between the interest rate paid on the deposits and the interest rate charged on the loans is small. The banks can offer higher interest on Eurodollar deposits and can charge lower interest on loans.

Many Eurodollar loans are direct credits to customers on the basis of formal lines of credit. However, it is possible to arrange syndication loans for very large Eurocurrency loans required by governments or multinational companies. Using this technique the banks can diversify some of the sovereign risk that arises in

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international lending. Of course, the interest rate for syndication loans is higher than the Eurocurrency loans. The interest rate is usually computed by adding a spread to LIBOR. In a syndication loan there are three categories of banks: lead banks, managing banks and participating banks. The lead bank, after the negotiation with the borrower, begins to assemble the management group which commits itself to provide the entire amount of the loan, and then markets the portions of the loan to the participating banks

4.2.2. Eurocommercial Papers

The use of commercial paper goes back to the early 1800s in US. The first issuers were businesses such as railroad companies, textile mills and tobacco companies. The nature of the market began to change in the 1920s with the need of personal loans to buy cars or other durable consumer goods. Commercial banks were the major purchasers of the commercial papers until the beginning of 1950s. Since then, many other business firms, insurance companies, non-financial business firms, banks trust departments, government....etc. began purchasing commercial papers because of its combination of low default risk, short maturity, and relatively high rate of return. Whilst the commercial paper market is developed so well in the USA, for the UK domestic market the subject is rather young. The Banking Act in UK treated all short term securities as deposits, so that non-banks were not permitted to take. Since April 1986 exemption was given to commercial and industrial businesses listed on the London International Stock Exchange and having net assets of at least 50 million pound.

Commercial paper is a short-term promissory note with fixed maturity and issued by large creditworthy business firms, financial institutions or banks. The issuer should have a very high credit rating because it promises to pay a fixed amount on maturity, but pledges no assets to guarantee this promise. As an alternative to bank borrowing, large companies issue commercial paper to finance their short-term working capital needs with a lower rate of interest.

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The commercial paper market is almost a wholesale money market, since most of them are sold in denominations of $250.000, $500.000, and $1.000.000 or more. The average maturity of commercial papers is 30 days or less, but it is possible to issue paper for up to a year (270 days in the USA). Since the commercial papers with a maturity more than 270 days must be registered with the Securities and Exchange Commission (SEC) which is a time consuming and costly procedure, in practice most of the commercial papers sold are within the range of 30 days and less.

Since commercial paper has short maturities, the issuer usually wants to roll his paper instead of paying off his borrowing. With this way he sells new commercial paper to obtain funds to pay off the maturing paper. In this case, off course, there is a possibility that the market conditions will change unfavorably and make it difficult to sell new paper for some time. To cover this risk, the issuer usually uses a line of credit from a bank.

The rate offered on a commercial paper depends on the following points;

- the maturity of the commercial paper,
- the total amount that the issuer wants to borrow,
- the general rates of the current money market rates, and
- the credit-worthiness of the issuer.

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5. INTERNATIONAL BOND MARKETS

5.1. International Bond Market Instruments

The growth of international bond markets can be explained by the unique features that are offered to the users (both bond issuers and investors) which the domestic bond markets can not offer. Commonly, the countries make different legal regulations between the domestic bond issues and foreign bond issues. The differences might be on the taxation, on the timing or amount of bonds that will be issued, on the type of information that will be given by the issuer before the actual issue, and on the type of investors who will or can buy the bonds. For example, foreign investors had to pay 30% withholding tax when they purchased bonds that were placed in the United States until 1984. After the elimination of withholding tax in 1984, the foreign demand increased largely for US-placed bonds. But the Eurobond market continued growing contrary to the expectations that most of the US dollar Eurobond market would move back to New-York. The reason is that the Eurobond market has been

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recognized by the borrowers and investors as the most efficient and innovative, in the mean time least costly market.

From the definition, domestic bonds are issued in the domestic market by a domestic borrower and denominated in the local currency. The international bond market is divided into two broad groups: foreign bonds and eurobonds. Foreign bonds can be defined as the bonds that are issued on a nation's domestic market by a foreign borrower and denominated in that nation's local currency. The most important foreign bond markets are in New-York, London, Tokyo, Amsterdam, and Zurich. Some foreign bonds have common names such as Samurai bonds in Japan, Yankee bonds in the US, Bulldog bonds in the UK, Rembrandt bonds in the Netherlands.

Eurobonds can be defined as the bonds that are placed in the countries other than the country whose currency the bond is denominated. Contrary to the foreign bonds that are usually sold by the banks (or brokers) who are located in the country where the bonds are issued, Eurobonds are usually underwritten by a multinational syndicate of banks and issued simultaneously in the several capital markets. For example, a US dollar denominated bond sold outside of the US is a Eurobond (Eurodollar Bond), or a DM denominated bond sold outside of Germany is a Eurobond (Euromark bond). The most commonly currency used in the eurobond market is the US dollar, but there are also markets for eurobonds denominated in DM, British pound, Canadian dollar, Swiss franc, or Japanese yen. The other difference between the foreign bonds and the Eurobonds is that most of the countries do not have pre-offering registration or disclosure requirements for eurobond issues.

5.1.1. Foreign Bonds

The foreign bond market is an important part of the international capital markets. The foreign bond market is simply some portion of the domestic bond market that represents the issues of foreign borrowers in the currency of that domestic market. They

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are subject to local laws and sometimes subject to additional restrictions such as queuing system, that is they must wait for their turn to be issued.

The major issuer in the international foreign bond markets are the developed countries and some organizations such as the World Bank, International Development Bank, European Investment bank, Asian and African Developments Banks, and European Union.

From the investors point of view, the advantage of purchasing foreign bonds is the fact that they can make international diversification in their portfolio without taking any risk on the fluctuations of the foreign exchange rates. Since the foreign bonds are the bonds issued and denominated in the currency of a country other than the one in which the issuer is located, investors can be able to buy a foreign company's bond denominated in his/her own currency unit. For example, an American investor is able to buy a bond denominated in US dollar and issued by Toyota in the USA. Since all his/her coupon payments and principal will be paid in US dollars, he/she does not to worry about exchange rate fluctuations between the US dollar and Japanese yen.

Most of the issues in the international bond markets are fixed interest rate bonds. On the other hand, when the interest rates are too volatile it is not uncommon to issue floating rate notes (FRNs). FRNs were firstly issued on the US domestic market and US international FRNs market became the biggest market around the world. The following large markets for FRNs are in British pound, Swiss franc and French franc.

FRNs are usually indexed to inflation, short or long term interest rates, the stock market index or the price of a commodity. For example, the UK government issued bonds in 1981 indexed to the changes in the UK retail price index. The French government issued bonds indexed to the price of gold (gold bonds). Mexican firms used as indexation the price of oil (petro bonds).

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FRNs shows better price stability than the straight bonds. Straight bond prices move opposite to the interest rates. In case of an increase in the interest rates, the price of the straight bonds goes down to maintain competitive yield to maturity. Vice versa in case of a decrease in the interest rates. At the contrary, the price of FRNs does not show same pattern because of the adjustments that is made on the coupon payments according to the interest rate changes. The price volatility of FRNs can be explained by three factors: spread over index, maturity and reset date.

In the Euro-dollar FRN market, for example, the borrowers must offer a spread over the reference interest rate such as LIBOR + 1%. If the borrower is risky, the spread goes wider. For the less risky issuer the spread is usually very small, i.e. 1/8 % or 1/16 %. Any change on the credit standing of the borrower affects the price of outstanding bonds of that borrower.

The other factor that can affect the price of a FRN is the maturity of the note. The long-term FRNs prices are usually more volatile than the short-term FRNs prices. This can be explained firstly by the fact that the spread is not adjusted according to the interest rate changes. The spread is fixed over the life of the bond. Secondly, the credit risk of the issuer is more likely to change over a long time of period. Since the short-term bonds are repaid quicker, they are less sensitive to changes in market yield than the long-term bonds.

The third factor is the reset date of the FRNs coupons. FRNs coupons are rolled over either quarterly, semiannually or annually. A quarterly rollover is the most common application. This makes the coupon fixed at the reset or rollover date until the next reset date. Therefore, the prices of FRNs become more volatile after the reset date because at this time they have the longest fixed coupon maturity.

The other type of most common used foreign bond is the straight bond with simultaneous call and put options. A call option gives right to the issuer to redeem the bond at a preset price earlier

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than the maturity date. When the interest rates goes down, call option gives opportunity to the issuer to call back the bond and issue a new bond with the lower interest rate. The prices of bonds with a call option will not move adversely to the market interest rates changes because of the risk that the issuer will call the bond back.

A put option, at the contrary, gives right to the bondholder (not to the issuer) to redeem the bond at a preset price before the maturity date. In this case, the bondholder will redeem the bond when market interest rates goes up and consequently the price of the bonds goes down. The bondholder can invest his/her money in another bond with a higher interest rate.

There are other options that have been used recently in the international bond markets (Solnik,p204). These are;

-bonds convertible into the common stock of the issuer,

-bonds exchangeable for bonds with longer maturity,

-bonds issued with warrants, i.e., with the option to buy more bonds with the same characteristics at a preset price,

-bonds with warrant for common stock, and

-floating rate bonds convertible into fixed interest rate bonds and vice versa.

5.1.2. Eurobonds

As we mentioned earlier, Eurobonds are the bonds that are offered outside the country of the issuer and outside the country in whose currency the bonds are denominated. The reason of doing this is to avoid some government restrictions on investment in foreign securities. For example, a US firm can issue a bond denominated in British pound and sell it in the Japanese or German capital market. The Eurobond market is free of official regulations, neither regulated nor taxed, and it offers some advantages to the issuers and the purchasers of the bonds. For example, if General Motors issue Eurobonds and sell them outside of US, no tax will be withheld by General Motors in US because these bonds will not be registered

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under the US Securities Act of 1933, and the tax paid by the purchaser will depend on the country of residence.

Most of the Eurobonds are denominated in US dollars and they are called Eurodollar bonds. When they are denominated in Japanese yen, they are called Euroyen bonds. Similarly Eurosterling Bonds or Euromark bonds are available. The Eurobond market is very innovative. The terms of repayment and the basis of calculating the interest can be varied to suit the particular needs of issuers and investors. The different type of issue include:

- Euro straights: they carry a fixed rate of interest (fixed-rate coupon bonds).
- Zero-coupon bonds: they carry no periodic coupon rate payments during the life of the bond, the principal and the interest payments are made at the maturity.
- Deferred-interest bonds: they are issued at a substantial discount (deep- discounted) and do not pay interest for an initial period, most common from three to seven years.
- Step-up bonds: they carry coupon rate payments. However, the coupon rate is low in the beginning and increases (steps up) to a higher rate after the initial period.
- Convertible bonds: they carry the option of conversion into another asset at a preset price after a certain date. Most commonly, they are equity convertible.
- Dual-currency bonds: they pay the coupon interest in one currency but pay the principal in another currency.
- Indexed bonds: their value is linked to a commodity (gold, silver or crude oil), or a currency which is different than the issued one.
- Floating rate notes: they are issued on the basis that the coupon interest will be reset periodically based on some reference interest rate such as six month LIBOR.
- Warrants: Eurobonds issued with warrants grant the holder the right to purchase shares (this shares might be

the shares of the issuer or shares of a firm other than the issuer) or another debt obligation of the issuer. In fact, the warrants can be detached from the bond and traded separately.

The Eurobond market has no physical location, but most of the Eurobonds are listed on the Luxembourg stock exchange in order to obtain a public quotation quarterly or annually. The other most common national stock exchange markets are London and Zurich where the Eurobond issues are listed or registered. Unlike the domestic bond markets that are regulated by officials, the Eurobond market is self regulated by the Association of International Bond Dealers (AIBD) created by the Eurobond dealers. Most of the members of the association come from the UK and Switzerland. The AIBD publish rules which govern behavior in the secondary markets. The International Primary Market Association (IPMA) publishes rules which govern behavior in the primary markets. The primary market deals with the placing of newly issued Eurobonds. Since they are issued on an unsecured basis, the market is limited to entities of the highest credit ratings.

Eurobond issues in the primary market are organized by an international bank called the lead manager who invites several co-managers to form the management group after having discussed the terms of the bond (amount, maturity, coupon, and fixed or floating rate) together with the borrower. The mechanics of a Eurobond issue that is placed nearly within tree weeks are as follows:

Announcement day: the management group is responsible to prepare the details of the issue, to set the final conditions of the bond, and to send invitation telex to underwriting group members to underwrite the issue of the bonds and to selling group members to sell the bonds to the public. The invitation telex contains basic issue details in the form of an offering circular or prospectus in preliminary form.

Offering day: seven or ten days after the announcement day the final terms of the issue are fixed and the bonds formally offered to the market on the offering day. The price will have been fixed one day before the lead manager having indicated demand and market conditions. And the price that has been fixed is notified to the underwriting group who has 24 hours to accept or decline.

Closing day: about two weeks after the offering day the subscription is closed on the closing day and the funds are made available to the issuer against delivery of the bonds. After the closing day the Eurobonds can be publicly traded.

A typical timetable for issuing a new Eurobond is shown in the below exhibit (Solnik,1989,p.166).

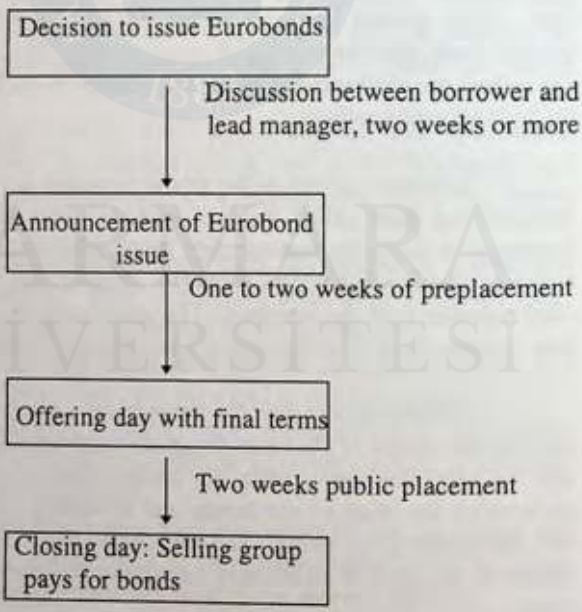

Figure 5- Timetable for Issuing New Eurobond

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Most Eurobonds are bearer bonds, that is the ownership of the bond is evidenced by the fact that you have the bond in your pocket (bearer). Since they are not registered bonds, meaning that they are not registered under the ownership name assigned to the bond serial number, they can be transferred to a new owner without any formality. This feature of the Eurobond makes the bonds more attractive to the investors who want to remain anonymous because of taxes or any other reason. Apart from the private investors who wish to anonymously invest some of his/her wealth in Eurobonds, there are other institutional investors such as insurance companies, pension funds, investment managers, unit trusts, and banks.

The secondary market for Eurobonds operates via telephone and/or other communication systems like the foreign exchange and money markets. There is no centralized location for the market. The dealing can be either spot or forward, although the latter is not so common. The settlement day for spot deals is seven days after the deal is done. Forward deals are done today for settlement at any future date in excess of seven days.

Almost all transactions in the secondary Eurobond market are cleared through one of the two clearing houses, Euroclear in Brussels or Cedel in Luxembourg. Euroclear was found by Morgan Guaranty and Cedel was created by a group of Eurobond traders to compete with Euroclear. These two bodies hold the vast majority of the Eurobonds issued. When a deal is done by two members, they inform Euroclear or Cedel who will effectively initiate the settlement. It is necessary that each member of the Euroclear and Cedel has both bond accounts and cash accounts with these bodies. All transactions are done by computer so that the bonds do not physically move. Euroclear and Cedel charge a clearing fee for each book entry and a custody fee for holding the bonds.

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5.2. *Use of Swaps in International Bond Markets*

The Eurobond market is directly linked to the swap market where the bond issuer assures that the bonds will be easily replaced with another type of bonds or/and with another currency which is more desirable. In order to achieve the desirable position various types of swap agreements can be executed. Most popular ones are interest rate swaps and currency swaps.

An interest rate swap allows an international bond issuer to exchange the coupon interest payments in the same currency but in another type of interest payments. The most common one is to exchange fixed-rate to a floating rate or vice versa. Sometimes, the firms that issue bonds in the international bond markets are better able to issue one type of bond than another. Consider the information given below for two firms who want to issue bonds:

Firm	Objective	Cost of Fixed-rate bonds	Cost of Floating-rate bonds
[AAA Firm]	Issue Floating-rate bonds	12 %	LIBOR+ 1 %
[BBBFirm]	Issue Fixed-rate bonds	14 %	LIBOR+ 2 %

Since the BBB firm has higher default risk, the cost of the funds are higher than the AAA firm. BBB firm would pay 2 % more on fixed-rate bonds and 1 % more on floating rate bonds. In this case, although the BBB firm's objective is to issue fixed-rate bonds, it is in its advantage to issue floating-rate bonds. These two firms can arrange an interest rate swap, in which BBB firm issues floating-rate bonds while AAA firm issues fixed-rate bonds, and then they swap the interest payments.

Assume that in the swap agreement it is indicated that BBB firm will pay fixed interest of 13.5 % to AAA firm, and AAA firm will pay, in exchange, Floating-rate of LIBOR+ 2 % to BBB firm.

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Both firms benefit from this transaction. BBB firm benefits because the floating-rate payments cover the payments to the bondholders, and the fixed-rate payments are 0.5 % less than what they would be if the firm issued fixed-rate bonds (14 % - 13.5 % = 0.5 %). AAA firm benefits because the fixed payments received from BBB firm are 1.5 % higher than the 12 % paid to the bondholders (13.5 % - 12 % = 1.5 %). Although AAA firm pays floating-rate payments of 1 % more than what it would if the firm issued floating-rate bonds, AAA firm can still enjoy the 0.5 % (1.5% - 1%) net reduction on the financing cost. There are usually intermediary banks who arrange this kind of transactions and in turn they charge a fee. Of course, this fee reduces the benefits of counterparties. This type of swap is illustrated in the below figure;

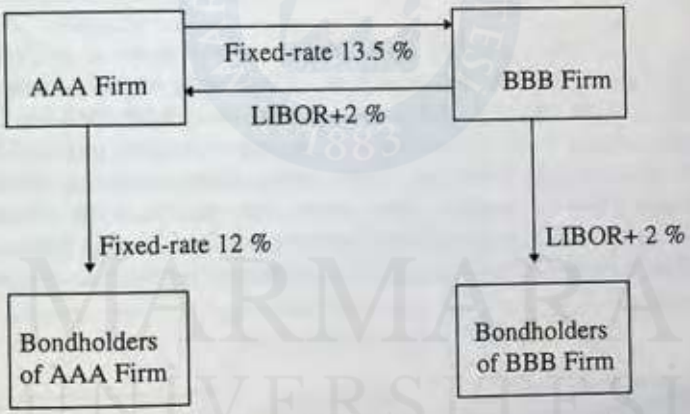

Figure 6-Interest Rate Swap

A currency swap allows an international bond issuer to exchange the currency in which the bond was denominated into another currency. Suppose a French company wanted debt denominated in US dollars for financing its subsidiary in US. One way to get US dollars debt is issue directly dollars bonds, the other way that could be more easier and perhaps less costly for the French company is issue French franc bond and swap it for US dollars debt.

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Currency swaps resemble back-to-back loans and Parallel loans. Back-to-Back loans are loans between two parties in different countries, each of which issue a loan to the other in its respective currency. For example, a US firm would lend dollars to a French firm in return for French firm lending francs to US firm. This is illustrated in the below figure:

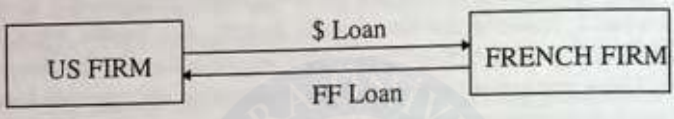

Figure 7- Back-to-Back Loans

Under a parallel loan, there are two firms in different countries involved in the transaction and both they have a subsidiary in the other's country. Instead of financing their subsidiaries in the local currency where the subsidiary is settled and be open to the foreign exchange risk, they finance each other's subsidiaries. For example, the US parent firm would lend dollars to the French subsidiary in US in return for French parent firm lending francs to US firm's subsidiary in France. This is illustrated in the below figure:

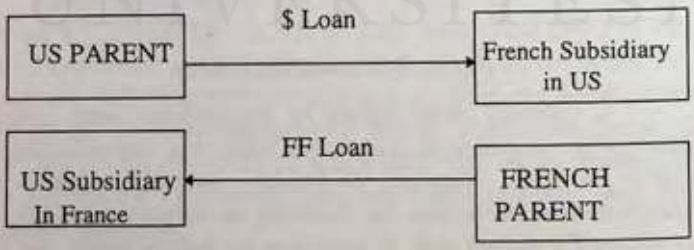

Figure 8- Parallel Loan

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Currency swap involves counterparty (X) exchanging fixed rate interest in one currency with counterparty (Y) in return for fixed rate interest in another currency. This is called fixed rate currency swap and involves three basic steps: the first step is the initial exchange of principal. In this step the counterparties exchange the principals at an agreed rate of exchange. This exchange might be physical exchange of the principals or on a notional basis meaning no physical exchange of the principals. The second step is the ongoing exchange of interest. In this step the counterparties exchange interest payments on agreed dates. The third step is the re-exchange of principals at maturity.(Buckly,1992, p.231)

Currency swap transactions might be set up in a way that uses a combination of interest rate swap and fixed rate currency swap called currency coupon swap. This kind of swap involves an exchange of fixed rate interest in one currency for floating rate interest in another currency. The transaction follows the three steps described for the fixed rate currency swap. For example, a firm wants to borrow floating-rate Japanese yen but it has easier access to fixed-rate US dollars market. Another firm wants to borrow fixed-rate US dollars but it has easier access to floating-rate Japanese yen market. The swap market enables them to match with their requirements. The first firm issues fixed-rate US dollars bond and the second issues floating-rate yen bond and then, they swap the payments of interests and the principals. Consider the following situation;

Firm	Objective	Limitation
Firm (Y), a US Co.	Borrow Japanese yen	Japanese investors are not familiar with Firm (X)
Firm (X), a Japanese Co.	Borrow US Dollars	US investors are not familiar with Firm (Y)

In this case, firm (X) will issue floating rate yen bonds, and firm (Y) fixed-rate US dollars bonds. They will consult an intermediary bank to help to arrange a swap agreement and they will exchange the

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payments of interest and the principals. This is illustrated in the below figure.

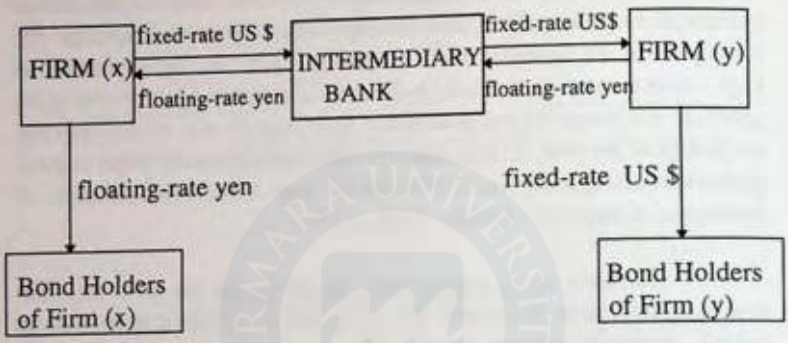

Figure 9- A Swap Transaction

Most of the Eurobond issues are driven by swap agreements. They are usually used by firms to manage the currency and interest rate exposure of their assets and liabilities as well as speculation and lower cost funding. The minimum size of the contracts is nearly US$ 3 million so that they are not attractive for the average investors. The typical contract is arranged for the period of two to ten years.

Currency swaps can be arranged in most major currencies against the US dollar, but it is possible to arrange a swap with two currencies other than the US dollar.

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6. *INTERNATIONAL STOCK MARKETS*

After the liberalization of capital markets, foreign stock markets become more accessible to investors and issuers. But, there are some differences on legal and physical organizations as well as transaction and accounting methods among national stock markets so that an international investor must be familiar with those differences. Basically, three different types of market structure can be defined;

- the public stock exchange markets,
- the private stock exchange markets,
- and, the semipublic stock exchange markets.

In a public stock exchange market usually the number of brokerage firms is fixed and they are appointed by the government. The commissions that can be charged by the brokerage firms are set by the Ministry of Finance. The Paris Bourse is a good example of this type of stock exchange market where the brokerage firms have a monopoly. All transactions must go through those brokerage firms. Even the private deals between two parties must be registered by a broker and a commission must be paid.

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The private stock exchange corporations are founded by independent members in order to trade stocks as in the US, Canada, Australia, Japan and South Africa. For example, The New York Stock Exchange (NYSE) corporation has 1.366 full members. The corporation has some rules and regulations related to the operations of its members. It has a board of 26 directors that is elected by the members. In order to have a seat in NYSE the applicant must pass a written examination, be sponsored by at least two current members, and be approved by the board. The seats must be purchased from a current member.

The third type of the stock exchange market is the semi-public bourses as in Turkey. The Istanbul Stock Exchange Market (IMKB) has its own budget and corporate identity, but on the other hand it is under the supervision of the capital market Board (SPK). The Capital Market Board has set up all the rules and regulations for the members of the stock exchange as well as the commissions that can be charged by the brokerage companies. In order to become a member of the exchange, a permission given by the board is required.

Foreign stock markets are useful both for issuers of the stocks and the investors. We will present the reasons of both users of the international stock market.

6.1. Use of Foreign Stock Markets By Issuers

Firms in need of financing sometimes use foreign stock markets to raise some additional funds. The reasons behind this can be summarized as follows;(Tucker, Madura, Chiang. p.157)

1. This option provides the companies to raise more funds without flooding the home market with their stocks. In this way they can avoid large declines in the market price of the stocks.

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2. Some certain markets made their reputation on a particular type of stock so that the firms willing to issue that particular stock should go to this market. For example, the US market is the only market that is developed for preferred stocks.
3. The other reason that the companies go to international stock markets is to avoid some regulatory requirements in their home market and to take advantage of differences in tax laws.
4. Issuing stocks in foreign markets help companies to have an international recognition. They can increase their visibility and reputation worldwide which enables them to raise financing more easily on both national and international financial markets.
5. The more internationalized firms need funds in foreign exchange than the ones working locally. These firms can achieve such objective by issuing stocks in foreign markets.

In 1986, a major deregulatory event occurred in the London Stock Exchange Market called the "Big Bang". A computerized network system similar to the NASDAQ system (called SEAQ, Stock Exchange Automated Quotations) was created and permitted US and Japanese investment firms to trade on the system. Tokyo Stock Exchange created CORES (Computer-assisted Order Routing and Execution System) in 1982, and in order to admit foreign firms as members, FORES (Floor Order Routing and Execution System) was introduced in 1990. These developments created a nearly 24-hour trading, given the time zone differences between London, New York and Tokyo. The New York Stock Exchange market works from 9.30 A.M. to 4 P.M. Eastern time, the London Stock Exchange market from 4 A.M. to 10.30 A.M. Eastern time, and the Tokyo Stock Exchange from 7 P.M. to 1 A.M. Eastern time. In NYSE, the SEC recently permitted after-hours trading during which stocks trade at the closing price of the day. Stocks that are listed on each market could be sold or bought almost any time of the day. Many multinational companies are listed on several stock markets around the world.

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6.2. *Use of Foreign Stock Markets By Investors*

For an international investor there are several alternatives when they want to buy foreign stocks (Solnik, p.107). First alternative is to check whether or not the foreign stock is listed on the local stock exchange market. If this is the case, he/she can buy the stock more conveniently and less costly in his/her local market. Second alternative is to check on whether or not some local institutions make a market in the foreign stock. For example, in the US and Britain there are OTC markets maintained by the brokers for foreign stocks. The third alternative is to buy the stocks directly on the foreign stock market where the stock originally was issued. To make a choice between those alternatives will depend on the transaction cost, taxes, administrative costs and the price levels between the markets.

The gains from the foreign investments may be taxed on one of the two locations, either in the home country or in the foreign country where the investment is done. The taxes may be applied on transactions, capital gains, and/or other incomes such as dividends. Some countries charge a fixed tax for every transaction, in some others tax is proportional to the amount of the transaction or to the commission charged by the brokers. Capital gains are usually taxed in the home country of the investor. Income on foreign stocks such as dividends often poses conflict of jurisdiction. Withholding taxes are usually charged from foreign investors income where they have received this income. This tax is levied on dividend payments. On the other hand, many international investors are also taxed in their home country. To avoid dual taxation, international investor receives a dividend net of withholding tax plus a tax credit from the foreign tax authority. International tax treaties allow investors to claim foreign withholding tax as a tax credit against income taxes paid at home. The tax authority in the home country imposes the tax on the gross foreign dividends, but the amount of this tax is reduced by the withholding tax credit. For example, if a US investor earns dividends in Canada and has 15% withheld in Canada on his/her income, and

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the investor is in a 30% tax bracket in the US, the US tax payable will be reduced to 15 % after credit for the other 15% is given.

The other important aspect in an international investment is the different applications on commissions charged by the brokers. Commissions are different in every market. In US, Canada and Australia they are fully negotiable, in other countries they are often fixed by governments or other authorities such as stock exchange and capital market board.

6.3. *Benefits From International Diversification*

Since international capital markets have not yet been fully integrated, international diversification helps to improve the risk-adjusted performance of a portfolio. If we assume that various capital markets of the world have independent price behavior, international investments lower risks without sacrificing expected returns. The degree of independence is linked to the independence of a nation's economy and government policies. And, rules and regulations imposed by the local authorities, technological specialization, cultural and sociological differences play an important role on the degree of independence of a nation's capital market. However, it can not be denied that there are some common world factors affecting expected cash flows of all firms around the world. In a way, all capital markets move together to some extend, but their high degree of independence leaves ample room for risk diversification.

There are two main arguments against foreign investments. One is that the volatility of foreign markets might be higher than the domestic market. However, adding more risky foreign assets in a domestic portfolio can still reduce the total risk of the portfolio as long as the correlation is not large between the foreign asset and the domestic market. For example, assume that the foreign stock has a standard deviation of 15 %, while the domestic stock has only 10 % . If the correlation coefficient is R= - 0.20 between these two stocks,

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the variance of the total portfolio equally invested in both assets, is given by

$$\text{Var.}(r_p) = 0.50^2 \{ \sigma^2_d + \sigma^2_f + (2 R \sigma_d \sigma_f) \}$$

$$\text{Var.}(r_p) = 0.25 \{ 100 + 225 + (2 \times -0.20 \times 150) \} = 66.25.$$

The standard deviation of the portfolio is $\sqrt{66.25} = 8.13$ %, which is lower than the domestic stock's standard deviation of 10 %. By using several foreign stocks, the total risk of the portfolio can be reduced further.

Solnik (1974) studied the risk reduction character of the international diversification using actual stocks instead of stock market indices that had been used in earlier studies. He found that with a well diversified international portfolio risk reduction can be done much faster than the purely domestic portfolio as shown in the below figure.

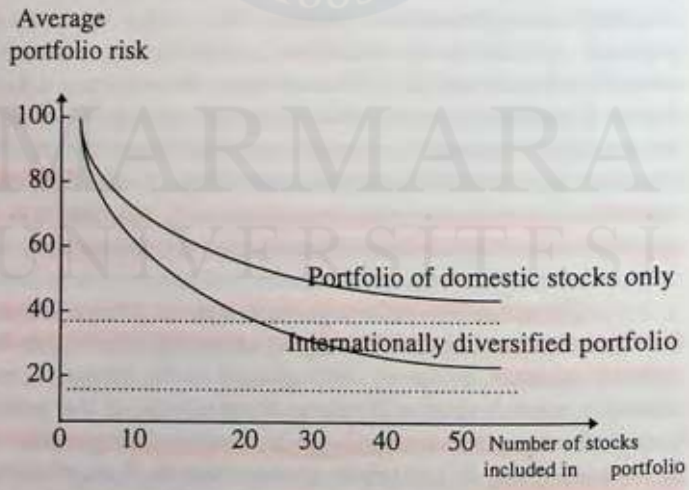

Figure 10- The Benefits of International Diversification

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Solnik showed that the degree of risk reduction was clearly greater than a purely domestic portfolio when including international stocks in the portfolio. In the figure 100% represents the risk of a single domestic (US) stock. When more domestic stocks are added to the portfolio the risk of the portfolio is reduced. As it is shown in the figure, after 40 or 50 stocks addition of new domestic stocks to the portfolio provides little reduction in risk. Adding foreign stocks to the portfolio reduces risk much faster than the purely domestic portfolio as can be seen from the bottom curve. In Solnic's research, a well diversified international portfolio exhibited less than one-half the variability of a well diversified domestic portfolio.

The second argument against international diversification is the possibility of added risk from unanticipated changes in exchange rate. This additional risk might offset the reduction in stock risks achieved by international diversification. Therefore, we should consider whether the gains from international diversification more than compensate for the risk introduced by exchange rates. There are several reasons not to avoid international diversification for the investors. The first reason is the fact that market risks and foreign exchange risks are not additive because of the imperfect correlation between returns on stocks and foreign exchange. This implies that the total risk of the internationally diversified portfolio will be less than the amount of the market risk plus foreign exchange risk since the correlation coefficient is smaller than 1. The second reason why international diversification is not to avoid is that the exchange risk may be hedged in the forward market by a forward contract, by borrowing in the money markets, or by using futures or currency options. A third reason why international diversification is beneficial despite foreign exchange risk is that some part of the foreign exchange risk might be diversified by the currency cocktail used in the portfolio.

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6.4. *International Stock Market Instruments*

As we mentioned before, there are several methods to achieve international diversification;

- Direct investment in foreign stocks
- American depository receipts (ADRs) for American investors
- International mutual funds.

6.4.1. Direct Investment in Foreign Stocks

Foreign stocks are sometimes purchased directly by individuals and institutional investors. Even thought this way might be more costly than the other methods, some investors who are interested in international diversification need an alternative method. In this case, the international investor must be familiar with the different organization and trading system, different commissions and tax applications at the foreign stock market where he is thinking to buy the stock.

The most important thing in the international stock trading is the settlement since the settlement process operates on a local basis. Every market has its own underlying mechanisms and settlement cycles and sometimes this causes difficulties to the international investors. For example, in the US there is a central depository facility (DTC) which has done away with the transfer of paper. All transactions are recorded in a book entry transfer system and the settlement cycle is 5 day rolling. The system in the UK is the paper bound system, that is, settlement takes place depending on the time of the year. In Japan the settlement process is based on a 4 day cycle with no allowance for Saturday trading. In Hong-Kong settlement takes place within 24 hours. In addition communication lines can cause some difficulties and consequently fails in trade can occur.

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6.4.2. American Depository Receipts (ADRs)

The other form of international stock known is the depository receipts. American Depository Receipts are most widely used and known depository receipts. There are other forms of depository receipts, but the process is the same. They are negotiable certificates representing ownership of foreign stocks. The creation of depository receipts results from the sale of a non domestic stock to a domestic investor who wants to retain that stock in a local currency denominated form.

In the US foreign shares are usually traded through American Depository Receipts. Originally, the idea of trading ADRs comes from the Morgan Guarantee Bank, but other leading banks such as Citibank, Bank of New York and Chase Manhattan are involved in the trade of ADRs. They are issued by an American bank in the United States representing a foreign stock which is held in trust at a custodian bank in the foreign country. An ADR typically represents 1 to 10 shares of the underlying stock. This makes it easier for ADRs to trade in an appropriate price range even if the price of the stock is inappropriate when converted to US dollars. For example, since Japanese stocks are usually priced at only a few yen per stock, therefore they are combined into lots of 100 or more so that their value is in the range of a typical US stock price. Dividends paid by the foreign firm are received by a depository bank and transferred to the investors in return of a fee charged by the bank. ADRs might be issued in two forms: "sponsored" or "unsponsored". In the sponsored form the foreign firm who wants its stocks traded in the US, applies to the Securities and Exchange Commission (SEC) and a US bank for registration and issuance of ADRs. In the unsponsored form, a US securities firm may initiate creation of the ADRs since the foreign firm does not want its stocks traded in the US.

Although there are considerable large amount of ADRs listed in the New York Stock Exchange, most of the ADRs are still traded in the over the counter market. Trading in the relatively

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unregulated over the counter market gives an advantage to foreign firms for reducing listing fees and the information that they must report. Porsche from Germany, Hachette from France, Phillips lamp from the Netherlands, Jaguar from the UK are most famous firms in the US which issued ADRs. The foreign firms represented by ADRs are required by SEC to file financial statements consistent with the generally accepted accounting principals in the US. On the other hand, some of the reporting rules are looser for the foreign firms. For example, they need to provide financial reports only semiannually, and are not required to disclose salaries of top management.

6.4.3. International Mutual Funds

It is clear that the most efficient method of diversifying internationally is to invest in an International Mutual Fund. Because they are managed by the sponsoring investment firm's portfolio managers, the investor does not need to control the investment performance. There are several kinds of international mutual funds from which the investor can choose. Some include stocks from all stock markets, others focus on a specific country or continent. For example, Fidelity offers the following IMFs;

- Fidelity Overseas Fund, representing stocks all over the world
- Fidelity Pacific Basin Fund, representing stocks in Hong Kong, Japan, Singapore, Australia and other Far East countries.
- Fidelity Europe Fund, representing stocks in Europe
- Fidelity United Kingdom Fund, representing stocks in the UK
- Fidelity Canada Fund, representing stocks in Canada
- Fidelity International Growth and Income Fund, representing stocks and bonds mostly outside the US.

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7. THE OPTIONS MARKETS

7.1. The Market and The Trading Mechanism

With the creation of the Chicago Board of Options Exchange (CBOE) in April 1973, the market in listed options has provided investors and traders with a wealth of new, strategic opportunities for managing their investments. Before this date, the options contracts were arranged privately between two parties and they were not standardized contracts. Since it was very difficult to find someone to take over the specific option contract, there was no or little secondary market activities. With the listed or traded options system introduced by the CBOE, the options market developed rapidly and expanded worldwide.

The key factor for standardizing the contracts was to build up an options clearing house. The clearing house steps into the transaction and breaks down the deal into two option contracts, one between the buyer and the clearing house and the other between the

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seller and the clearing house. In the first one the clearing house acts as seller, in the latter the clearing house acts as buyer. This procedure allows the investors to close a position by simply making a reverse transaction before the expiration date. If the buyer wants to exercise the option, the clearing house randomly selects a seller of the option and issues an exercise notice to him or her.

The trade mechanics in the option markets is shown in the below exhibit.

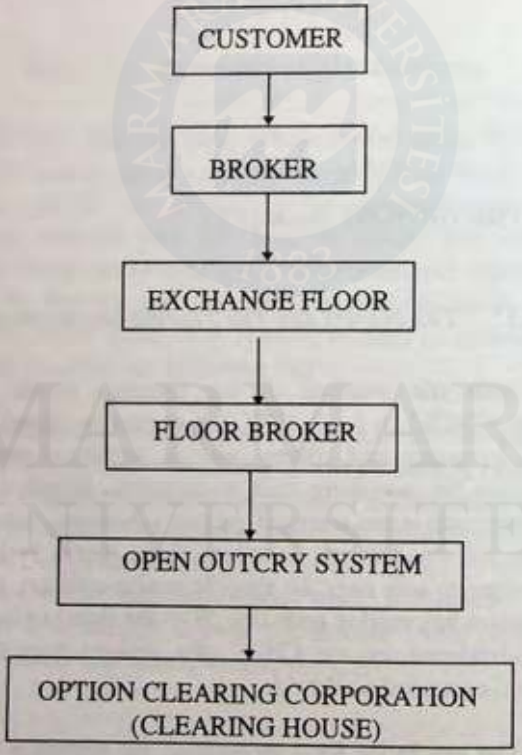

Figure 11- The trade mechanics in the option markets

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The customer gives the order to buy or to sell a specific option to his broker. The broker company transmits this order to the appropriate exchange floor, such as

- The Chicago Board of Option Exchange (CBOE)
- Philadelphia Stock Exchange (PHLX)
- American Stock Exchange (AMEX)
- Pacific Stock Exchange (PSE).

In the exchange floor a "runner" conveys the order to a floor broker who represents the brokerage company. The floor broker attempts to obtain the best price possible through an open outcry system. Once the trade occurs, the option clearing corporation (clearing house) is notified. The clearing house serves as intermediary between every option writer and every option buyer.

7.2. *The Principles of an Option*

An option can be defined as the right to buy or sell a particular asset at a certain price for a limited time of period. The asset in question is called the *underlying asset* which could be a commodity, a currency, a bond or a stock. A *call option* gives the owner the right to buy the underlying asset, while a *put option* gives the owner the right to sell the underlying asset with a predetermined price for a limited period of time. The price at which the underlying asset may be sold or bought is the *exercise price*, also called the *striking price* (In the listed option markets these two terms are used synonymously). In other words, it is the prespecified price at which an option can be exercised. Since the options can be used for a limited time of period, they have an *expiration date.* The *expiration date* is the last date at which an option can be exercised. We should note, however, the difference between the European and American type of options. *European options* may be exercised only at the expiration date, while the *American options* may be exercised any time on or before the expiration date. Thus, American options

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command a greater price than the similar European options. The price difference is called *early exercise premium.*

As a result, in an any kind of option contract four specifications can be described;

1.the type of the option (put or call)
2.the underlying asset
3.the expiration date, and
4.the exercise price.

An option buyer has the right, but not the obligation, to exercise the contract. The seller or writer of the option contract is subordinate to the decision of the buyer. Since the buyer exercises the option only if it is profitable to him or her, option contracts have one sided risk and return. The buyer of a call option benefits if the price of the underlying asset is above the exercise price at expiration date. The buyer of a put option benefits if the underlying asset's price is below the exercise price at expiration date. Consequently, option buyers' potential losses are limited to the *premiums* (the price of the option) paid while their potential gains can be unlimited. The option premium is the amount paid by the option buyer to the option seller or the writer at the time of contracting. Conversely, the profits of the option writers are limited to the premiums received while their potential losses can be unlimited.

An option has an initial value that declines as time passes. The price of an option fluctuates as the price of the underlying asset rises or falls. If the value of the option rises, the buyer of the option who is the purchaser of a call or put option will realize a profit by selling the option at a price above the purchase price. If the value of the option falls, the buyer will realize a profit by buying, or canceling, the option at a price below the original sales price.

If the underlying asset's price is lower than the exercise price, the call option is said to be *out-of-the-money*. A rational option buyer would never exercise the option when it is out-of-the-money

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because he or she will lose money. If the underlying asset's price is higher than a call's exercise price, the call is said to be *in-the-money*. The buyer would like to exercise the option when it is in-the-money. Of course this is only valid for the American type of options where the buyer can exercise the option any time before expiration. If the underlying asset's price is close to the exercise price the call option is said to be *at-the-money* or *near-the-money*. When an option is at-the-money, its buyer does not exercise the option, because there is nothing to gain by its exercise. Obviously, as far as put options are concerned the above mentioned definitions of in-the-money and out-of-the-money will be reversed.

Another distinction that is made is the difference between *naked* and *covered* options. If a call is sold on an underlying asset which the writer (seller) does not own, the call is said to be a *naked call*. If the call is sold on an underlying asset which the writer owns, the call is said to be a *covered call*. Put options can also be naked or covered depending on the writer's position in the underlying asset.

Other terms used in the context of options are *long the option* and *short the option*. The party who buys an option is long the option and option writers are said to be short the option.

7.3. The Position Graphs for Call Options

An investor who thinks the underlying asset's price will rise may buy a call option. Such an investor is said to have a long call position. If the underlying asset's price falls opposite to his/her expectations, no more than the premium can be lost. But, if his/her expectations realize the profit will be as much as the price increase of the underlying asset. The profit and loss implications of buying a call option can be shown in the below figure which shows the relationship of profit from a position, if held to expiration, to the underlying asset's price at expiration.

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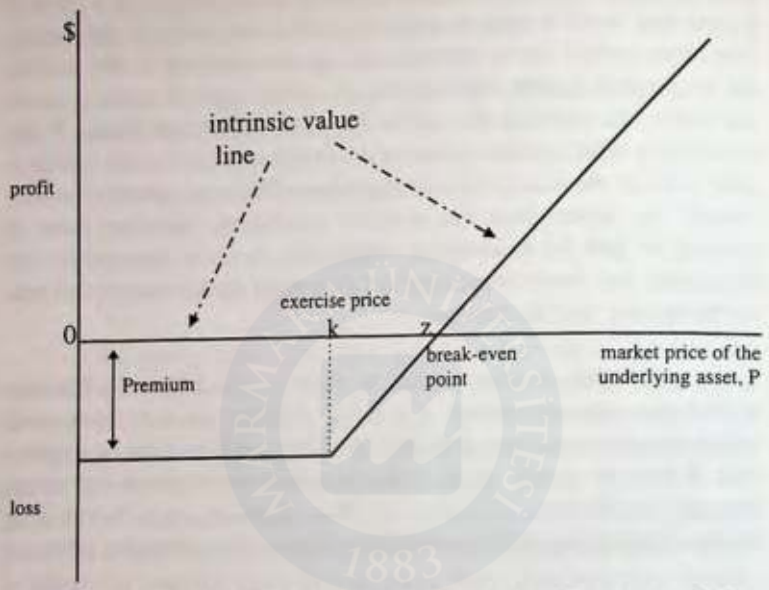

Figure 12- The Profit and Loss Implications of Buying a Call Option

As we mentioned before, a purchased call is like a long position in the underlying asset, except that it has the advantage of insurance against extreme decrease in the market price of the underlying asset. It can be easily seen from the graph that the maximum loss is the amount of the premium paid and this is constant for any price of the underlying asset below the exercise price. If this is the case, the option will not be exercised since it is possible to obtain the asset in the outside market at a price less than the exercise price of the option. If the market price of the underlying asset moves above the exercise price, then the option gradually increases in value and the potential profit is unlimited.

By contrast the profit profile of the call writer (seller) illustrated in the below exhibit shows that the maximum profit which can be made, is fixed by the premium received if the price of the

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underlying asset falls below the exercise price. If the price of the underlying asset rises above the exercise price, the probability of the option being exercised by the buyer increases and the loss potential is infinite.

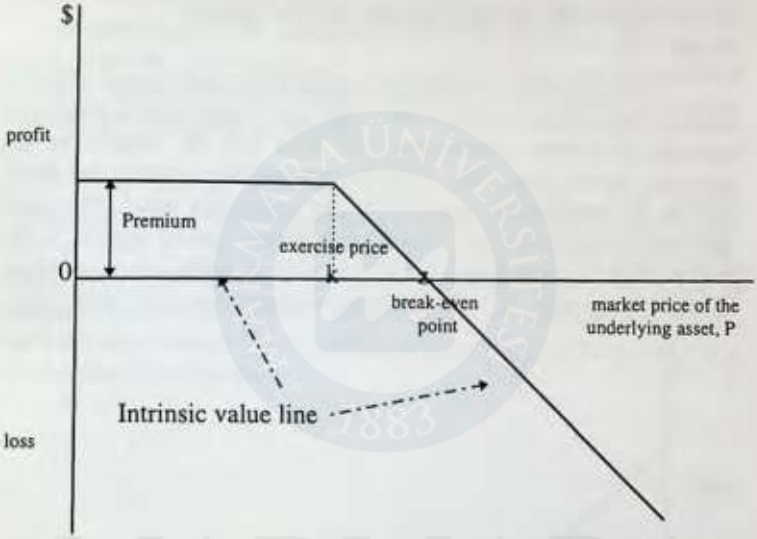

Figure 13- The Profit Profile of The Call Writer

The parallel line above the horizontal axis shows profit for the call writer, who gets the premium for doing nothing as long as the market price of the underlying asset does not rise above the exercise price. If the price rises above the exercise price (P>k), the call buyer will like to exercise the option and the amount of the loss for the writer will increase as much as the price increase of the underlying asset.

We can see from both diagrams that the profit and loss structures on these two positions exactly mirror each other because, any dollar gain for the option buyer will be the loss of the option

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writer. From the risk point of view that is taken in an option contract, the buyer risks losing the premium, but the writer of the same option bears the risk of an almost unlimited loss.

7.4. The Position Graphs for Put Options

An investor who thinks the underlying asset's price will fall, can buy a put option in this asset. If the underlying asset's price rises opposite to his/her expectation, the loss will be limited to the premium he/she paid. But, if his/her expectations realize the profit will be as much as the price fall of the underlying asset. The profit and loss implications of buying a put option can be shown in the below exhibit which shows the relationship of profit from a position if held to expiration, to the underlying asset price at expiration.

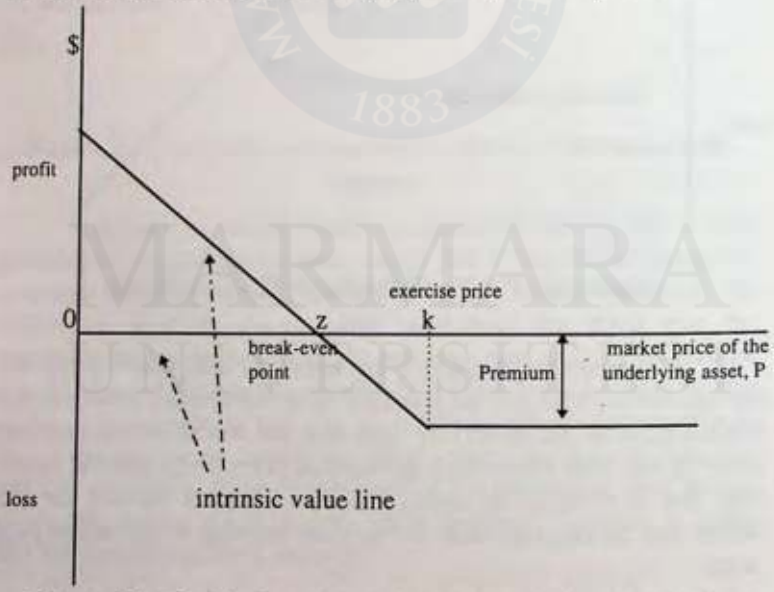

Figure 14- The Profit and Loss Implications of Buying a Put Option

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It can easily be seen from the graph that the maximum loss is the amount of the premium paid and this is constant for any price of the underlying asset above the exercise price. If this is the case, the option will not be exercised since it is possible to sell the asset in the outside market at a price higher than the exercise price of the option. If the market price of underlying asset moves below the exercise price, then the option gradually increases in value and the potential profit is as much as the difference between market price of the asset and the exercise price of the option.

By contrast the profit profile of the call writer (seller) illustrated in the figure below shows that the maximum profit which can be made is fixed by the premium received if the price of the underlying asset increases above the exercise price. If the price of underlying asset falls below the exercise price, the probability of the option being exercised by the buyer increases and the loss potential is as much as the price fall.

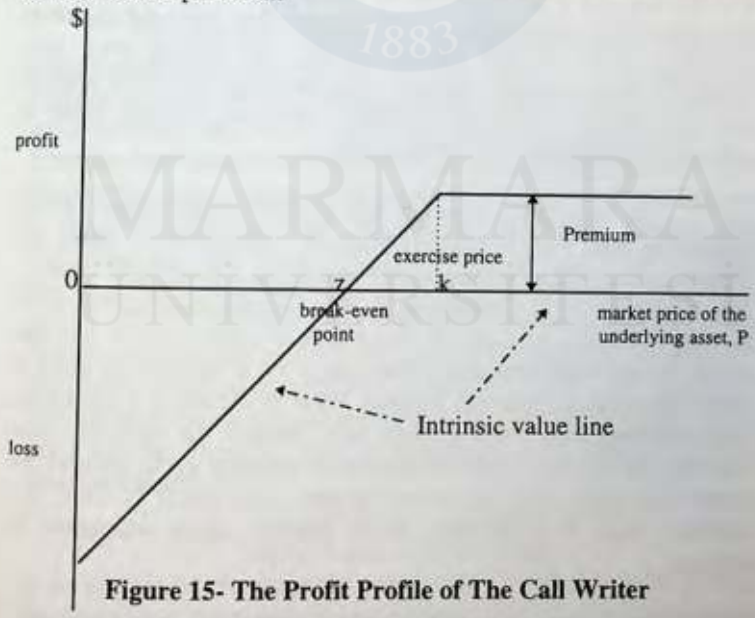

Figure 15- The Profit Profile of The Call Writer

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The parallel line above the horizontal axis shows profit for the call writer, who gets the premium for doing nothing as long as the market price of the underlying asset does not fall below the exercise price. If the price falls below the exercise price (k>P), the call buyer will like to exercise the option and the amount of the loss for the writer will increase as much as the price fall of the underlying asset.

We can see from both diagrams again that the profit and loss structures on these two positions exactly mirror each other because any dollar gain for the option buyer will be the loss of the option writer.

7.5. The Option Price and Valuation Models

The option has a price that must be paid at the time of constructing. The price of an option, called premium, fluctuates over time depending on the volume of the underlying asset and the other variables which we will discuss further. The option price is a reflection of the option's intrinsic value and any additional amount over the intrinsic value. The premium over the intrinsic value is referred to as the time value of the option.

The difference between the current market price of the underlying asset and the exercise price of a call option is called the *intrinsic value* of the option which is subject to a lower limit of zero. When the price of the underlying asset is less than the exercise price the intrinsic value is zero (the line between exercise price and the origin on the horizontal axis).When the price of underlying asset is above the exercise price the intrinsic value is shown by a 45-degree line extending from the horizontal axis, because the intrinsic value increases by the same dollar amount as the increase in the price of the underlying asset (the slope of the intrinsic value line is 1). Thus, the intrinsic value is either zero or the quantity (P-k), whichever is greater.

Intrinsic Value = current price of the underlying asset - exercise price of the option

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= P - k
= Max (0, P-k)

If the exercise price is more favorable to the buyer than the current market price of the underlying asset (P>k), the buyer can make an immediate profit by exercising the option and selling spot. The option must therefore be worth at least as much as this profit.

The intrinsic value of a put option, that is what a put is worth if it is held until maturity, equals either zero or the excess of the puts exercise price over the price of the optioned asset, whichever is greater. When a put option has a positive intrinsic value, it is said to be in-the-money.

Intrinsic Value = exercise price of the option - current price of the underlying asset
= k - P
= Max (0, k-P)

The difference between the option premium and the intrinsic value is called the *time value* of the call option. This represents the component of the option premium value which exceeds the intrinsic value of the option. Time value of the option can be considered as a premium that would be charged for the risk that the price will move against the option writer in the period left before the option expires. It is normal that the time value of the option will decline near expiration date and finally disappears. This decline is not a straight line, it is more rapid nearer to the expiration date. This relationship can be seen in the below exhibit. Note that the slope (usually called delta,δ) of a tangent to the curve gives the instantaneous reaction of the option premium to a change in the underlying asset price. The tangent line can be used to estimate what the change in the option price will be when the price of underlying asset changes. Delta is measured as follows:

$$\text{Delta} = \frac{\text{change in price of call option}}{\text{change in price of underlying asset}}$$

If the delta is 0.6, for example, means that a $1 change in the price of the underlying asset will cause a change of $0.60 in the price of the

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call option. When the price of the underlying asset is well below the exercise price the delta will be close to zero and when it is well above the exercise price the delta will be close to 1.

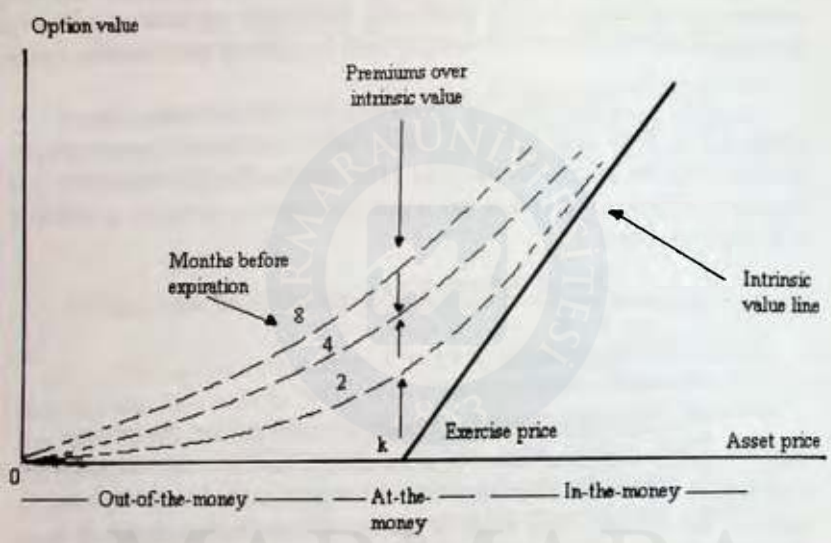

Figure 16- The Relationship Between Time Value and Intrinsic Value for a Call Option

Option premiums vary with the underlying asset prices along the curves similar to those shown in the above exhibit. If the underlying asset's price is very low relative to the exercise price, the intrinsic value of the option is zero and the time value is close to zero since the option will not be exercised in this condition. If the underlying asset's price is very high relative to the exercise price, the option premium will be almost equal to the option's intrinsic value since it is sure that the option will be exercised at expiration. Therefore, the time value will be close to zero in this condition. If the underlying asset's price is near to the exercise price the time value of

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the option will be very large and the premium will be well above its intrinsic value.

The time value of a put, that is the premium over intrinsic value, is largest at the point where the market price of the underlying asset is equal to the exercise price of the put option (P = k). This relationship can be seen in the below exhibit.

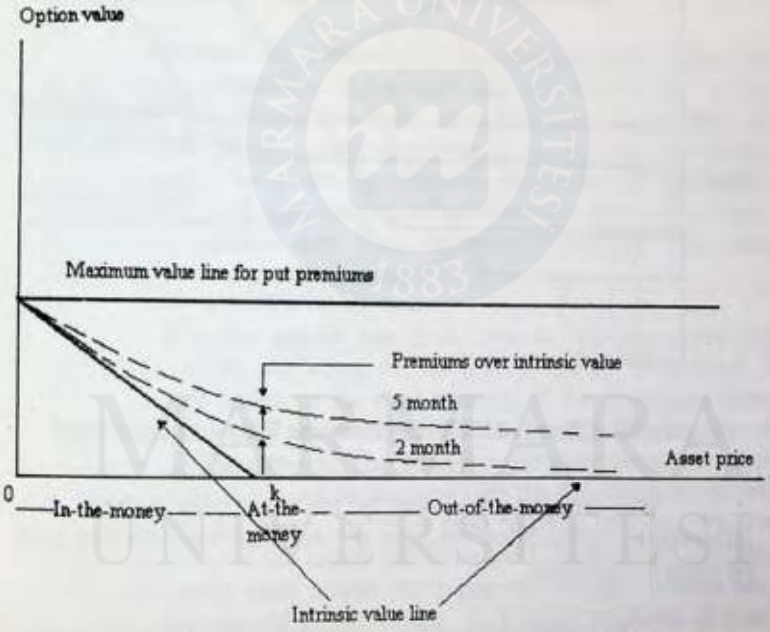

Figure 17- The Relationship Between Time Value and Intrinsic Value for a Put Option

We can conclude that the value of an option depends critically on the exercise price of the option (k), relative to its current

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asset price (P). The higher the exercise price, the lower the premium for options on the same underlying asset that have an identical expiration date. Effects of differing exercise prices on premiums to be paid can be shown as it is in the below exhibit.

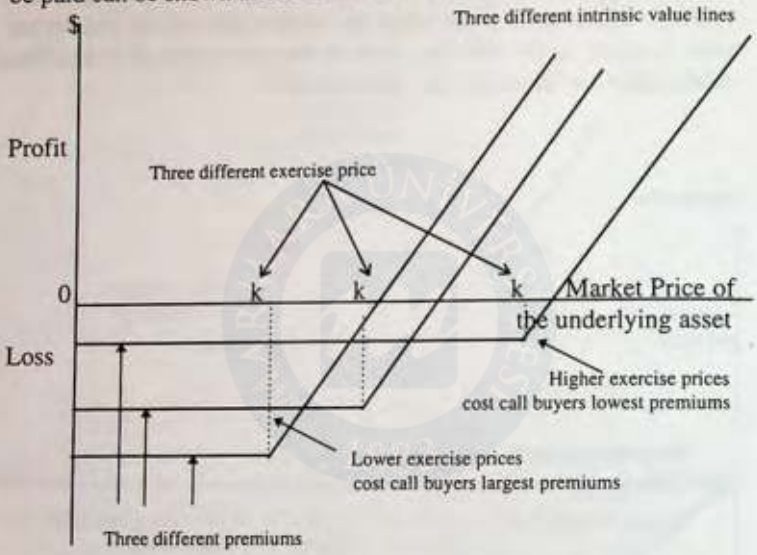

Figure 18- Effects of Differing Exercise Prices on Premiums

The exercise price may be the most critical factor that influences an option price, but there are also other variables that must be taken into account;

- The current price of the underlying asset: The option price will change as the price of underlying asset changes. For a call option, for example if the price of underlying asset increases, the option price will increase as well, because the intrinsic value of the option increases. Vice versa in the case of a put option. If the price of underlying asset increases, the price of a put option will decrease.

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-Time to expiration of the option: The value of an option is an increasing function of the time to expiration, because an option is a wasting asset, meaning that the option has no value after its expiration date. Consequently, the longer the time to expiration date, the greater the option price. There are two reasons for this. First, as the time to expiration decreases, less time remains for the underlying asset's price to rise for a call option buyer or to fall for a put option buyer. Therefore, for American options the option price approaches its intrinsic value near to the expiration date. Second, the leveraging advantage increases with time.

- Expected price volatility of the underlying asset: The value of an option increases with the high volatility of the price of the underlying asset. Since the buyer can never lose more than the premium paid, he/she would be willing to pay for such an option. This is because the greater the volatility, the greater the probability that the price of the underlying asset will move in favor of the buyer before the expiration date. Thus, the more volatile the underlying asset's price, the larger the premium paid.

- Risk-free interest rate: If an investor buys the underlying asset itself, he/she will tie-up his/her money. On the other hand, if he/she buys an option on the same quantity of the underlying asset, he/she will pay only the premium of the option which is a much smaller capital investment. The difference between the actual stock price and the premium can be invested with the risk-free interest rate. Consequently, the higher the short term risk-free interest rate, the more attractive the call option will be relative to the direct purchase of the underlying asset. Hence, the higher the risk-free interest rate, the greater the price of the call option. As a result, the value of a call option is an increasing function of the short term risk-free interest rate.

All the variables which effect an option's price can be measured precisely except the volatility of the underlying asset. The volatility of the underlying asset is measured by the standard

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deviation of the returns and must be estimated either from past data or through other prospective methods.

The most famous and worldwide excepted valuation model is developed by **Black and Scholes** (1973). The Black and Scholes option pricing formula is based on an arbitrage model for a European type of call options given the following assumptions:

1. There are no taxes, transaction costs, or restrictions on short selling;
2. The underlying asset exhibits no dividends or other leakages;
3. Returns on the underlying asset follows a normal distribution with a constant variance;
4. Interest rates are constant and risk-free;
5. Markets operates continuously.

Given these assumptions, a call premium may be valued by the following formula:

$$Pr_0 = PN(d) - ke^{-rt}N(d - \sigma\sqrt{t})$$

where,

$$d = \frac{\ln(P/k) + (r + \sigma^2/2)t}{\sigma\sqrt{t}}$$

where, Pr_0 = is the call option premium(or price)
P = is the price of the underlying asset,
k = is the exercise price of the option
r = is the risk-free interest rate expressed on a continuous compounding basis,
σ = is the standard deviation of the asset's annual rate of return,
t = is time to expiration (in years),

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e = is 2.71828 (natural antilog. of 1),
ln = is the natural logarithm, and
N(.) = is the probability that a deviation less than (d) will occur in a normal distribution with a mean of zero and a standard deviation of one.

The Black-Scholes option pricing formula computes the fair or theoretical price using the five variables that we mentioned above. This price is fair in the sense that if any other price existed, it would be possible to earn riskless arbitrage profits by forming a portfolio consisting of a long position in the underlying asset and a short position in its European type of call option if the price of the call option in the market is higher than the price derived from the formula. If the reverse is true, that is, the market price of the call option is less than the price derived from the formula, the investor would form a portfolio consisting of a long position in the call option and short position in the underlying asset.

For example, consider a call option in the stock market that expires in three months (thus, t = 0.25 in years basis), and that has an exercise price of k = $ 50. Furthermore, the current price of the underlying stock is P = $ 52 and the standard deviation of the annual rate of returns is 25%, whereas the risk-free interest rate is 8%.

Substituting these values into equations, we get

$$d = \frac{\ln(P/k) + (r + \sigma^2/2)t}{\sigma\sqrt{t}}$$

$$d = \frac{\ln(52/50) + (0.08 + 0.25^2/2)0.25}{0.25\sqrt{0.25}}$$

$$d = \frac{0.0670332}{0.125} = 0.5363 \cong 0.54$$

From a normal distribution table: N(0.54)= 0.7054

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The fair value of the option;

$$Pr_0 = PN(d) - ke^{-rt}N(d - \sigma\sqrt{t})$$

$$Pr_0 = (52x0.7041) - \frac{50}{e^{0.08x0.25}} xN(0.54 - 0.25\sqrt{0.25})$$

here, $N(0.54 - 0.25\sqrt{0.25}) = N(0.415) \cong N(0.42)$

From a normal distribution table $N(0.42) = 0.6628$

$$Pr_0 = 36.6132 - \frac{50}{1.0202} x0.6628$$

$$Pr_0 = 36.6132 - 32.4838 = \$\ 4.1294$$

The theoretical option price with 0.25 standard deviation is $ 4.1294≅ $ 4.13. What happens if the expected price volatility, which is the only variable in the formula that must be estimated, is higher than 0.25, say 0.50.

$$d = \frac{\ln(52/50) + (0.08 + 0.50^2/2)0.25}{0.50\sqrt{0.25}}$$

$$d = \frac{0.09047}{0.25} = 0.3619 \cong 0.36$$

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From a normal distribution table: N(0.36)= 0.6406

The fair value of the option;

$$Pr_0 = (52 \times 0.6406) - \frac{50}{e^{0.08 \times 0.25}} \times N(0.36 - 0.50\sqrt{0.25})$$

here, $N(0.36 - 0.50\sqrt{0.25}) = N(0.11)$

From a normal distribution table: N(0.11)= 0.5438

$$Pr_0 = 33.3112 - \frac{50}{1.0202} \times 0.5438$$

$$Pr_0 = 33.3112 - 26.6516 = \$\ 6.6596 \cong \$\ 6.66$$

The theoretical option price with 0.50 standard deviation is $ 6.66. Notice that when the expectation on price volatility is higher, the price of the call option gets higher.

So far we have focused on pricing a call option. The valuation for put options with the same expiration date and exercise price on the same underlying asset can be done using the parity relationship between the put and the call option prices. This relationship which is applicable only for European type of options can be shown as follows (Fabozzi,p339);

Put option price - Call option price = Present value of exercise price + Present value of dividends - Price of underlying stock

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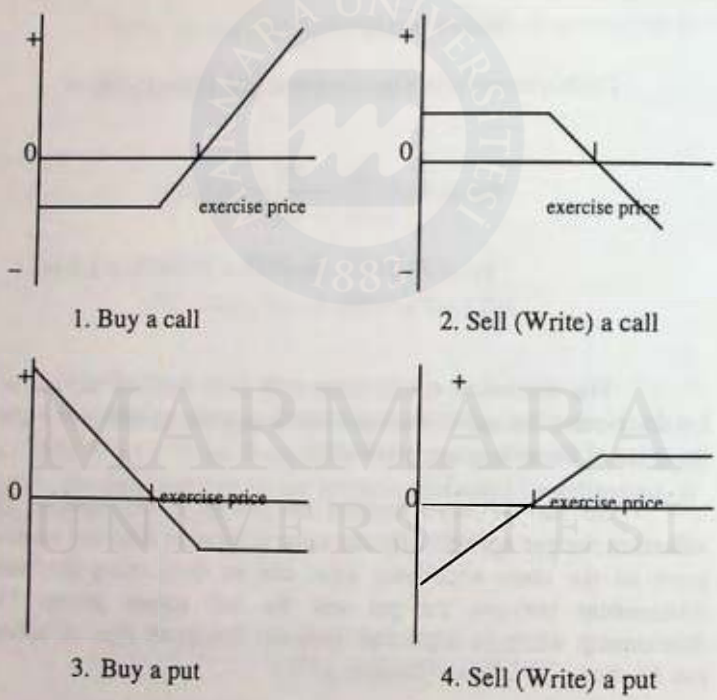
7.6. *Option Strategies*

There are basically four types of option strategies, while there are several ways to combine these strategies;

1. Buying call option (long call strategy)
2. Selling call option (short call strategy)
3. Buying put option (long put strategy)
4. Selling put option (short put strategy)



1. Buy a call
2. Sell (Write) a call
3. Buy a put
4. Sell (Write) a put

Figure 19- Basic Option Strategies

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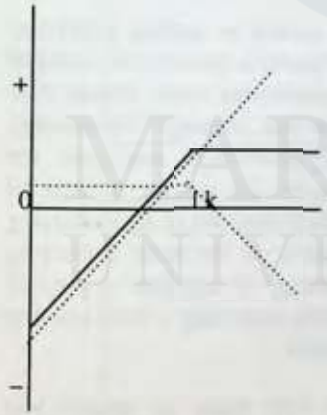
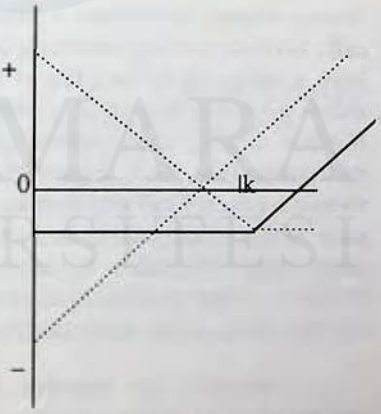
There are several strategies involving an option on the underlying asset and the underlying asset itself. These strategies combine an option with its underlying asset in such a way that either the option protects the underlying asset against loss or the underlying asset protects the option against loss due to any adverse price movements of the underlying asset. The strategies are as follows:

- A long position in the underlying asset with a short position in a call (selling a call) or a long position in a put (buying a put),
- A short position in the underlying asset with a long position in a call (buying a call) or a short position in a put (selling a put).

The profits from these strategies can be illustrated as it is in the below figures.



1.Long position in a stock with a short position in a call



2. Long position in a stock with a long position in a put

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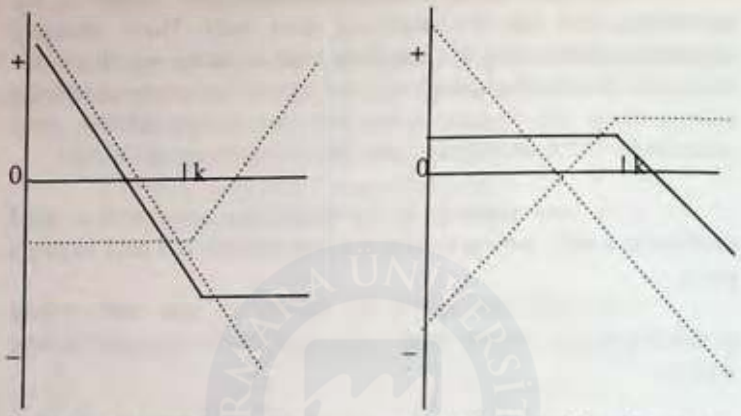

3. Short position in a stock with a long position in a call

4. Short position in a stock with a short position in a put

Figure 20- Combination Strategies

Figure 19-1 shows a strategy known as ***writing a covered call*** , because the long underlying asset position protects the investor from a sharp rise in the price of the underlying asset. Figure 19-2 shows a strategy known as a ***protective put strategy***. The strategy involves buying a put option on an underlying asset and the underlying asset itself. Figure 19-3 shows the reverse strategy of writing a covered call that involves a short position in an underlying asset with a long position in a call option on the same underlying asset. Figure 19-4 shows the reverse strategy of a protective put that involves a short position in an underlying asset with a short position in a put option on the same underlying asset.

Investors can assemble these four types of options into combinations to hedge against adverse movements in rates whilst leaving unimpaired the ability to profit from favorable movements. Such strategies have colorful names such as spreads, straddles, strips, and straps.

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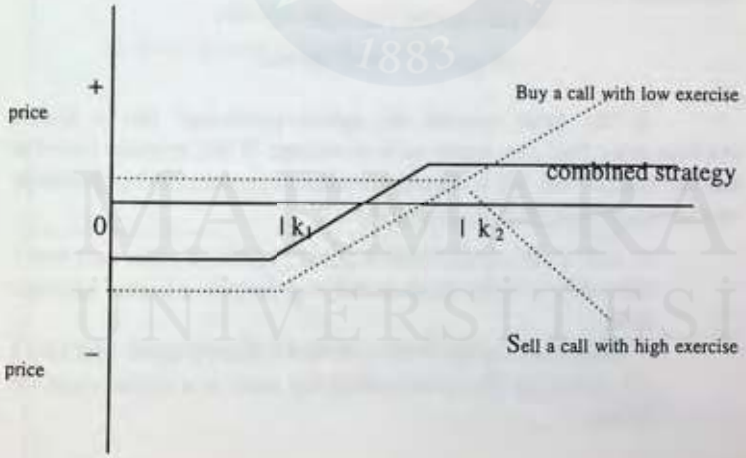
A **spread** combines call or put options on the same underlying asset but with different expiration dates or exercise price. Three common spreads are the bull, bear and butterfly spreads.

In the **bull spread** the option purchased has the lower exercise price than the option sold or written. If the investor believes that the market will rise but has reservations and wish to protect his/her position, two forms of bull spreads are possible;

1. Buy a call option with a certain exercise price and sell a call option on the same underlying asset at a higher exercise price,
2. Buy a put option with a certain exercise price and sell a put option on the same underlying asset at a higher exercise price.



a) Bull Spread using call options

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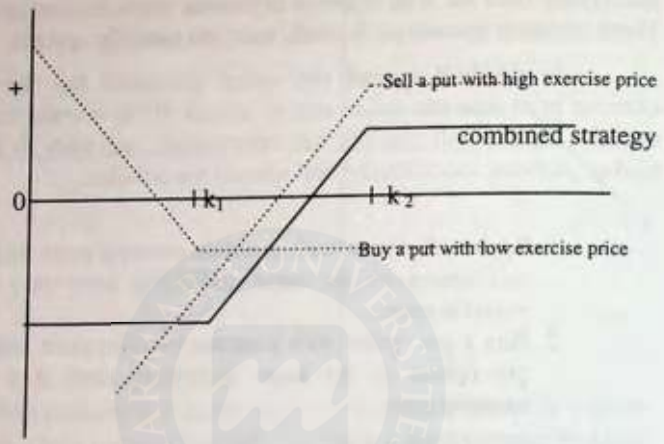

b) Bull spread using put options

Figure 21- Bull Spread

In the **bear spread** the option purchased has a higher exercise price than the option sold or written. If the investor believes that the market will fall and he/she wishes to protect his/her position, two forms of bear spreads are possible;

1. Sell a call option with a certain exercise price and buy a call option on the same underlying asset at a higher exercise price,
2. Sell a put option with a certain exercise price and buy a put option on the same underlying asset at a higher exercise price.

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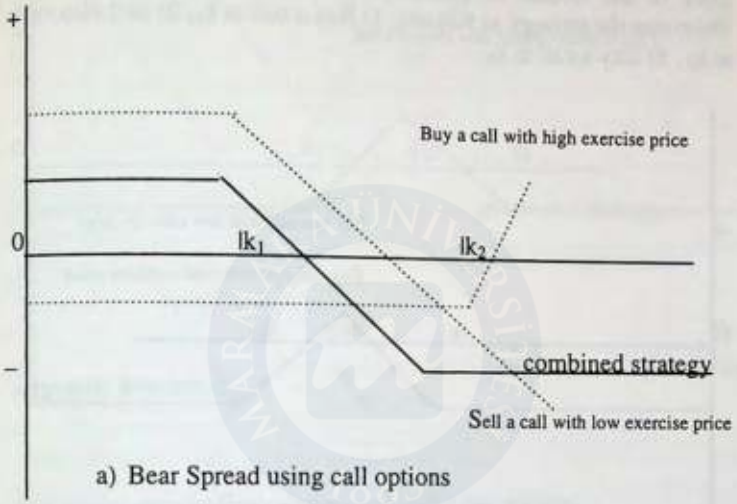
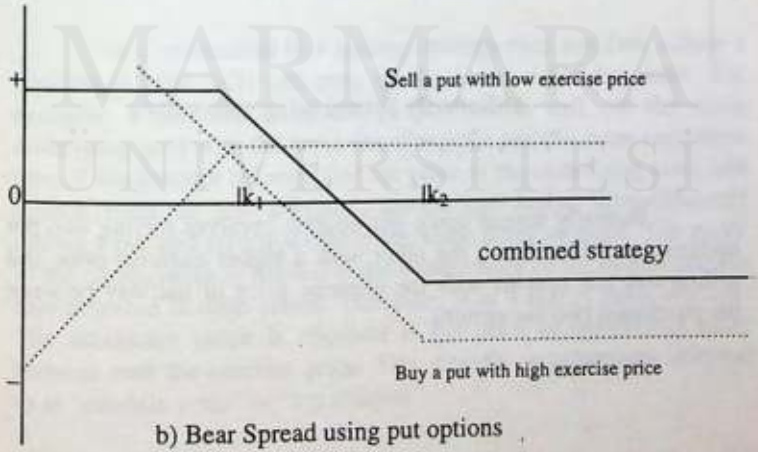


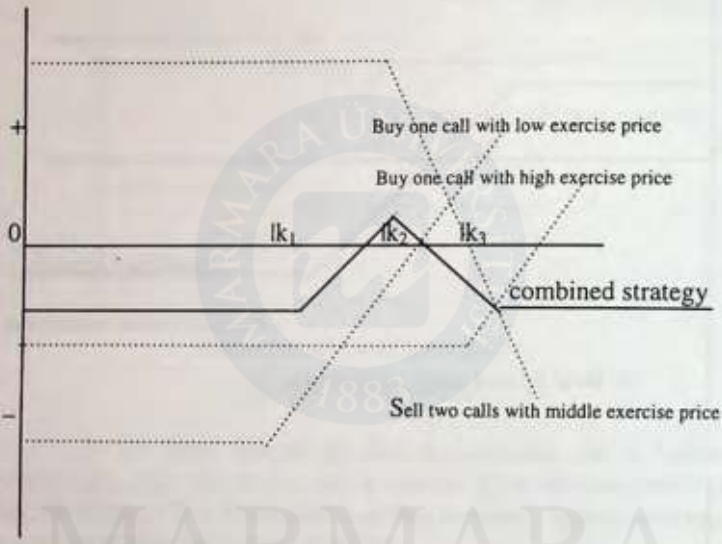
a) Bear Spread using call options



b) Bear Spread using put options

Figure 22- Bear Spread

In a **butterfly spread**, the investor buys two calls one with low and the other with high price and sells two calls with the exercise price in the middle of purchased call options. The graph below illustrates the strategy as follows; 1) Buy a call at k_1, 2) Sell two calls at k_2, 3) Buy a call at k_3.



a) Butterfly Spread using call options

Butterfly spread using put options involves buying two put options one with a low , the other with a higher exercise price and selling two put options with the exercise price of halfway between the purchased two put options.

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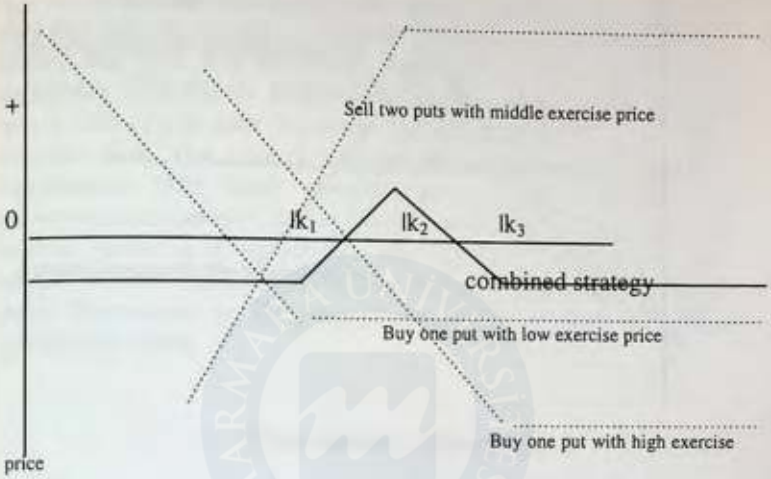

b) Butterfly Spread using put options

Figure 23- Butterfly Spread

A combination is a trading strategy that involves taking a position in both calls and puts on the same underlying asset. For example, a **straddle** combines a put and a call on the same underlying asset with the same exercise price and the same expiration date. If the investor believes that the price of the underlying asset will remain more or less constant, he/she can hedge himself/herself selling a put and selling a call at the same exercise price. The profit of the combination is limited to the selling price of the option and the loss potential is open ended. Therefore, it is a highly risky strategy. The maximum profit is obtained if the price of underlying asset remains near the exercise price. This straddle is sometimes referred to as "straddle write" or "top straddle".

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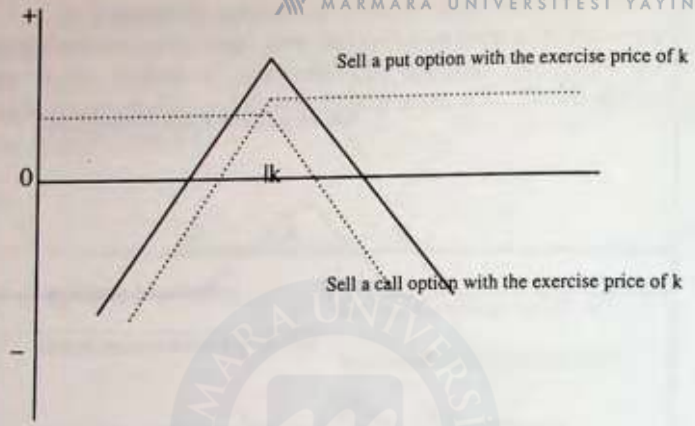
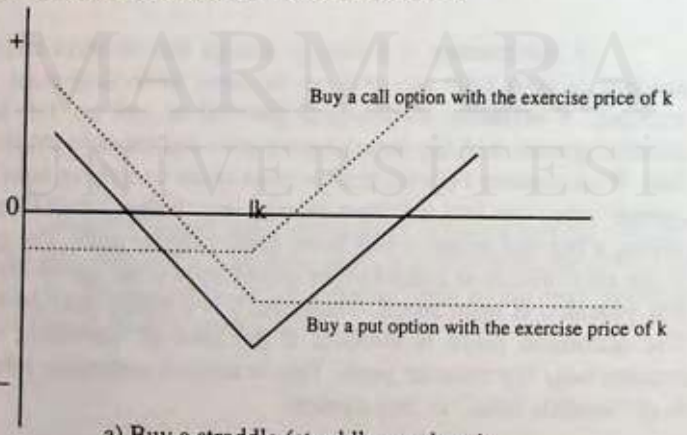


a) sell a straddle (straddle write)

The investor can create a straddle by buying both a call and a put option with the same exercise price and the same expiration date if he/she is expecting a large move in the price of the underlying asset but does not know the direction of it . In this case the straddle is called "straddle purchase", or "bottom straddle".



a) Buy a straddle (straddle purchase)

Figure 24- Straddle

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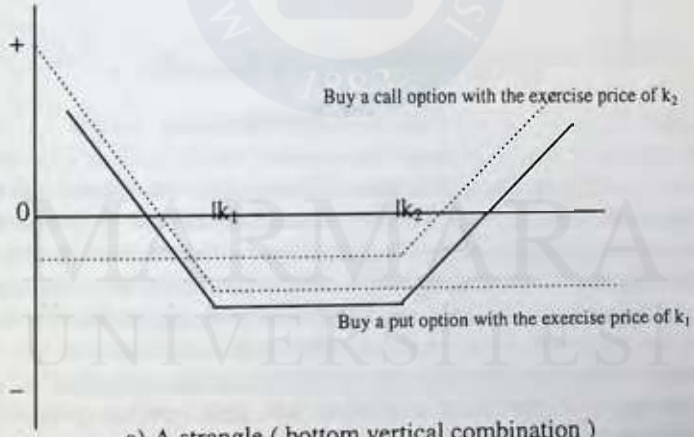
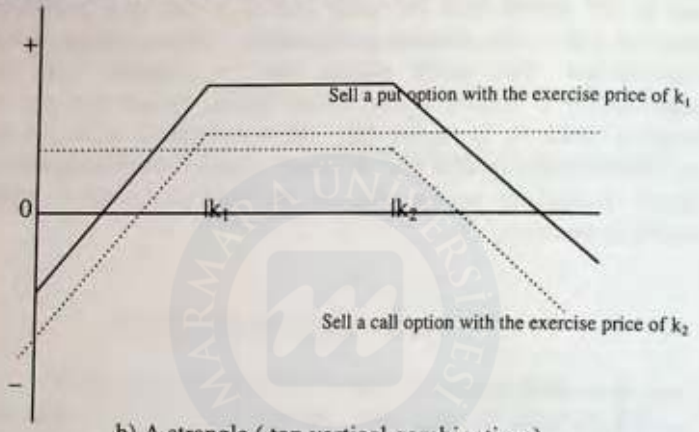
A **strangle** is a similar strategy to a straddle except that the puts and calls are bought at different exercise prices. If the investor expect that there will be a large fluctuation on the prices of the underlying asset but its direction is uncertain, he/she can buy a put and a call option with the same expiration date and a different exercise price. This strategy is sometimes called a *bottom vertical combination.* The profit pattern that is obtained from this combination is shown in the below figure. Notice that the call exercise price k_2 is higher than the put exercise price k_1. The maximum loss is smaller than the one in straddle but there have to be larger fluctuations on the price of the underlying asset to enable profits to be made.



a) A strangle (bottom vertical combination)

It is possible to have a strangle position by selling a put option and a call option with the same expiration date and a different exercise price. This strategy is usually called " *a top vertical combination*" or "*strangle write*" and it is appropriate when the

investor does not expect large price movements on the underlying asset. This is a very risky strategy, like the top straddle, since the potential loss is unlimited. The profit pattern that is obtained from the combination is shown in the below figure.



b) A strangle (top vertical combination)

Figure 25- Strangle

A **strip** is a combination of long position in one call and two puts with the same exercise price and expiration date. If the investor expects that there will be a large price move in the underlying asset and that this is more likely to be a decrease, he/she can use a strip combination. On the other hand, if the investor expects that the large price move will be an increase rather than a decrease, he/she can make a combination consisting of a long position in two calls and one put with the same expiration date and exercise price. This strategy is called **strap.** The profit patterns from strips and straps are shown in the below figures only with the combined lines.

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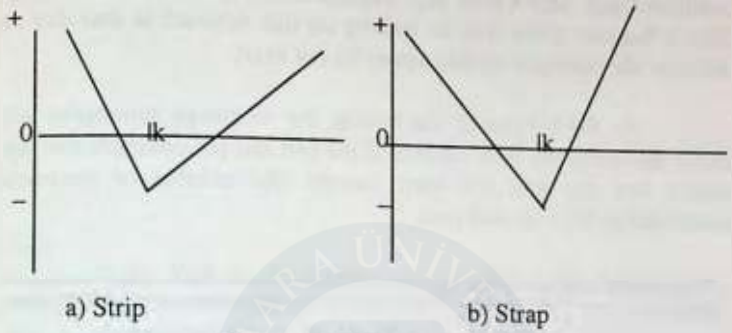

a) Strip b) Strap

Figure 26- Strip and Strap

7.7. How to Look at Financial Pages for Listed Options

Option quotations are given daily in the financial papers such as The Wall Street Journal and Financial Times. It should be mentioned that the option quotations in various financial centers are published in different formats, but they all include the same information. In the below exhibit a portion of the daily listing of the trading activities on the CBOE is shown (The Wall Street Journal Europe Wednesday, August 12, 1998, p.16).

The first column shows the name of the company and, just below the company name, the closing price of the underlying equity. The second column shows the exercise or strike price for the option contracts on the equity, followed by a column showing the expiration date. The fourth and fifth columns show the trading volume and last trade premium for call options. The last two columns show the trading volume and the last trade premium for the matching put option. The options that are not traded during the day are indicated by three periods (...). The contracts that are not available for trading but included in the report because of the format of the report are also

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indicated by three periods. Thus, if nothing is indicated for the contract (see, AES Cp 40 Sep. Calls) it is difficult to know whether this is because there was no trading on this contract at that day or because the contracts on this equity do not exist.

At the bottom of the listing, the exchange summaries are given including the total volume of the call and put contracts that are traded that day and the open interest (the number of contracts outstanding) for calls and puts.

U.S. LISTED OPTIONS QUOTATIONS

Tuesday, August 11, 1998

Option	Strike	Exp.	-Call- Vol.	3pm	-Put- Vol.	3pm.
AES Cp	40	Sep	...	...	1000	1.875
AFLAC	32 ½	Aug	410	0.5625	...	...
AMR	60	Sep	535	5.5	170	2.375
62.625	67½	Aug	764	0.9375	10	5.375
62.625	70	Aug	524	0.25	16	8
AT&T	60	Oct	552	1.875	258	4.625
57	65	Jan	390	2	140	9
Aames	7.5	Mar	...	...	650	0.9375
10.375	10	Dec	...	...	400	1.625
AdobeS	30	Aug	45	2	668	1.3125
30.8125	55	Jan	1500	0.375	...	...
AMD	20	Aug	472	0.25	5	2.375
AdvTis	5	Sep	512	0.375	500	2.25
Albtsn	45	Aug	400	3.75	...	...
AldSgnl	35	Sep	4	1.9375	355	1.875
AldWste	25	Sep	1020	1.375	10	1.875
Altera	40	Aug	554	1.5	72	1.875
39.125	45	Sep	549	1.125	3	6.625
Amazon	110	Aug	203	16	504	2
124	115	Aug	186	12.375	832	3
124	120	Aug	936	9.25	334	4.625
124	125	Aug	411	6.625	144	7.25

Option	Strike	Exp.	-Call- Vol.	3pm	-Put- Vol.	3pm.
DellCptr	55	Nov	...	...	1016	0.75
106.25	70	Aug	34	35.625	750	0.125
106.25	85	Nov	416	27.5	1719	4.875
106.25	90	Aug	226	17.5	379	0.6875
106.25	90	Nov	434	24	16	6
106.25	95	Aug	1202	13.25	384	1.125
106.25	100	Aug	644	9.375	2363	2.375
106.25	105	Aug	2548	6.125	1100	4
106.25	105	Sep	570	10.875	219	8
106.25	110	Aug	4166	3.875	1012	6.75
106.25	110	Sep	1304	8.375	81	11
106.25	115	Aug	2369	2.4375	301	10.125
106.25	115	Sep	377	6.125	20	13.5
106.25	120	Aug	2312	1.25	36	14.375
106.25	120	Sep	535	4.5	10	17.25
106.25	130	Aug	911	0.375	10	23.625
106.25	130	Sep	379	2.625	...	...
Disney	32.5	Jan	538	3.375	19	3.375
31.75	35	Aug	6	0.125	390	3.125
31.75	35	Sep	158	0.875	404	3.875
31.75	35	Jan	119	2.375	363	4.75
DuPont	60	Aug	670	1.125	129	2.375

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If we look at the exhibit, for example, for AMR equity closed at $62.625 on August 11, 1998, we can say that 535 AMR call option contracts had been traded by the end of that day having an exercise price of $60 and expiration date of September 1998. The closing trade that day took place at $5.5 per share or $550 per contract. On the put options column, we can see that 170 AMR put option contracts with the same exercise price and expiration date had been traded. The closing trade was at $2.375 per share or $237.50 per contract.

For the most active option contracts additional information is provided every day in the financial pages. The Exhibit below provides an example of the most active contracts on August 11, 1998. The first column shows the name of the company, the second, expiration date and the third, exercise price of the contract. Volume column shows the trading volume on the contract on that day. Exch. column shows the exchange on which the option is traded (CB- Chicago Board Options Exchange, AM- American Stock Exchange, PB- Philadelphia Stock Exchange, PC- Pacific Stock Exchange, NY- New York Stock Exchange, XC- Composite). The sixth column that is indicated as "Last" shows the closing price of the contract at that day and the following column that is indicated as "Net Chg" shows the net change on the closing price from the previous day's closing price. The eight column shows the closing price of the underlying equity and the last column shows the open interest in that contract.

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U.S. LISTED OPTIONS QUOTATIONS

Tuesday, August 11, 1998

Volume and close for actively traded equity options with result for corresponding put or call contracts as of 3 p.m. Volume figures are unofficial. Open interest is total outstanding for all exchanges and reflects previous trading day. Close when possible is shown for the underlying stock on primary market. **CB**- Chicago Board Options Exchamge. **AM**- American Stock Exchange. **PB**- Philadelphia Stock Exchange. **PC**- Paqcific Stock Exchange. **NY**- New York Stock Exchange. **XC**- Composite. c- Call. p- Put.

MOST ACTIVE CONTRACTS

Option	Strike	Vol.	Exch.	Last	Net Chg	3 pm Close	Open Int
Compaq	Aug 35	5,730	XC	0.625 - 0.1875		33.75	39,334
Intel	Aug 85	4,641	AM	2.25 - 1		84.5625	26,047
Micsft	Sep 95	p 4,524	PC	1.4375+0.3125		103.4687	12,920
DellCptr	Aug 110	4,166	AM	3.875 - 1.625		106. 25	24,821
AsiaPlp	Mar 7.5	p 4,112	XC	2.125+ 0.375		6.8125	3,932
MicrTc	Sep 30	3,931	XC	3.5 - 1.25		31.3125	14,326
IBM	Aug 120	p 3,925	XC	1 + 0.4375		126.625	8,442
Intel	Aug 80	3,899	AM	5.625- 1.5		84.5625	21,375
IBM	Aug 130	3,830	XC	2.0625-0.875		126.625	9,284
Intel	Aug 85	p 3,753	AM	2.5 + 1.1875		84.5625	8,458
Coke	Aug 85	p 3,652	XC	6.5 + 1.75		78.6875	8,150
Coke	Aug 80	3,364	XC	1.8125+0.0625		78.6875	8,566
Tex In	Oct 55	3,255	CB	7 - 2.375		58.75	4,149

For example, Compaq August 35 calls (if they were put options there would be a "p" latter after the strike price, see Micsft Sep 95) that are traded on the Composite were the most active issue on August 11, 1998. On the day of August 11, 5,730 of Compaq contracts were traded. The premium on the last trade was $0.625 per share or $62.50 per contract. This represents a decrease of $0.1875 from the last trade premium on the previous trading day. The closing price of the IBM shares on that day was $33.75 per share. The amount of contracts outstanding was 39,334.

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8. THE FUTURES MARKETS

8.1. The Market and the Trading Mechanism

Futures have started operating in the middle of the nineteenth century on agricultural products at Chicago Board of Trade (CBOT). With the collapse of the fixed exchange rate regime in the beginning of 1970s, more than a hundred years later than the futures on agricultural products, financial futures could be introduced in the financial markets. Since then the volume of trade in financial futures, in a number of important markets, exceeds the volume of trade in the original market upon which the contract was based. Financial futures are available on foreign currencies, on interest rates and on market indices. The largest market in futures is the Chicago Mercantile Exchange (CME) on the world. The first interest rate futures contract, based on the US Government National Mortgage Association securities, was introduced by the Chicago Board of Trade in 1975.

In the 1980s trading in futures expanded to the other countries particularly in Europe. The London International Financial Futures Exchange (LIFFE) started operating with a range of futures contracts in 1982. The Marché A Terme des Instruments Financiers (MATIF) in Paris started trading futures contracts in 1986. In later years futures markets were also opened in Switzerland in 1988 (SOFFEX), in Ireland 1989 (IFOX), in Germany in 1990 (DTB), in Austria in 1991 (ÖTB), and in Italy in 1992 (MIF).

A financial futures contract is an agreement to buy or sell a standard quantity of a financial instrument at a future date for a price agreed between the two parties. Standard quantity refers to the amount of each contract, for example, DM125,000. Future date refers to the delivery of the amounts specified in the contract, for example, March, June, September or December- four specified dates in the forthcoming year. Standardization of the contracts as quantity and type of the financial instrument enables easy transferability of the contracts to be achieved.

Trading mechanism of futures on organized exchanges is similar in some respects to options. The orders from an investor must be transmitted to the exchange floor and they must be taken to a designated spot for execution by a member of the exchange, like it is done for options. This spot is called "pit" because of its shape, which is circular with a set of interior descanting steps on which members stand. Only members are allowed to execute orders within the trading pit. Members can be either "floor brokers" or " floor traders". The floor brokers execute only customers' orders, while the floor traders execute orders for their own accounts. The floor traders are known as **locals** or **scalpers** since their holding period is very short, less than a day, and they attempt to make profits by buying low and selling high. Some traders may maintain a position for days or even weeks. In this case, they are called **position traders** and opposite to the scalpers they operate with a lower turnover.

All trades must be executed within the pit, in public and announced by "open outcry", meaning that all the members must

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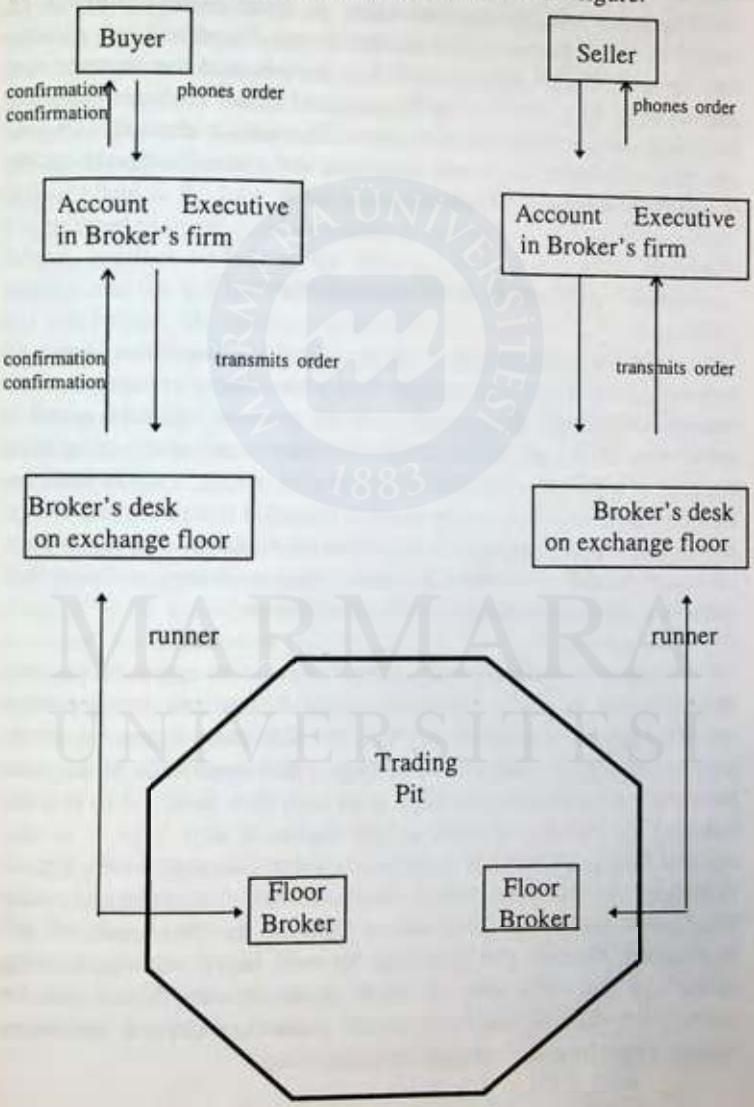
verbally announce the orders and the prices at which they are willing to trade. This system gives a unique edge to the futures pit. The operating process of futures is illustrated in the below figure.



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Trading mechanism based on pit trading in a physical marketplace is nearly abandoned with the technological developments. Technology provides a more modern alternative which is called Screen-based system. Screen-based trading can take two forms: the first alternative is that the prices of the contracts are broadcast using a service like Reuters, and actual deals are executed by telephone and confirmed by telex. The second alternative is that the price dissemination and execution of trades both take place through the screen i.e. Reuters Dealing 2000.

8.2. Forwards and Futures Compared

A forward contract is an agreement between two parties to buy or sell an asset at a certain future time for a certain price. A futures contract may be defined in the same way a forward contract is done. But there are some differences between them. A forward contract is a private agreement between two parties, such as between two financial institutions or between a financial institution and one of its clients, and is normally not traded on an exchange. Unlike forward contracts, futures contracts are traded on an exchange, meaning that there is a secondary market for futures contracts.

In a forward contract, one of the parties agrees to buy the underlying asset on a certain specified future date for a certain specified price (long position) while the other party agrees to sell the asset on the same date and same price (short position). At the time the contract is entered into, there is no cash flow involved so that the value of the forward contract to both parties is zero. That is, to take either a long position or a short position costs nothing. In the futures contracts, on the other hand, two contracts are written for any transaction and a clearing house handles the two sides of the transaction. One of the contracts between buyer and the clearing house and the other contract between the clearing house and the seller. Both parties involved in the transaction deposit the initial margin at the time the contract is entered into.

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In a forward contract, the amount and the delivery date of the contract are determined according to the customer's wish (that is, the terms of each contract are negotiated individually between two parties), while they are standardized in a futures contract. Standardized contracts make it possible to trade the contracts in the secondary markets and to create a highly liquid market for the investors. Forward contracts can not offer such liquidity because all contracts are different in terms of size and delivery date. Exact delivery date in the futures contracts is not usually specified, instead it is referred to by its delivery month. For example, the size the wheat futures contract traded on the Chicago Board of Trade is 5.000 bushels and the delivery months are March, May, July, September, and December. The delivery period for the commodities is usually the whole month and the holder of the short position can choose the time during the period when he will make the actual delivery. Delivery date for currency futures, for example based on Chicago IMM contracts is the third Wednesday of March, June, September, and December.

It should be mentioned that futures contracts are not intended for physical delivery. Forward contracts, in contrast, are intended to be settled by delivery. Most of the positions on futures contracts are canceled by taking a reverse position, selling contracts previously bought or buying contracts previously sold. Reverse trade is not possible in the forward market. Even if the trader finds an identical forward contract in terms of size and delivery date, he/she has to wait until the delivery date to realize profit (or loss) on the position.

The other difference between a forward contract and a futures contract is the credit risk to which the parties are exposed. Credit risk is higher in the case of forward contracts because either party may default on the obligation. Since the clearinghouse associated with the exchange guaranties the other side of the transaction in a futures contract, the credit risk is minimal.

8.3. *The Quotations of Financial Futures*

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Financial futures contracts, as we mentioned before, are available on foreign currencies, interest rates and on stock market indices. Interest rates futures mainly include contracts of 90-day US treasury bills, US domestic certificates of deposit and three-month Eurodollar deposits. For example, three-month eurodollar deposit contracts on the London International Financial Futures Exchange (LIFFE) are for a $1,000,000 three-month deposit commencing on the second Wednesday in March, June, September or December and based on three-month LIBOR. The futures contracts prices are quoted as 100 minus the annual rate of interest on the deposit. If the interest rate is %10, the price will be 90. If the interest rate rises to %10.5, the price falls to 89.5 and if the interest rate falls to %9.5, the price rises to 90.5.

The minimum price movement for the three-month eurodollar contracts on LIFFE is %0.01 and often referred to as 1 basis point. The minimum price movement refers to the changes on the last decimal place quoted by the dealer and is known as a "tick". So, in this case, each tick has a value of $25, since 1 basis point represents a %0.01 p.a. change in the rate of interest on a three-month Eurodollar deposit of $1,000,000.

$$\$1{,}000{,}000 \times \left(\frac{0.01}{100.00}\right) x \left(\frac{3 \text{ months}}{12 \text{ months}}\right) = \$25$$

Foreign exchange (currency) futures contracts are priced in terms of the number of dollars per unit of foreign currency and the tick value is 0.01 cents per unit of foreign currency. It is similar to the direct quotation in New-York, say DM might be quoted at $0.5643 or sterling at $1.6230 one day and DM at $0.5656 or sterling at $1.6330 on the next day.

The profit or loss on an open position can be calculated by multiplying the number of ticks by the tick value and by the number

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of contracts. For example, consider that a trader buys 4 sterling contracts at a price of $1.6230 and suppose that a week later the position is closed at a price of $1.6425. The profit of the position can be calculated as follows:

$$\underbrace{\frac{\$(1.6425-1.6230)}{0.0001}}_{\text{the number of ticks}} \times \underbrace{2.50(\$ \text{ per tick})}_{\text{tick value}} \times \underbrace{4 \text{ contracts}}_{\text{the number of contracts}} = \$\,1,950$$

Currency futures contracts traded on the London International Financial Futures Exchange (LIFFE) and the Philadelphia Stock Exchange (PHLX) are shown in the below table.

Contract	Contract size	Price quoted in points	tick value
LIFFE			
$/Pds	Pds25,000	$/Pds	0.01c/BP ($2,50)
$/Sfr	Sfr125,000	$/Sfr	0.01c/Sfr($12,50)
$/DM	DM125,000	$/DM	0.01c/DM($12,50)
$/yen	Yen12.5 m	$/100yen	0.01c/yen ($12.50)
PHLX			
$/C$	C$100,000	USc/C$	0.01c($10)
$/DM	DM125,000	USc/DM	0.01c($12.50)
$/ECU	ECU125,000	USc/ECU	0.01c($12.50)
$/Ffr	Ffr500,000	USc/Ffr	0.01c($10.00)
$/Pds	Pds62,500	USc/Pds	0.01c($6.25)
$/Sfr	Sfr125,000	USc/Sfr	0.01c($12.50)
$/yen	Yen12,5 million	USc/yen	0.0001c($12.50)
$/A$	A$100,000	USc/A$	0.01c($10)

8.4. The Principals of Futures

Futures, much similar to options, provide financial leverage to the investors meaning that the capital invested in futures is less than the price of the underlying asset and allows the investor to multiply the rate of return on the underlying asset. In this way, an international investor can allow himself/herself to speculate or hedge risk without much capital investment.

A futures contract fixes the price and conditions **now** for a transaction that will take place in the **future**. In other words, a futures contract is a legally binding agreement to take or make delivery of a given quantity and quality of a commodity at an agreed price on a specific date or dates in future (Gailtz,1995 p.70). Unlike forward contracts, futures contracts are normally standardized contracts which are traded on an exchange. The other difference is that in the futures contracts an exact delivery date is not usually specified. The contract is referred to by its delivery month. For example, the wheat futures contracts on the CBOT are available for five delivery months being that March, May, July, September, and December and delivery period is often the whole month. Furthermore, futures contracts may be freely traded on the market. To cancel a position the investor simply has to reverse the trades by selling contracts previously bought or buy back contracts previously sold, while in a forward contract it is impossible to reverse a contract. Most of the contracts on the futures market are closed by a reverse transaction before the expiration date.

When a futures contract is signed there is no money exchanged. The clearing mechanism transfers the risk from members to the clearing house. The risk involved in a futures contract is that one of the counterparties fails to fulfill its commitment. However, clearing house could not take such risk without any protection since the potential for loss is enormous when one takes the volume of contracts traded into consideration. The necessary protection is provided by the "**margining system**". The exchanges usually set the minimum margin for each contract and the specification of every contract defines the level of margin that must be deposited by members with the clearing house. For example, for the eurodollar future contracts on CME the required margin is $500 per contract. This margin is not a "down-payment" for the underlying asset, it is a guarantee against default by a member. Therefore, when the member closes out a position, the margin is refunded.

All the futures contracts positions are **marked-to-market** daily at the close of trading. The exchange publishes the official closing price (settlement price) at the end of the day and all

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outstanding positions are marked to this closing price. Any gain on the account due to price fluctuations of futures that day may be withdrawn the next day by the investor. Any losses incurred that day, on the other hand, are debited to the member's margin account and must be made good the following morning. This creates a distinction between the **initial margin or performance margin** and the **maintenance margin**. Initial margin is required when the position is first established. The level of the initial margin depends on the volatility of the futures contract price and the risk being taken. Since the logic is that the margin per contract should exceed the maximum potential loss, the more volatile the contract price the more margin is required. Depending on the underlying asset, the typical initial margin is in between 5 to 15 % of the total purchase price of the futures contract. The maintenance margin arising from the regular daily marking-to-market process is the minimum level below which the initial margin is not allowed to fall. This is usually 70 or 80 % of the initial margin for the American futures exchanges. For non-American futures exchanges the maintenance margin is equal to the initial margin. What happens if the daily loss exceeds the level of the maintenance margin? The investor will receive a **margin call** from his/her broker to restore the balance once again to the level of the initial margin. If the investor does not response to this call, then the broker will close out his/her position by entering a reversing trade in the investor's account.

Margin payments are normally made in the form of cash and the broker does not pay any interest on deposits. However, most futures exchanges allow to use some interest-bearing securities, such as T-bills, as deposit instead of cash when the initial margin is established. In that case, members can effectively earn interest on their margin accounts. Maintenance margin, on the other hand, can normally only paid in the form of cash.

As we mentioned before, the initial and maintenance margin varies from market to market. In the below table current margin requirements for pure speculators for the major currency futures contracts traded on the International Monetary Market (which is

division of the Chicago Mercantile Exchange) are shown. The margin requirements for hedgers are typically lower than these rates.

Currency	Contract size	Initial margin	Maintenance margin
British pound	62,500 pds	$2,000	$1,500
Deutche mark	125,000 marks	$2,000	$1,500
Canadian dollar	100,000 dirs	$ 900	$ 700
Japanese yen	12.5 million yen	$1,500	$1,000
Swiss franc	125,000 francs	$2,000	$1,000

8.5. Marking to Market: An Example

An illustration of the daily workings of the margining system may help to clarify the process. Suppose that on day 1, a German mark June contract is purchased on the International Monetary Market (IMM) at the opening price of $ 0.5740/DM. This means that one standardized contract for DM 125,000 has a market price of

$$\$ 0.5740/DM \text{ X } DM\ 125{,}000 = \$71{,}750$$

The settle price at the end of day 1 is $ 0.5750 which will be used for calculating settlements. This price reflects the market expectation for future spot price for June. At this price, the German mark contract to buy DM 125.000 is worth

$$\$ 0.5750/DM \text{ X } DM\ 125{,}000 = \$71{,}875$$

The purchase of the mark futures contract has earned the investor

$$\$ 71{,}875 - \$ 71{,}750 = \$ 125$$

We assume this is left in the margin account and added to the originally placed initial margin of $2000. If the investor likes to withdraw this $125, he/she can do so.

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Suppose that on day 2 the June mark futures rate becomes $0.5720/DM. the contract is now worth

$$\$\ 0.5720 \text{ X } 125{,}000 \text{ DM} = \$\ 71{,}500$$

Compare to the previous settle contract price of $71,875 there is a loss of

$$\$\ 71{,}875 - \$\ 71{,}500 = \$\ 375$$

When this is deducted from the margin account the total is $1,750 ($2,125-$375) which is above the maintenance level of $1,500. In this case nothing needs to be done.

Suppose that on day 3, the settle price falls to $0.5680/DM. The contract is now valued at

$$\$\ 0.5680 \text{ X DM } 125{,}000 = \$\ 71{,}000$$

The loss from the previous day is

$$\$\ 71{,}500 - \$\ 71{,}000 = \$\ 500$$

This brings the margin account to $1,750 - $500= $ 1,250, which is below the maintenance level of $1,500. The investor is asked to bring the account up to $2,000, requiring that at least $ 750 be deposited in the margin account. All this transactions are summarized in the below Table.

Day	Opening or Settle price	Contract	Margin price	Margin contribution Adjustment	Margin or Withdrawal Account
1 opening	$0.5740	$71,750	0	+ $2,000	$2,000
1 settle	$0.5750	$71,875	+$125	0	$2,125
2 settle	$0.5720	$71,500	-$375	0	$1,750
3 settle	$0.5680	$71,000	-$500	+$750	$2,000

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8.6. *Payoff Profiles on Futures*

We will use the currency futures to explain the payoff profiles on futures contracts. Assume that at the time of buying the futures contract the market's expected future spot rate for the maturity date of the contract is $0.5680. At this expected spot rate a future contract for DM125,000 has a market place of $0.5680XDM125,000=$71,000. The investor is betting on the outcome vis-à-vis this price. Let us compare this contracted price with the realized value of DM125,000 to find the outcome of the bet.

If realized spot exchange rate is $0.5714/DM, a DM contract will worth $0.5714/DM X DM 125,000 =$ 71,425. This represents a gain over the initially contracted price of $425 ($71,425 - $71,000). That is, the investor has won $425 on the bet. If the realized spot rate is $0.5555/DM, the DM purchase contract is worth $0.5555/DM X DM125,000 = $69,437.50 and this represents a loss of $1562,50 ($71,000-$69,437.50). Other values in the below Table are calculated in a similar way.

Realized spot rate	Unexpected change in spot rate	Maturity value of contract	Accumulated marking-to-market gain(+) or loss(-)
$0.5780/DM	-DM0.03/$	$72,250	+ $1,250
$0.5747/DM	-DM0.02/$	$71,837.50	+ $837.50
$0.5714/DM	-DM0.01/$	$71,425	+ $425
$0.5680/DM	0	$71,000	0
$0.5650/DM	DM0.01/$	$70,625	-$375
$0.5617/DM	DM0.02/$	$70,212.50	-$787.50
$0.5555/DM	DM0.03/$	$69,437.50	-$1,562.50

The figures in the Table show that the payoff profile on a futures contract to buy DM is downward-sloping, because an unexpected increase in DM price of the dollar causes a loss and an unexpected decrease in DM price of the dollar causes a gain on a future contract to buy DM. However, the gain and the loss figures in

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the Table are somewhat uncertain since, these figures do not include any opportunity cost of the deposited margins, or interest earnings if the gain is withdrawn and invested. Because of this uncertainty, the downward-sloping line is made purposely "fuzzy" in the below Exhibit.

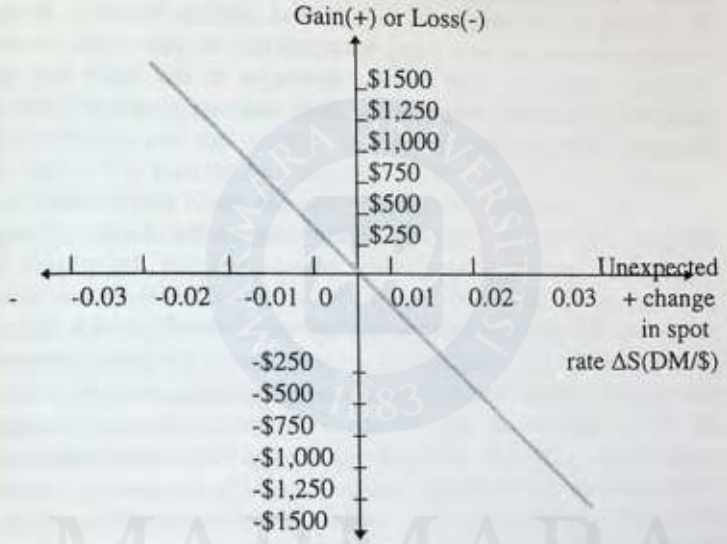

Figure 27- Payoff Profile on Purchase of DM Futures

8.7. Pricing of a Futures Contract

We will here again take the foreign currency futures into consideration in order to explain pricing of futures. Foreign currency futures are priced according to the notion of interest rate parity theorem (Sharpe, Alexander, Baily, p.747).

The riskless investment is to invest domestically in a

riskfree security and receive the principal and interest in the end of the maturity in terms of local currency. The other riskless alternative is to exchange the local currency for a foreign currency and use this fund to buy the foreign riskfree security. In addition to this the investor would short sell the requisite number of foreign currency futures contracts so that in the end of maturity, when he/she receives the principal and interest in the form of foreign currency, he/she would know exactly how many local currency he/she would receive for them. They are both riskless strategies in the sense that the investor knows exactly how many local currency they will yield in the end of the investment period.

An American investor, for example, could simply invest in a one-year US riskfree security or otherwise, he/she could exchange US dollars, let's say, for British pounds and use the pounds to purchase one-year British riskfree security and, at the same time, short sell the requisite number of one-year British pounds futures contracts. If the first strategy has a higher return per dollar invested, the British investor would like to exchange pounds in the spot market for dollars and invest in riskfree US security and buy a one-year pounds futures contract. If the second strategy has a higher return per dollar invested, an American investor would like to exchange his/her dollars for pounds in the spot market and invest in riskfree British security and buy one year dollar futures contract. As a consequence, these two strategies must have the same cost, in equilibrium, if they have the same dollar payoffs. If we show the payoffs of these two strategies as equilibrium, we obtain,

$$\$1\,(1 + R_{\$}) = (\$1/P_s)\,(1 + R_{Pds})\,P_f$$

Where; $R_{\$}$ = rate of return on riskfree US security,
P_s = current spot rate of exchange,
R_{Pds} = rate of return on riskfree British security,
P_f = future rate of exchange.

The left side of the equation shows the cash flow of the strategy of investing \$1 in a US riskfree security that has return of $R_{\$}$. The right

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side of the equation shows the cash flow in dollar terms of the strategy of investing $1 in a British riskfree security that has return of R_{Pds}.

The future price of the pound can be determined by rewriting the equation as the interest-rate parity equation:

$$P_f = P_s [(1 + R_S) / (1 + R_{Pds})]$$

If the spot rate of exchange for the British pound is $1.6319/Pds, and the riskfree interest rate for US is 6% and for Britain is % 8, then the one year futures price of the pound will be;

$$P_f = \$1.6319 (1.06/ 1.08) = \$1.6015.$$

8.8. How to Look at Financial Pages for Futures

Some popular futures contracts are commodities, currencies, interest rate and the index contracts that can be found in the international financial press. Most of the currency contracts are traded in several markets throughout the world such as London, Singapore, Chicago Board of Trade (CBT), Chicago Mercantile Exchange (CME). Since all these markets are linked to each other, it allows positions that are opened in one market to be liquidated in another.

The amount of transaction costs are usually small in the currency futures, so that the investors may transact even with a small amount of money. The other advantage of currency futures is that the procedure of marking to market allows the investors to realize a gain or a loss daily.

Since futures contracts at the international financial centers are usually shown in terms of US dollars relative to other currencies, a German investor, for example, wanting to hedge the currency risk of French assets has to take two positions: one in German mark and

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one in French franc. For example, to hedge his/her French assets against the depreciation of franc relative to the German mark, he/she would sell French franc futures and buy German mark futures.

Here, we will show currency futures quotations as an example in order to illustrate the type of information available in The Wall Street Journal.

FUTURES PRICES

Tuesday, August 11, 1998

CURRENCY

	Open	High	Low	Settle	Change	Lifetime High	Lifetime Low	Open Interest
JAPAN YEN (CME)-12,5 million yen; $ per yen (.00)								
Sept	.6873	.6880	.6807	.6819	- .0056	.8695	.6807	144,503
Dec	.6955	.6965	.6900	.6908	- .0057	.8445	.6900	3,222
Mr99	.7000	.7000	.6997	.6997	- .0058	.8315	.6997	1,918
June				.7086	- .0060	.7800	.7086	652
Est vol 14,691; vol Mon 13,534; open int 150,295, +3,886.								
DEUTSCHEMARK (CME)-125,000 marks; $ per mark								
Sept	.5643	.5647	.5604	.5628	- .0015	.5944	.5425	104,929
Dec	.5656	.5666	.5647	.5647	- .0015	.5840	.5496	806
Est vol 13,715; vol Mon 13,648; open int 105,925, +3,771.								
CANADIAN DOLLAR(CME)-100,000 dlrs.; $ per Can $								
Sept	.6594	.6594	.6571	.6574	- .0023	.7463	.6513	66,938
Dec	.6595	.6595	.6578	.6581	- .0022	.7400	.6519	4,924
Mr99	.6585	.6599	.6585	.6587	- .0021	.7247	.6515	1,161
June				.6593	- .0020	.7170	.6540	314
Est vol 5,586; vol Mon 7,115; open int 73,392, -90.								
BRITISH POUND (CME)- 62,500 pds.; $ per pound								
Sept	1.6322	1.6328	1.6258	1.6286	- .0038	1.6870	1.5690	40,255
Dec	1.6230	1.6250	1.6192	1.6210	- .0038	1.6760	1.5630	853
Ju99	1.6040	1.6080	1.6040	1.6072	- .0038	1.6460	1.5960	130
Est vol 5,255; vol Mon 5,617; open int 41,241, +597.								
SWISS FRANC (CME)- 125,000 francs; $ per franc								
Sept	.6710	.6756	.6698	.6738	+.0025	.7420	.6503	63,017

AUSTRALIAN DOLLAR (CME)- 100,000 dlrs.; $ per A.$

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MEXICAN PESO (CME) - 500,000 new Mex. Peso, $ per MP

As we mentioned before, the futures contracts are standardized contracts. For example, one futures contract on Japanese yen is 12,5 million yen, one futures contract on Deutsche mark is 125,000 marks, one futures contract on Canadian dollars is 100,000 dlrs,.....and so on. This can be seen on the first line where the related currency is shown. The top of the above table gives futures prices for Japanese yen contracts. For example, the September contract opened at 0.6873 dollars per Japanese yen and settled, or closed, at 0.6819. The high and low price of the day were 0.6880 and 0.6807 dollars. The change gives the price change from the previous day's settlement price. After the change come the highest and lowest prices recorded during the lifetime of the contract. The open interest (shown in the last column) is the number of outstanding contracts on the previous day.

Summary figures are given below the figures for the last delivery date. In the case of Japanese yen, the summary figures are below the June 99 delivery date figures. They indicate the total volume (the number of contracts) traded on Tuesday, August 11 (Est vol 14,691) and the number of contracts on the previous trading day that is Monday, August 10 (Mon 13,534) as well as the total open interest for Japanese yen contracts with different delivery dates on that day and the change in total open interest from the previous trading day.

Since the settlement price is the price used for the marking-to-market procedure, it is easy to calculate the gain (or loss) on the contract. For example, the buyer of one September Japanese yen contract would have lost $ 700 from the previous day of quotation (12,5 million yen X 0.000056 $/yen). On the other hand, the buyer of

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one September Swiss franc contract would have gained $312.50 from the previous day of quotation (Swiss francs 125,000 X 0.0025 $/SF).

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9. *FOREIGN EXCHANGE EXPOSURE MANAGEMENT*

It might be useful to identify the risks that are involved in international investments before we start to give the management techniques of them. Basically, there are two types of risks each company and investor involved in international investments, is faced with. One is the foreign exchange exposure risk and the other one is the political risk.

Foreign exchange exposure can simply be defined as the possibility of a change of home currency value of assets, liabilities, revenues or expenditures which are denominated in foreign currencies due to changes in exchange rates (Abuaf and Schoess,p.3). Some authors define the foreign exchange exposure as the *sensitivity* of changes in the *real* domestic-currency value of assets, liabilities, or operating incomes to *unanticipated* changes in exchange rates (Levi,p.293). In the second definition there are several features that are worth noticing. First, foreign exchange exposure is a measure of the sensitivity of domestic currency value of assets, liabilities, revenues or expenditures, meaning the extent or degree the home

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currency value of those assets, liabilities, revenues or expenditures is changed by exchange rate changes. The second difference in the later definition is the fact that it concerns with the *real* domestic-currency values, meaning the value adjusted to inflation. Thirdly, the later definition does not make a difference between domestic and foreign assets, liabilities, or operating incomes since either of them can be affected by the unexpected changes in exchange rates. Finally, the later definition refers only to *unanticipated* changes in exchange rates since the markets compensate anticipated changes in exchange rates.

Political risk can be defined as a change in value that arise because of political actions. This definition says that political risk is not only a problem for the international investors but also a problem for the domestic firms and investors (Ross, Westerfield, Jordan,p.705). Political risk faced by international investors can be divided into three components. First is the confiscation or expropriation risk which arises mainly in the less developed countries. In order to reduce this sort of risk parent companies should use mainly or as much as possible local sources of funds. The reason for this is the fact that in case of confiscation the host government usually takes over the liabilities as well as the assets of the foreign investments.

Second is the commercial political risk that arises due to commercial regulations changes in the host country such as high minimum wages and price level restrictions or discrimination based on country of origin such as not awarding government contracts to foreign companies, refusing to grant work permits to non-resident staff and restricting import licenses for raw materials.

Third is the financial political risk that arises due to restrictions on capital movements such as restriction on the repatriation of capital and dividends or imposing heavy interest free import deposits.

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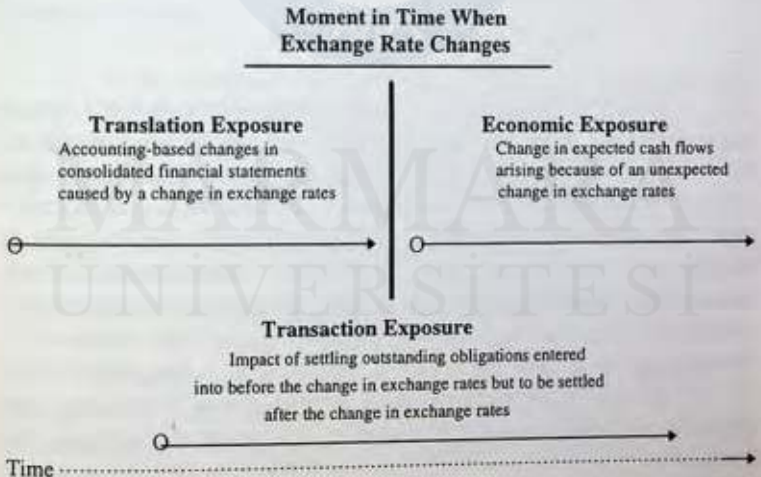
Since the concept of political risk is out of the line of this book, we will mainly concentrate on the foreign exchange exposure risk.

9.1. Types of Foreign Exchange Exposure

The measurement of foreign exchange exposure is an important task of the financial manager in the current business life. It should be measured correctly in order to maximize the net cash flow, profitability, and market value of the firm. The effect of the changes in foreign exchange rates can be measured in three ways: transaction exposure, translation exposure and economic exposure. In the below exhibit the three types of foreign exchange exposure is shown in the framework of time (Eiteman and Stonehill, 155).



Transaction exposure measures the effect of the foreign exchange rates changes on the cash flows of the transactions that are denominated in a foreign currency. Translation exposure measures

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the effect of the foreign exchange rates changes on the consolidated financial statements of a multinational company. Economic exposure measures the effect of the foreign exchange rates changes on the future expected cash flows of the company and consequently on the net current value of the company.

When a contract on credit basis between buyer and seller is denominated in a foreign currency for one of the counterparts, the counterpart who has signed the contract in another currency apart from his/her home currency will be open to the foreign exchange exposure risk and may incur substantial exchange losses or gains depending on the direction of change in the exchange rates. If the exchange rate remains stable between the contract date and the payment date in the case of foreign exchange denominated contract, or the counterpart who has signed the contract in his/her local (domestic) currency, transaction exposure will not incur.

9.1.1. Transaction Exposure

Consider the case of a local company who entered into a sales agreement with a foreign company and signed the contract in the foreign company's devaluation prone currency. Suppose that there are 6 months between the contract date and the actual payment date. The exporter's receivable will be staggered over the next 6 months after the contract date. According to the direction of the change in exchange rates during maturity the exporter company may experience an exchange loss or gain. Since the contract is denominated in a devaluation prone currency, it is most likely that the exporter will have a considerable exchange loss. Note that if the domestic export company had invoiced in its local currency, the transaction exposure would have been shifted to the foreign company (or buyer).

Let $A_f(t)$ denotes an accounting receivable (or any other Asset) denominated in foreign currency and maturing at time (t), and $S_{d,f}(0)$ and $S_{d,f}(t)$ denotes the exchange rates between domestic

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currency and the foreign currency at time (0) when the contract is originally initiated and time (t) when the actual payment is made, respectively. Then, the exchange loss or gain can be expressed as follows:

$$\text{Exchange gain or loss} = A_f(t) \times S_{d,f}(t) - A_f(t) \times S_{d,f}(0)$$

$$= A_f(t) \times [S_{d,f}(t) - S_{d,f}(0)]$$

The first term of the equation $[A_f(t) \times S_{d,f}(t)]$ denotes the value of the account receivables in domestic currency when actual payment is made, and the second term of the equation $[A_f(t) \times S_{d,f}(0)]$ denotes the value of the account receivables in domestic currency when the contract was initiated. One can easily see that the magnitude of the exchange loss or gain depends on the volume of the transaction exposure in foreign currency, that is $A_f(t)$, and the extent of the foreign currency devaluation (or revaluation) vis-a-vis the domestic currency.

If the company has liabilities that are denominated in a foreign currency, by using the similar notations as above the exchange loss or gain can be expressed as follows, where $L_f(t)$ denotes the value of Liability when payment comes due.

$$\text{Exchange gain or loss} = L_f(t) \times S_{d,f}(t) - L_f(t) \times S_{d,f}(0)$$

$$= L_f(t) \times [S_{d,f}(t) - S_{d,f}(0)]$$

If we continue using the above example that assumes the contract is signed in a weak currency (devaluation prone currency), an exchange gain will arise on liabilities that are denominated in this currency.

When the company has transaction exposure on its liabilities as well as its assets, the net transaction exposure simply be expressed with the difference of these two exposure:

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Net exchange gain or loss = $A_f(t) - L_f(t)$

For the companies that are engaged in buying, selling and borrowing or portfolio investments operations in foreign currencies, it is important to concern transaction exposure for every currency and every maturity in order to avoid duplication of hedging facilities (Jacque,p.124). This information can be shown in matrix form as in below matrix.

	Maturity		
Currency	Period 1	Period 2	... Period t...
f_1	$A_{f1}(1), L_{f1}(1)$	$A_{f1}(2), L_{f1}(2)$	...$A_{f1}(t)$, $L_{f1}(t)$..
f_2	$A_{f2}(1), L_{f2}(1)$	$A_{f2}(2), L_{f2}(2)$	...$A_{f2}(t)$, $L_{f2}(t)$..
f_3	$A_{f3}(1), L_{f3}(1)$	$A_{f3}(2), L_{f3}(2)$	...$A_{f3}(t)$, $L_{f3}(t)$..

Since transaction exposure is simply a cash flow exposure, it is a relatively easier concept to understand. Translation and economic exposure are more complex.

9.1.2. Translation Exposure

Translation exposure, sometimes called accounting exposure, arises from the need of periodical consolidation of financial statements of foreign subsidiaries into the parent company's financial statements. Consolidation of the income statement is relatively easier than the balance sheet consolidation. The parent company may use either the average exchange rate or the closing rate of the accounting year in order to translate the foreign currency profit and loss accounts of the subsidiary. Nevertheless, in both cases the expected consolidated profit or loss in the home currency may vary as exchange rates vary.

The translation of balance-sheet items in home currency is more complex since there are different approaches for translation,

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which we will mention later. Some items may be translated at their historical exchange rates (the rates at the date of acquisition), some other items may be translated at the closing exchange rates at the end of the accounting year. The use of historical exchange rates can not alter the home currency value of the translated item, but the use of closing exchange rates may alter the home currency value of the translated item as the exchange rate alters. Hence all the items that are translated in home currency at current (closing) exchange rates are exposed to translation exposure in accounting sense. Translation exposure is a purely accounting sense exposure, since it occurs during the consolidation of the subsidiaries' financial statements. There is no cash flow involved as in transaction exposure.

There are mainly four translation methods that are used by multinational companies, namely the current rate (or closing rate) method, the current/non-current method (sometimes called the traditional or working capital method), the monetary/non-monetary method, and the temporal method. We will briefly discuss these methods.

The current rate method : This is the simplest and most commonly used method (especially by British companies since it is recommended by the Institute of Chartered Accounts of England and Wales and the Institute of Chartered Accounts of Scotland), because all the items denominated in foreign currency in the foreign subsidiary's financial statements (both, in the balance sheet and in the income statement) are merely translated at the exchange rate that prevails at the time of consolidation.

Since all balance sheet items are translated at the current rate, and if the foreign currency denominated assets exceed the foreign currency denominated liabilities, the company will have a translation exposure loss in the case of a devaluation and it will have a translation exposure gain in the case of a revaluation. The opposite situation will occur if the foreign currency denominated liabilities exceed foreign currency denominated assets.

The current/ non-current method : This method depends on the classical accounting distinction between the short term (current) and the long term (non-current) items on the balance sheet. Under this method, current assets and current liabilities are translated at the closing rate (the rate that prevails at the time of consolidation) and the long term items such as fixed assets and long term liabilities are translated at their historical exchange rates. Hence, the net sum that is exposed to translation exposure is the difference between current assets and current liabilities (net working capital), since they are the only items that will alter as exchange rates alter.

Under this method, the income statement items are usually translated at the average exchange rate of the related period, except the revenues and expenses that are associated with fixed assets (such as depreciation) and non-current liabilities. Those items are translated at the same exchange rates (historical rates) as the corresponding non-current balance sheet items.

The important weakness of this method is the fact that it translates the long term liabilities at their historical exchange rates, although the long term debts denominated in foreign currency are very much exposed to foreign exchange exposure risk. The domestic currency value of foreign currency denominated long term debts changes as exchange rates change.

The monetary/ non-monetary method : This method depends on the other classification of the balance sheet items, namely monetary and non-monetary items. Monetary items are the items that represent a fixed amount of foreign currency denominated assets and liabilities such as cash, account receivable and payable and long term liability. Non-monetary items are the items that represent physical assets and liabilities such as inventory, fixed assets.

Under this method, monetary assets and liabilities are translated at closing rates and the non-monetary items are translated at their historical exchange rates. Hence, translation exposure under this method is given by net monetary assets. This method can be

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considered as a method that is in between the current method and the current/ non-current method.

Income statement items are usually translated at the average exchange rate of the related period, except the revenues and expenses that are associated with non-monetary assets and liabilities. Those items are translated at the same exchange rates (historical rates) as the corresponding non-monetary balance sheet items.

The temporal method : Under this method, all the items in the financial statements stated at historic cost are translated at their historical exchange rates and all the items stated at replacement cost, realizable value or market value are translated at closing rate. In other words, the exchange rate used for the translation of each item depends on the measurement basis used in the subsidiary's accounts.

The difference between the temporal method and the monetary/ non-monetary method is that the inventory is always translated at the historical exchange rate under the monetary/ non-monetary method, but under the temporal method, it could be translated at the current rate according to the accounting system that is used. For example, if the company is using LIFO accounting system for their inventory, the inventory item will be translated at current exchange rate.

Using a numerical example can be helpful to explain further the differences between the four translation methods. Assume that a US parent company's subsidiary in Germany projected its balance sheet to prevail 31 of December, 1998 on 1 of December 1998 as in the first column of the below table. In the beginning of the accounting period (January 1, 1998), DM is worth $0.7000 and is expected to depreciate to $0.6000 per DM by year-end (December 31, 1998).

The second column shows the values of the balance sheet items assuming that the exchange rates will remain unchanged or

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constant during the accounting period. This will help us to calculate the exchange gain or loss after the devaluation of the DM.

0.7000/$	German Subsidiary's Balance sheet in DM	German subsidiary's balance sheet translated at DM
Current Assets		
Cash	500	350
Marketable securities	600	420
Accounts receivable	900	630
Inventory (at cost)	1,400	980
Total current assets	3,400	2,380
Fixed Assets (net)	2,000	1,400
Total Assets	5,400	3,780
Liabilities		
Current liabilities	2,500	1,750
Long-term debt	1,000	700
Total Liabilities	3,500	2,450
Equity	1,900	1,330
Total liabilities + equity	5,400	3,780

	Current Method	Current / non-current	Monetary / non-monetary	Temporal Method
Current Assets				
Cash	300	300	300	300
Marketable securities	360	360	360	360
Accounts receivable	540	540	540	540
Inventory (at cost)	840	840	980	840
Total current assets	2,040	2,040	2,180	2,040
Fixed Assets (net)	1,200	1,400	1,400	1,400
Total Assets	3,240	3,440	3,580	3,440
Liabilities				
Current liabilities	1,500	1,500	1,500	1,500
Long-term debt	600	700	600	600
Total Liabilities	2,100	2,200	2,100	2,100
Equity	1,140	1,240	1,480	1,340
Total liabilities + equity	3,240	3,440	3,580	3,440

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We have defined the translation exposure earlier as the difference between exposed assets and exposed liabilities. Hence, this difference will be reflected in the difference between the equity capital translated at DM 0.7000/$ and the equity capital total in the examined translation method. The translation loss or gain figures are shown in the below table for each translation method.

	Current Method	Current / non-current	Monetary / non-monetary	Temporal Method
-Equity Capital translated at DM 0.7/$	1,330	1,330	1,330	1,330
-Equity capital total in each translation method	1,140	1,240	1,480	1,340
-Translation gain (loss)	($ 190)	($ 90)	$ 150	$ 10

As we can see from the table, according to the method chosen, the translation results can range from a loss of $190 to a gain of $ 150. These calculations are the results in case of a devaluation of the foreign currency; in case of a revaluation the first two methods would result in a translation gain and the latter two would result in a translation loss.

9.1.3. Economic Exposure

We have already defined foreign exchange economic exposure as the extent to which the net present value of the cash flows of the company is changed due to an unexpected change in exchange rates. The exchange rates changes could effect the revenues and costs of the company and this effect in value could be positive or negative, depending on the direction of the exchange rates changes. The definition does not include the expected changes in foreign exchange rates, since they are assumed to be anticipated in the expected cash flows of the company.

The important difference of economic exposure from the accounting based exposure is that the economic exposure is not static

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and historically based. The economic exposure looks at the future effects of exchange changes which have occurred or may possibly occur in the future. (Prindl, p.21)

The economic exposure to foreign exchange rate changes can be analyzed into four levels depending on the time horizon used : namely short term, medium term assuming equilibrium conditions, medium term assuming disequilibrium conditions and the long term (Eiteman/ Stonehill, p.158).

In the short term, the effect of unexpected exchange rate changes can be seen in the expected cash flows in the one year operating budget of the company. Since it is very difficult to make changes in the existing obligations (such as purchase or sales commitments) of the company in the short term, the company might have different cash flows from the ones that are expected in the one year budget.

In the medium term, with the assumption that there is an equilibrium between foreign exchange rates, national inflation rates and national interest rates, the company is assumed to be able to adjust prices and costs to maintain its competitive position. In this case, we can not talk about the economic exposure, since there will not be any difference between expected and realized cash flows of the medium term budget of the company. Hence, the market value or the net present value of the company will remain unchanged.

In the medium term assuming disequilibrium conditions among foreign exchange rates, national inflation rates and national interest rates, the company is assumed not to be able to adjust prices and costs to maintain its competitive position. In this case, the company will be exposed to foreign exchange economic exposure since the realized cash flows of the company will differ from the expected cash flows. Hence, the market value or the net present value of the company will alter when the exchange rates alter.

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In the long term, all the companies that are subject to international competition are exposed to foreign exchange economic exposure, since in the long term foreign exchange markets are assumed to be not in equilibrium continuously.

The measurement of economic exposure requires a simultaneous consideration of the relative rates of inflation associated with each foreign currency that appears in the company's cash flow. Therefore, a distinction should be made between the nominal exchange rate and the real exchange rate.(Shapiro,p.116)

The nominal exchange rate is the rate that is seen in the market. It indicates the price of a currency in terms of another one, very much the same as the price of a good. We perfectly know that the price of goods in one year can not be compared to the price of goods in another year without adjusting for inflation. Using the same logic the nominal exchange rates changes should be adjusted for inflation rate differences between currencies. Having in mind the purchasing power parity relation that was explained in the first chapter, the changes of nominal exchange rates reflects or depends on the differences of inflation rates among countries.

The real exchange rate is the rate that is adjusted for changes in the relative purchasing power of each currency. For adjustment one of the earlier period's exchange rate must be taken as a base period. Assumed that e_0 indicates base period exchange rate, e_t indicates nominal exchange rate in period t, and $i_{d,t}$ and $i_{f,t}$ indicate the fractional changes in the price levels of domestic and foreign currencies between the period 0 and period t, respectively. The real exchange rate in period t can be calculated as follows:

$$\overline{e} = e_t \frac{\left(1+i_{f,t}\right)}{\left(1+i_{d,t}\right)}$$

If purchasing power parity holds exactly, the changes in the nominal exchange rates will be fully offset by the changes in the

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relative purchasing power between the two countries. In this case, the real exchange rate does not change. If purchasing power parity holds exactly, the nominal exchange rate in period t will be equal to:

$$e_t = e_0 \frac{\left(1+i_{d,t}\right)}{\left(1+i_{f,t}\right)}$$

then, $\bar{e}_t$ equals e_0 ,meaning that, the real exchange rate remains unchanged between the period 0 and period t. If , on the other hand, the changes in the nominal rate are not fully offset by the relative price changes between two countries, the real exchange rate will change, so that exchange risk will result.

As mentioned in the first chapter of this book, there is a lot of evidence that purchasing power parity theorem holds only in the long term (over three years or more). In the long term, there will be no importance of which currencies a company buys/sells or borrows/lends, since the effects of foreign exchange rates movements will be offset by countervailing changes in inflation rates. However, the theorem does not hold in the short term, and the unexpected exchange rate changes cause a variability in cash flows.

9.2. Managing Foreign Exchange Exposure

After defining the three types of foreign exchange exposure, we can now focus on the various ways to manage foreign exchange exposure. When and how a multinational firm or a firm whose operations and financial sources are internationally diversified, should react to foreign exchange exposure basically depends on the management's financial objectives. For example, if the management considers to maximize stockholder's wealth in the long term, the attention must be given to the economic exposure. If the management considers to maximize after tax earnings per share in the short term,

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the attention must be given to the transaction and translation exposure.

An international investor who has an internationally diversified portfolio, must also manage his/her portfolio according to changes in expectations. In this case, the attention must be given to both the asset class and the currency of investment. It is very important to consider the asset class since the technique to reduce the exposure might differ according to the asset. For example, a portfolio which is constructed heavily by long term bonds will need to be protected by, say, interest rate futures or options. However, a portfolio that is constructed heavily by foreign stocks might need other techniques to reduce the risk.

All the techniques available for multinationals and international companies or portfolio managers are lumped together as "covering" or "hedging" techniques. Although these two terms are used interchangeably, some authors define hedging as a broader term than covering. Covering is defined as the forward purchase or sale of foreign exchange to offset completely the risk of fluctuation in a rate of exchange when payments are to be made or received in that foreign currency in future (Transaction exposure), or when balance sheet positions need to be translated at a closing spot rate (Translation exposure) (Prindl, p.58). Hedging, however, is defined as all the actions taken to change the exposed positions of a company in a currency. In this book, we will use the two terms interchangeably.

The techniques available to international or multinational companies, and which can be used in foreign exchange risk management, can be classified into two categories according to their basic origin. The first category of techniques are the ones that are internal to the company, the second category techniques are the ones external to the company. The first group of techniques is generally aimed at reducing or preventing an exposed position; the second group is used to insure against the possibility of any losses due to

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exposed positions of the company which can not be eliminated by internal measures.(McRae, p.100)

Internal and external exposure management techniques can be summarized as follows:

Internal Techniques
- Internal Techniques Affecting Outstanding Positions
  - Netting
  - Matching
  - Leading and lagging
- Internal Techniques Affecting Future Positions
  - Pricing Policies
  - Asset and Liability management

External Techniques
- Forward Contracts (Forward Exchange Market Hedge)
- Short Term Borrowing (Money Market Hedge)
- Foreign Currency options (Options Market Hedge)
- Foreign Currency Futures (Futures Market Hedge)
- Foreign Exchange Swaps

9.2.1. Internal Techniques

It should be emphasized that the possibility of using internal techniques largely depends on the company's involvement to international business. Obviously an international company (importer or exporter company) has less internal (and external) choice available to manage foreign exchange exposure compared to a multinational company who has subsidiaries abroad. We will now discuss these techniques in detail in this section.

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9.2.1.1.Netting

Netting is a simple technique to apply between subsidiaries of a multinational company which do trade with each other. In this technique, only the net amount of debt is paid to the counterpart on a regular basis, so that the gross inter-group trade receivable and payable are netted out. Netting can be bilateral or multilateral. Bilateral netting is more straightforward to apply. Each pair of subsidiaries nets out their own position with each other. Suppose that a multinational company have two subsidiaries one is in Germany and the other is in France. Further assume that the subsidiary in Germany(X) owes French franc equivalent of $2 million to the subsidiary in France(Y), and (Y) owes German mark equivalent of $3 million to (X). When the actual cash remittance is netted out, (Y) pays (X) the German mark equivalent of only $1. With this way these two companies have saved transfer and exchange costs associated with $2 million of eliminated cash flow.

Multilateral netting is a somewhat more complex matter. It can be used when subsidiaries both import from and export to companies within the same group. Suppose that company (X) in the above example buys goods worth $5 million monthly from company (Y) and sells goods worth $2 million monthly to another subsidiary in Turkey (Z); company(Y) buys monthly $2 million from company (Z). After multilateral netting, company (X) pays monthly $3 million to company (Y). In this way, netting would eliminate $2 million in transfers from each subsidiary's monthly payments. In total $6 million flow will be eliminated [$2 million from (X) to (Y); $2 million from (Y) to (Z); $2 million from (Z) to (X)].

9.2.1.2.Matching

Although "netting" and "matching" are often used interchangeably, we made a separate heading for them. While netting is used mostly in multinational companies for the group's receipts

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and payments, matching can be used by both multinationals and international companies (exporters and importers).

If a company matches its foreign currency inflows with its foreign currency outflows with respect to amount and timing, this is called "matching". Hence, these cash flows should not be necessarily intercompany cash flows as in the case of netting. It can be applied to third party as well as intercompany cash flows. For a natural matching, the two-way cash flow must be in the same foreign currency. However, it is possible to match this two-way cash flow with different foreign currencies which have a close link to each other, such as, German mark and Belgian franc or Dutch guilder. This is called "parallel matching". In the case of parallel matching, of course, there is a risk that these two currencies will not move together in the same direction. If they move in opposite directions, both sides of the parallel match would lead to an exchange loss or gain.

9.2.1.3.Leading and Lagging

Another technique to reduce foreign exchange exposure called leading and lagging refers to the adjustment of intercompany credit terms. Leading means speeding up the payments or prepayment of the trade obligations and lagging means delaying the payments. This technique can be easily applied between subsidiaries of a multinational company, since they have a common set of goals for the consolidated group. However, leading and lagging can be used between independent companies, when it satisfies both sides of the operation. For example, a German company may wish to lead in collecting its accounts receivable denominated in US dollars when it thinks the US dollar will depreciate against German mark. But the US company will not like to pay earlier its accounts payable unless the German company will offer to US company a discount equal to the forward discount on the US dollar.

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This technique is widely used by multinationals not only to deal with foreign exchange risk but may be more commonly to shift liquidity from one subsidiary to another. Of course, there is a cost involved taking the funds from one subsidiary earlier then expected and giving them to the other before anticipated. There are three elements in this calculation (McRea, p.107): (a) a cash cost/benefit represented by the interest rate differential between the two countries; (b) an expected cash gain/loss to be realized on the altered transactional exposures arising in the lead and lag countries; (c) an expected translation gain/loss arising on the altered translation exposures in the lead and lag countries.

9.2.1.4.Pricing Policies

The above mentioned techniques can be useful for a short term hedging to the existing positions. There are, however, other techniques that are useful for longer term exposure management, such as price adjustments and asset/liability management.

Pricing policy as a foreign exchange exposure management might be considered into two tactics: one is the price variation and the other is the currency of invoicing changes. Price variation means that to increase the selling price at a level at which the negative effect of exchange rate changes can be offset. In some countries with weak home currencies, this may be the only way to reduce foreign exchange risk since the other techniques are not appropriate or restricted by local authorities, or simply the markets do not exist (such as forward markets). If the company can raise its selling price before devaluation, it can protected the reported income stream after devaluation. There are some requirements to do so; first, marketing department must be convinced that a price change is now appropriate, and second, competitive conditions must allow a price increase to be made.

The other price policy is trying to invoice exports in relatively stronger currencies and imports in relatively weaker

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currencies than the local currency (currency of invoicing changes). Currency of invoicing tactic can be used either defensively or aggressively. An aggressive strategy is the one that is just mentioned above. A defensive strategy is trying to invoice both exports and imports in local (home) currency. In this case the company does not need to take into consideration the weakness or strength of the currency of invoice since its home currency.

For an exporter with a strong home currency, a defensive strategy is most suitable, but for an exporter with a weak home currency an aggressive strategy might produce a good opportunity for some gains. However, there are risks involved in changing currency of invoice from weak to strong. If the exchange rate changes alter from expected changes, and reverse the situation in the future, it will be difficult for the company to switch the currency of invoice back to the home currency.

9.2.1.5.Asset and Liability Management

The second technique affecting future positions of the company is the asset and liability adjustment. The main logic behind this technique is to reduce assets and increase liabilities in weak currencies (likely to depreciate), and to increase assets and reduced liabilities in hard currencies (likely to appreciate). If the company likes to apply asset and liability management technique defensively, it will try to match assets and liabilities, revenues and expenses in order to minimize foreign exchange gains and losses irrespective of the distinction between strong and weak currencies.

For example, consider a subsidiary in a country where a devaluation is likely to appear, the basic hedging strategy would be as follows: reduce the level of cash in local currency (local currency refers to where the subsidiary is located), apply tighter credit terms in order to reduce accounts receivable in the local currency, increase local borrowing, and delay accounts payable. Reducing the level of local currency cash balance can be achieved by transferring this cash

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back to the parent company or to other subsidiaries where the local currency is hard. Intercompany leading and lagging technique and/or increasing the dividend or quasi-dividend (royalties, management fees) payments can be used to apply such tactics. Increasing local currency debt should be considered into short term and long term maturity categories, since in a weak currency country the subsidiary is usually restricted to short term borrowing. The underlying reason is that in such countries capital markets are often not available for long-term loans (restrictions by host governments for foreign companies to issue long-term loans) or that the private placements of such loans is simply very difficult. In practice, long-term funds are usually supplied by the parent company.

9.2.2. External Techniques

The second group of techniques are specific contractual arrangements, available in external markets (external to the company), to both international (export and import) as well as multinational companies. Contrary to internal techniques, the cost of external techniques are fixed and can be precisely determined in advance.

External hedging techniques can be used for both transaction and translation exposures, unless there are no government or market restrictions to do so. In some countries, for example, forward market and/or markets for derivatives such as options and futures do not exist, so that the companies with international involvement in their business have limited choice to deal with foreign exchange exposure. We will now give brief explanation to each external technique.

9.2.2.1.Forward Exchange Contracts

Hedging the company's foreign exchange commitments via forward market is the most classical technique. This technique involves purchasing or selling the exposed foreign exchange in the

forward market. To illustrate how this technique works to protect against transaction exposure, consider a German exporting company selling goods to a US company, in time (t_0) for $1,000,000 and on 3 months credit term (t_3). Further suppose that the German company obtains the following exchange rate quotations in time (t_0):

Spot rate	$1 = DM 1.7813
3 months forward rate	$1 = DM 1.7717

The German export company's treasurer expects to receive $1,000,000 in time ($t_3$). This receivable is booked at the exchange rate of $1 = DM 1.7813 , giving a DM equivalent receivable of DM 1,781,300. If there will be no change in the exchange rates during the credit term, which is very unusual in the current financial world, there will be no difference between the receivable booked and the actual dollar receipt. However, in real life situation the actual German mark receipt is unknown as in time (t_0) and this $1,000,000 receivable is exposed to exchange rate changes over 3 months.

To overcome this situation the German exporter company can sell the dollar receipts in the forward market at the fixed forward rate given at time (t_0) which is $1 = DM 1.7717 for delivery at the same date with the receivable payment date. With this way the German company makes sure that whatever happens to exchange rates during 3 months (exposure term) it will receive DM1,771,700 as an equivalent of $1,000,000 account receivable. The difference of DM 9,600 (DM1,781,300-DM1,771,700) will be booked as an additional cost of sales. This is referred as an ex-ante cost of a forward contract. Hence, ex-ante cost is defined as the difference between the booked receivable (or payable) and the amount actually received (or paid). If one wants to convert the ex-ante cost into annual percentage terms, this can be done as follows:

Annualized discount or

$$\text{premium in \% terms} = \frac{\text{Forward rate - Spot rate}}{\text{Spot rate}} X \frac{12}{\text{months to maturity}} X 100$$

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In the above example the annualized discount of the dollar forward is:

$$\text{Annualized discount} = \frac{1.7717 - 1.7813}{1.7813} X \frac{12}{3} X100 = 0.0053 X4 X100 = 2.12\% \text{ per annum}$$

The other, maybe more useful definition of the cost of the forward contract is the ex-post or opportunity cost definition. Ex-post cost of the forward contract is defined as the difference between the home currency amount which would have been received (or paid) if the exposed receivable (or payable) had been left uncovered and the amount which the forward contract yields. Suppose the spot exchange rate in time (t_3) realized as $1= DM 1.7830, which is contrary to what was expected in the three months forward rate in time (t_0). In this case, the ex-post (opportunity) cost will be DM 11,300 (DM1,783,000- DM1,771,700), which is higher than the ex-ante cost of the forward contract. As an annualized percentage the cost of the forward contract can be calculated as follows:

$$\text{Cost of forward contract} = \frac{\text{realized spot rate - forward rate}}{\text{forward rate}} X \frac{12}{\text{months to maturity}} X100$$

$$\text{Cost of forward contract} = \frac{1.7830 - 1.7717}{1.7717} X \frac{12}{3} X100 = 0.0063 X4 X100 = 2.52\% p.a.$$

Of course, one can discuss that if the German treasurer expects that the $ will appreciate instead of depreciate over the exposure term, he may simply decide to accept the transaction risk and remains unhedged. In this case, if his expectations realizes he would receive more dollars than the hedged position. In the above example, the German company would receive DM1,783,000 instead of DM1,771,700, which is DM11,300 more than the hedged position. However, that amount is at risk and realized receipts under the unhedged position could vary considerable from the amount when the transaction is hedged.

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Forward contracts are also used to hedge or cover translation exposure. The logic is to sell the exposed currency in the forward market in the beginning of the exposure term, purchase the same currency in the spot market and deliver them against the forward contract in the end of the exposure term.

It should be mentioned here that there is an asymmetrical situation on taxation to hedge translation exposure. In the case of transaction exposure, the gains and losses on the forward contract are added or subtracted from the taxable profit of the company. However, in the case of translation exposure, the gains and losses on the forward contract which is entered into to cover translation exposure are subject to corporate tax computation whilst translation gains and losses are not. In other words, the translation losses are not tax deductible, whereas the gains on the forward contracts would be counted as ordinary income of the company. Hence, the size of the forward contracts have to be grossed up to take account of the differential tax treatment. The size of the necessary forward contract can be determined by the following formula where (t) is the corporate tax rate:

$$\text{Forward Contract size} = \frac{\text{projected translation loss in home currency}}{\text{forward rate - expected future spot rate}} X \frac{1}{(1-t)}$$

The forward rate and the expected future spot rate in the denominator of the formula must be expressed on a direct basis, meaning that the home currency (parent company's currency) price of one unit of foreign currency.

Suppose that a US multinational company owns a subsidiary in Belgium. Under the current rate method, the US company treasurer calculates that the Belgian subsidiary's balance sheet represents a potential translation exposure of BEF10,000,000 for the year end. Further assume that the spot rate in the beginning of the accounting term is BEF1= $ 0.030 and 12-month forward rate is BEF1 = $ 0.0295. The treasurer forecasts a spot rate one year hence of BEF1 =

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$ 0.0270 meaning that the Belgium franc will drop in value relative to the dollar by 10%. In the case of such devaluation the US company will have a translation loss equal to 10% of the net exposed assets which is BEF1,000,000 or $30,000 (BEF10,000,000X$0.030 - BEF10,000,000X$0.027). In order to cover a potential translation loss of BEF1,000,000 the company must enter in a BEF24,000,000 forward contract (assuming that the corporate tax is %50 in both countries) , as it is calculated below.

$$\text{Forward contract size} = \frac{\$\ 30{,}000}{\$0.0295 / \text{BEF} \ - \ \$0.0270 / \text{BEF}} X \frac{1}{(1 - 0.50)} = \text{BEF } 24{,}000{,}000$$

If the company sells francs at $0.0295 on the forward market, and buys them later in the spot market at their expected price of $0.0270 (for simplicity, it is assumed that the realized spot rate is equal to the expected spot rate), it will make a profit of $0.0025 on each franc. Total profit, under the current rate translation method, can be calculated as follows:

Beginning of the accounting term	
Sell Belgium francs forward at present forward rate (BEF24,000,000 X $0.0295/BEF).....	$708,000
End of the accounting term	
Purchase francs in the spot market to fulfill the forward contract (BEF24,000,000 X $0.0270/BEF).....	($648,000)
Profit on forward hedge	$60,000
Tax on the profit (50%)	$30,000
Net profit on forward hedge	$30,000
Translation loss (not tax allowable) ($ 300,000 x 10%)	$30,000

As it is seen from the example, the after-tax net profit on the forward hedge ($30,000) completely offsets the translation loss of $30,000. For simplicity, we assumed that both parent and subsidiary

companies subject to same tax rate. It might be possible, however, that the subsidiary is located in a low-tax jurisdiction. In this case, the subsidiary could carry out the same hedge with a smaller contract size. For example, if the subsidiary had been subjected to 25% tax rate, then the contract size for the same amount of translation loss (BEF1,000,000) would have been BEF16,000,000.

It should be mentioned furthermore that in the above example it is assumed that the realized spot rate in the end of the accounting term is equal to the forward rate given in the beginning of the accounting term. In this case, of course, it is easy to calculate the contract size precisely. However, this is not applicable to real life situations. Hence, if the company's forecast is inaccurate, the realized exchange gain or loss will be different from the expected exchange gain or loss.

9.2.2.2.Short-term Borrowing

An alternative technique to deal with foreign exchange exposure is the short term borrowing. In the case of short term borrowing (money market hedge) the contract is the loan agreement, while it was the forward exchange contract in the case of forward market hedge. The difference between money market hedge and forward market hedge is that the cost of money market hedge is determined by the differential in interest rates, while the cost of forward market hedge is determined by the forward rate quotations. Under the interest rate theorem these two costs must be nearly the same in the efficient markets. But, we all know that not all markets are efficient at all times.

Hedging through the money market can be used for both transaction and translation exposure management. Again, we will distinguish between transaction and translation exposure types because of tax and exchange control considerations. In order to cover its foreign currency receivables an exporter company borrows the foreign currency simultaneously with the export contract that is

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entered into and immediately converts the proceeds into its home currency. In order to cover its foreign exchange payable an importer company borrows its own currency and immediately converts it into foreign currency.

To illustrate how this technique works for hedging the transaction exposure, we will recall our earlier example of a German company which has an exposure of $1,000,000 for three months. This time the treasurer of the German exporter decides to hedge their account receivables by borrowing in the money market rather than by buying a forward contract. The following steps should be taken simultaneously with the signing of the sales contract:

-The German exporter company borrows $1,000,000 for three months at 5.50% per annum and converts this into marks at the current rate of $1=DM1.7813, yielding DM1,781,300. This amount of marks will be placed on deposit account at 3.50% p.a. for three months and will earn DM15,586.

-In order to hedge the interest payable on the dollar loan, the German exporter buys $13,750 forward for three months at the given forward rate of $1=DM1.7717.

By doing the transactions mentioned above, the German exporter will be completely hedged against foreign exchange risk and interest rate risk over the exposure term. What will happen in the end of the exposure term is as follows:

-The German exporter receives $1,000,000 from the US importer and delivers this amount to the dollar lender as repayment of principal. Simultaneously, he receives $13,750 as per forward contract and delivers them to the lender as repayment of interest.

-Net DM yield for the German exporter company then will be DM1,772,525, which is the difference between the term deposit yield of DM1,796,886 (DM1,781,300 principal + DM15,586 interest) and the forward contract cost of DM24,361 ($13,750x DM1.7717).

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The cost of hedging through the money markets can be calculated in both terms, ex-ante and ex-post as it was done in forward market hedging. The ex-ante cost is simply the difference between borrowing and lending rate, which is 2% (5.5%-3.5%) in our example.

The ex-post (opportunity) cost of money market hedge is the difference between the home currency amount which would have been received in case of unhedged position and the home currency amount which the hedge position yields.

$$\text{Ex - post cost} = \frac{\text{Foreign currency receivable or payable}}{\text{Spot rate at settlement date}} - \text{Net home currency yield with hedging}$$

$$\text{Ex - post cost} = \frac{\$1,000,000}{\text{DM1.7830}} - \text{DM1,772,525} = \text{DM } 10,475$$

As it is in the previous example of forward exchange contract, the opportunity (ex-post) cost of money market hedge is high because the dollar actually appreciated against DM over the exposure term, rather than depreciate as indicated by the forward discount on the dollar.

Short term borrowing technique is also used to hedge translation exposure. Let us use the example of a US company with a BEF10,000,000 translation exposure to explain the technique as a means of hedging translation exposure. In this case, the treasurer of the US company will borrow BEF20,000,000 from the money market instead of selling BEF24,000,000 forward in the forward market. The calculation of the amount that will be borrowed from the money market can be calculated as follows:

$$\text{Total amount to be borrowed} = \frac{\text{projected translation loss in home currency}}{\text{spot rate - expected future spot rate}} X \frac{1}{(1-t)}$$

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$$\text{Total amount to be borrowed} = \frac{\$\,30{,}000}{\$0.030 / \text{BEF} - \$0.0270 / \text{BEF}} X \frac{1}{(1-0.50)} = \text{BEF } 20{,}000{,}000$$

We assume that the interest rates for Belgium franc and US dollar are 3.80% and 5.60% per annum, respectively. In the beginning of the accounting term, the US company (or the Belgium company) treasurer borrows BEF20,000,000 at 3.80% p.a. for one year and converts them into dollars simultaneously at the current spot rate, and lends the dollar proceeds at 5.60% p.a. for one year. Net profit on money market hedge can be calculated as follows:

Beginning of the accounting term

Borrows BEF20,000,000 at 3.80% for one year and converts them into dollars at current spot rate of BEF1=$0.030, yielding $600,000. Lends $600,000 at 5.6% for one year.

End of the accounting term

Receives $633,600 ($600,000x1.056) from the US borrower, $600,000 as principal and $33,600 as interest on it. Converts them into BEF at current spot rate of say BEF1=$0.027, yielding BEF23,466,667.

($633,600x 1/0.027).....BEF23,466,667

Pays BEF20,760,000 to BEF lender

(BEF20,000,000x1.038).....BEF20,760,000

The gain on money market operation before tax BEF2,706,667

Tax on the profit (50%).....BEF1,353,333

Net profit on money market hedge.....BEF1,353,334

US dollar value of after tax gain

(BEF1,353,334x$0.027).....$36,540

Translation loss(not tax allowable)

($ 300,000 x 10% devaluation).....$30,000

Net gain on the money market operation.....$6,540

At the end of the accounting term, the US company receives

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$633,600 as repayment of the dollar loan and converts them into BEF at the current spot rate, yielding BEF23,466,667. After paying the franc debt of BEF20,760,000 (BEF20,000,000 principal and BEF760,000 interest) the US company is left with a gain of BEF1,353,334 after tax which is $36,540 with the current spot rate. This amount is $6,540 higher than the translation loss of $30,000 due to interest rate differential of 1.8% (5.6%-3.8%) amounting to $600,000x1.8%x50%= $5,400 and the exchange gain on the payment of Belgian franc interest amounting to BEF760,000x($0.030-$0.027)x0.50=$1,140. The total of these two amounts ($5,400 +$1,1140 =$6,540) is equal to the amount of the company's profit on the money market hedge.

9.2.2.3.Foreign Currency Options

The company may use options market to hedge its receivable or payable (transaction exposure) or the value of foreign currency assets against adverse movements in the exchange rates. The treasurers are also attracted to use currency options when the future foreign currency cash flows are uncertain. The future foreign currency cash flows can be uncertain in the case of putting in a contract tender or in the case of issuing price lists in a foreign currency (Buckley,p292).

The major problem hedging via the options market is that the options contracts have specific amounts and expiration dates which may be different from the company's requirements. In order to match exactly the company's requirements for hedging, the over-the-counter (OTC) market has been developed where tailor made options are traded privately between banks and their customers. The company may ask a bank to write an option which matches its requirements with respect to the foreign currency, the amount, the price and the expiration date. Of course, it should be mentioned here that there is no secondary market for such tailor made options, but the company may sell it back to the bank or may enter into another over the counter option with reverse characteristics of the previous one.

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To illustrate how options market hedging works we will use the previous example of a German exporting company selling goods to a US company, in time (t_0) for $1,000,000 and on 3 months credit term (t_3). In order to protect $1,000,000 receivables against the adverse changes in exchange rates in three months' time, the German company can buy call options on DM(or a put option on dollars) with three months to expiration at a strike price of (say) $0.565/DM. Assume that the German company entered into the option contract on the Philadelphia Stock Exchange where the standardized contract size for DM is DM62,500 against the US dollar. Further assume that the price or premium of the call is $0.0052 per DM (option premiums are quoted in US cents per unit of the underlying currency and this appears on the quotation table as 0.52), so that the total premium would be $325, giving by DM62,500x$0.0052.

At the maturity of the option, if the spot rate is above $0.565 (say, $0.570), the option will be exercised and the $1,000,000 will be converted to DM at $0.565 rather than at the spot rate (If the spot rate is $0.570, the total proceeds on the spot market will be DM1,754,386 minus the cost of the call DM9,204). In this way it is guaranteed that the net proceeds of the $ receivables will be at least DM1,769,912 ($1,000,000x1/$0.565) minus the DM9,204 paid for the call as premium ($325 per contract x 16 contract x 1/$0.565) which is DM1,760,708. However, if the realized spot rate is below the exercise price of $0.565 say $0.560, the option will not be exercised because it will be more profitable to convert the $1,000,000 in the spot market. In this case, net proceeds of the trade will be DM1,776,510 which is the result of DM1,785,714 ($1,000,000 x 1/$0.560) minus DM9,204 (the cost of the call). This total is DM15,802 higher than the total of the exercised option.

It is clear from the above example that the benefit of buying a call option on DM (domestic currency) when there is a dollar (foreign currency) receivables is that it makes certain a minimum amount that is received for dollars but allows the company to benefit if the exchange rate ends up below the exercise price. It can be

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similarly demonstrated that if the German company has payables in dollars it can buy a put option on DM (or a call option on dollar) and ensure that a minimum amount of marks will be paid for dollars, and yet allowing itself to benefit if the DM value of the dollar ends up higher than the exercise price.

9.2.2.4.Foreign Currency Futures

Foreign currency futures markets can be used for hedging against adverse movements in foreign exchange rates by companies, of course, if a market exists in the foreign and domestic currency. In fact futures markets in foreign currencies exist for only a small range of currencies, such as DM, British pound, Canadian dollar, Swiss franc, yen, and French franc. The critic mentioned for options that hedging is not always exactly achievable because of the standardized contracts in respect to the amount and the term, is valid for the foreign currency futures as well. For example, a future contract on DM in the Philadelphia Stock Exchange is DM125,000 and has only four delivery dates per year being March, June, September, and December. Of course, it is possible to take that number of contracts which approximate the desired amount for hedging, but this will not end with an exact hedge. In order to overcome the problem of specific delivery dates, the company can trade such a number of contracts of one delivery date and such a number of contracts of another delivery date to achieve a weighted average equal to the receivable or payable date.

Currency futures markets are more frequently used by speculators and currency traders rather than by the company treasurers for hedging. The other reason why the companies are not frequent users of the futures markets is the fact that they can achieve their hedging more easily, more cheaply and more effectively via the forward markets. Remember that futures contracts require margin payments whereas currency forward contracts require no up-front payment (Buckley,p.256).

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If the German company decides to hedge its dollar receivables exposure in the futures market, it should buy DM futures contracts of equivalent to $1,000,000 to sell dollars against DM. To buy these futures contracts, it is necessary to post a margin and if the price of these contracts declines to a level that it falls below the maintenance level it is necessary to add to the margin account. However, if the price of these contracts increases, the margin account is credited by the amount gain and the company has the right to draw this gain from the account. As we said earlier in Chapter 8, this addition or subtraction to the margin account is done on a daily basis and is called marking to market.

The gain for the German company that is made by buying DM futures contracts will be the amount added or subtracted from the margin account minus the amount that was originally placed in the account. Suppose that the current $/DM spot rate is $0.5614 and the June DM futures contract (it is assumed that this covers 3 month exposure term) is currently priced $0.5690 and the company expects that DM will appreciate more than this in three months time. At 125,000 marks per contract, the price of one contract is $71,125, giving by $0.5690 x 125,000. The German company wants to hedge its receivables currently worth DM 1,781,261 ($1,000,000 / $0.5614) with contracts priced at $71,125 each. Thus, the number of contracts that the company must buy is 14 ($1,000,000/71,125).

Suppose that the spot rate in June is $0.5710/DM and the mark futures price increased to $0.5790 or $72,375 per contract. If the German company had stayed uncovered, it would have received DM1,751,314 in the spot market for its $1,000,000 which represents a loss of DM29,947 (DM1,781,261 - DM1,751,314). By purchasing 14 futures contract the German company made a profit of $17,500 [($72,375 - $71,125)x14] or DM30,648 when the company exchanges them in the spot market for DM. Thus, the futures position covered all of the companies loss of DM29,947 due to the mark's increased value and realized a profit of DM701 (DM30,648-DM29,947) on the entire transaction.

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It should be mentioned that as long as the spot and the futures rates move in the same direction, the hedge will be successful to reduce at least some part of the loss. If the DM depreciated over the exposure period contrary to the expectation, there would be a loss on the futures position. In this case, it would be more profitable to stay unhedged.

9.2.2.5.Foreign Exchange Swaps

The principals of swaps have been introduced earlier in Chapter 5, in the contents of using swaps in international bond markets. A foreign exchange swap was defined as an agreement between two parties to exchange a given amount of one currency for another for a period of time and at maturity to give back the original amounts swapped. The companies can swap foreign exchange denominated loans to its home currency using this technique and create a covered hedge against exchange losses.

There are different types of swap agreements, such as the "back- to-back loans", the "parallel loan", the "currency swap", and the "credit swap". The first three types of swaps were explained in Chapter 5 except the "credit swap". Credit swap technique was introduced in the US after World War II by multinational companies to finance their subsidiaries in weak currency countries. Before World War II the technique was used only between commercial banks and central banks in order to satisfy commercial bank's temporary needs for foreign exchange.

Assume that a US multinational company has a subsidiary in a weak currency country say in Mexico. The US parent company deposits dollars to the account of a Mexican bank's US correspondent in the US; in turn, the Mexican bank makes an equivalent loan in pesos to the US subsidiary company in Mexico. At maturity the transaction will be reversed and the subsidiary will repay the loan (as pesos) to the Mexican bank; in turn, the Mexican bank's correspondent will return the dollar deposit to the parent company in

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the US. In this way, the US parent company's principal will not be effected by the exchange rate changes between the dollar and the peso during the credit term. It should be mentioned that the exchange rates used in the credit swap transaction might be different (lower) than the spot market rates. So, the dollar amount needed to finance the subsidiary will be higher than the amount to make the same financing through the foreign exchange market.

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