



# CHAPTER 2

## FINANCIAL DERIVATIVES

### ✿ *Objectives*

After studying this chapter you should be able to understand:

**2.1 Foreign exchange risk: definition, types, identification**

**2.2 Financial derivatives**

*2.2.1 General concepts*

*2.2.2 Forward exchange contracts*

*2.2.3 Currency accounts: the Eurocurrency market, loans*

*2.2.4 Options*

*2.2.5 Swaps*

*2.2.6 Financial futures*

**2.3 Comparing different types of derivatives**

## 2.1 Foreign exchange risk: definition, types, identification

Foreign exchange risk has a variety of forms and can be obvious or obscure. Foreign exchange risk may exist for a company without the company even being aware of it. One must be able to identify the existence of foreign exchange risk and its specific type before it can be effectively managed.

E.g.

1. An import company Co. from USA is buying Wedgwood china from a supplier in England and is invoiced in English pounds. Payment is due on a net 30-day basis. Import Co. USA must buy English pounds sometime between the date the china is ordered and the payment due date.
2. An export Co. from USA is selling its tree trimming equipment to a company in Thailand. In order to be competitive, it must invoice its customer in local currency, the Thai baht. Export Co. USA will need to convert the Thai baht into US dollars upon receipt of the payment, as it has no accounts payable in Thailand.
3. New Products Inc. is exporting its products to Nigeria and is billing its customer in US dollars. Payment is on a net 10-day basis.
4. Worldwide Corp. has subsidiaries in several different countries around the world. At each quarter-end, a consolidated balance sheet must be given to the board of directors. Each subsidiary maintains its own bank accounts and is responsible for remitting US dollars for dividend payments.

In each of these situations, the companies involved have foreign exchange exposure. Each company has a different combination and varying degree of exposure.

The main foreign exchange exposure can be defined, such as:

1. **Sovereign risk** – this is another name for political risk. What are the chances that the government which is in power in the foreign country will remain intact and will continue to have favourable relations with the United States, in our case? What happens if the current government falls and a less-than-friendly governing is installed?
2. **Exchange risk** – Will the foreign currency be trading freely on the open market when the time comes to convert into or out of the currency? Further, are there any restrictions on the availability and

transfer of “hard currency” out of the foreign country? What happens if exchange controls are put in place?

3. **Translation risk** – this is an accounting-based risk. When operating an overseas operation and a consolidated statement must be filed, changes may occur in the book value of the overseas operation without any true changes in its balance sheet. This comes about when different currency conversion rates are used to value the same set of assets. Since foreign exchange rates can change in seconds, a quarterly consolidated statement will show changes in the operation’s value purely related to the use of current exchange rates versus those from the previous quarter.
4. **Transaction risk** – this is the risk associated with the potential gains and losses on a given transaction, which is susceptible to foreign exchange movements. This relates to any transaction resulting in a net receipt or payment, which must be made in a foreign currency. Therefore, items such as foreign currency receivables or payables, repatriation of revenues or dividends, or foreign currency loan payments or interest income are all subject to transaction risk.

Taking into account the connection between the above four examples of foreign exchange risk and the main foreign exchange exposures defined, it should be mentioned the following:

In **Example 1**, Import Co. USA has **transaction risk** associated with its purchase of china from England. The company runs the risk of the English pound increasing in value (in relation to the US dollar) prior to the company buying the pounds to cover the invoice. This would result in an increased cost of the china, which the company may or may not be able to pass on to its customers.

In **Example 2**, Export Co. USA has **sovereign risk**, **exchange risk**, as well as **transaction risk**. Is the government of Thailand stable and free of sanctions? Is the Thai baht a freely traded currency without conversion restrictions? Is there a forward market in the baht so Export Co. USA can sell that baht today for delivery in the future?

In **Example 3**, New Products Inc. has **sovereign risk** and **exchange risk**. How stable is the Nigerian government? Is it on good terms with the US government, in our case? Are there any trade sanctions covering the

products being exported? Will the customer be able to purchase US dollars and, if so, will it be able to transfer them out of the country? How reliable is the exchange market in Nigeria?

In **Example 4**, Worldwide Corp. has **translation** and possibly **transaction risk**. The translation risk comes from converting the foreign currency value of the subsidiary into a US dollar value. With everything else constant, the exchange rate alone could change the value of the subsidiary's assets significantly. If the subsidiary has local currency payables and does not remit profits or dividends to the US parent, no transaction risk exists; however, if profits or dividends are repatriated, a transaction risk exists and must be managed effectively in order to protect their value.

In order to identify the foreign exchange risk in a company, a lot of departments are involved, such as: accounting, sales, legal department, bank account officer, foreign exchange dealer etc.

The main steps for identifying foreign exchange risk are:

1. Determine what types of foreign exchange risk exists.
  - a. Sovereign
  - b. Exchange
  - c. Translation
  - d. Transaction
2. Determine the extent or degree of the risks identified.
  - a. Is there an extreme risk of the government failing?
  - b. Are there exchange controls pending?
  - c. Is war or sanctions imminent?
  - d. What are the tax implications of a translation profit or loss?
  - e. How volatile is the current foreign exchange market for the currencies involved?
3. Determine the longevity of the risk.
  - a. Is this a one-time-only transaction?
  - b. Will foreign denominated sales or purchases are an on-going part of your operation?
  - c. Are you dealing with an overseas subsidiary, which will continue to generate foreign income and expenses?
  - d. Are you borrowing or lending a foreign currency? Short term or long term?

4. Determine what control procedures are in place or are needed to monitor the identified risks.
  - a. Can you adequately forecast when the extent or degree of risk will increase or change?
  - b. Who is responsible for monitoring the control process and developing new controls, as they are needed?
  - c. How much movements in the foreign exchange rates can be tolerated without adverse effects on the company?
  - d. How much exchange risk will be tolerated?
  
5. Determine if the operation of the company has naturally offsetting foreign exchange transactions.
  - a. Is an overseas subsidiary having both local currency receivables and payables?
  - b. Are imports and exports denominated in the same foreign currency? Are they in similar payment schedules?

As a conclusion, it should be said that whenever someone is involved in a transaction in a foreign currency other than his or her home currency, an exchange risk occurs because one currency may move unfavourably against the other.

In Romania, the National Bank defines and regulates the maximum level of the adjusted individual currency positions and total currency positions for banks Romanian legal entities.

Under its provisions<sup>1</sup> the National Bank of Romania defined the following concepts such as:

- a) *the currency position in a certain foreign exchange* represents the net balance of the patrimony in the respective foreign exchange, being the expression of the currency risk;
- b) *on the balance sheet currency position in a certain foreign exchange* represents the amount emphasized in the creditor or debtor balance of the account 3721 “Exchange position”, opened on the respective foreign exchange;

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<sup>1</sup> The National Bank of Romania’s Norm No. 4/2001 concerning the supervision of the foreign exchange positions, published in Monitorul Oficial al României, Part I, No. 631/2001

- c) *off balance sheet currency position in a certain foreign exchange* is the amount emphasized in the creditor or debtor balance of the account 9361 “Exchange position”, opened on the foreign exchange in cause;
- d) individual currency position is the long currency position or the short currency position on each foreign exchange, in lei equivalent;
- e) *adjusted individual currency position* represents individual currency position adjusted with the updated equivalent in lei of the share capital subscribed and paid in foreign exchange and issue premiums paid in foreign exchange, calculated based on the differences in the exchange rate related to the availabilities in foreign exchange representing the contribution to the share capital and the issue premiums paid in foreign exchange;
- f) *total currency position* is the highest value, in the module, between the total of the long adjusted, individual currency positions and the total of the short adjusted individual currency positions.

In Romania, the supervision of the currency risk is accomplished:

- g) by banks;
- h) by the National Bank of Romania, on the basis of the currency position indicators reported by banks.

Under the Romanian legal framework, banks are obliged to report to the National Bank of Romania the level of their currency positions, according to the form “The supervision of the currency positions”, provided in the Annex No. 1.

The reporting form will include data referring to the bank’s global activity (the whole of the national territory and all the sub-units from abroad of the bank).

The currency position in a certain foreign exchange is calculated as an algebraic sum of the on and off balance sheet currency position.

In order to establish the total currency position, the amounts representing long adjusted individual currency positions will be considered with the plus sign (+), and the amounts representing short adjusted individual currency positions will be considered with the minus sign (-).

The total currency position shall be long when the total of the long adjusted individual currency positions is longer than the total of the short adjusted

individual currency positions and it shall be short when the total of the short adjusted individual currency positions is higher than the total of the long adjusted individual currency positions.

At the end of each working banking day the currency positions of a bank are submitted to the following limitations:

- a) maximum 10% of the bank's own funds for each of the adjusted individual currency positions; and
- b) maximum 20% of the bank's own funds for the total currency positions.

With a view to limiting the currency risk the banks have the following obligations:

- a) to have a records system which permits permanently both the immediate registration of the operations in foreign exchange and the calculation of their results, as well as the determination of the adjusted individual currency positions and the total currency position;
- b) to have a supervision and administration system of the currency risk on the basis of norms and internal procedures approved of by the bank's board of directors.

## **2.2 Financial derivatives**

### ***2.2.1 General concepts***

Exchange risk can be virtually fully removed by financial derivatives. Rather than buying or selling a currency or a commodity, a firm can now enter into an agreement to buy or sell the future change in almost any asset's value. These derivatives can remove or reduce some risks but might also increase others. There are hundreds of different derivatives. Some are very simple, but others are very complex and risky.

Banks, companies need to know what they are doing and have good controls in place before entering derivatives markets; otherwise, they risk disasters.

A derivative is a financial instrument based upon the performance of separately traded commodities or financial instruments. So, financial derivatives are financial instruments with prices determined by ("derived from") the prices of other financial instruments, commodities, exchange

rates, interest rates, or other prices. Many agricultural and mining products are traded on commodities markets by firms who are end users of those products. Equally, bond markets and foreign exchange markets allow end users to borrow or lend funds or to obtain foreign exchange. It is possible then to build contracts that promise to deliver those products at some time in the future or give the right to buy or sell them in the future. These contracts may then be traded in markets different from the original commodities and financial markets. Such contracts are known as derivatives. They are linked to the cash market through the possibility that a delivery of the primary commodity or instrument might occur. For example, if a trader is to carry out a promise to deliver an instrument in three months' time he will, at some time during those three months, need to buy the instrument on the cash market. It follows that the value of a derivative and hence its price varies as the price in the cash markets fluctuates. In practice, derivatives seldom lead to the exchange of the underlying instrument. Instead, contracts are closed out or allowed to lapse before the delivery.

In the International Monetary Fund's opinion<sup>2</sup>, *a financial derivatives contract* is a financial instrument that is linked to a specific financial instrument, indicator or commodity, and through which specific financial risks can be traded in their own right on financial markets.

Derivatives are used for a variety of purposes, including:

- Protecting against market risk of financial losses on commercial transactions and financial instruments;
- Reducing or modifying various financial risks;
- Earning income by arbitraging between derivatives and cash markets;
- Earning profits through trading in the instruments, and
- Speculation, especially in foreign exchange and commodity markets.

Therefore, derivatives, then, are instruments that allow market agents to gamble on movements in the prices of other instruments without being required actually to trade in them. Their initial purpose was to allow traders to hedge risks, which they faced in the cash markets as a part of their normal business activity by offsetting one type of risk with the opposite risk in a derivatives market.

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<sup>2</sup> IMF – Manual on monetary and financial statistics, Washington 2000

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In the case of financial derivatives, the underlying instrument is financial: bonds, currencies, or stock exchange indices. The need for financial derivatives markets was not seen until the early 1970s when the globalisation of business, which had been proceeding at pace for the previous 20 years, confronted the increased volatility of foreign exchange rates and increasing and fluctuating rates of inflation. As companies were exposed to increasing amounts of risk, risk management became a major concern of business.

The most obvious form of exchange rate risk relates to current individual transactions – the possibility that apparently profitable activities will turn into losses because of unfavourable movements in exchange rates. More generally, the whole future trading performance of a foreign branch or subsidiary may suffer as a result of exchange rate changes, depending on the impact they have on factors such as relative inflation rates, government interest rate and other policies, and a firm's profit margins and market share.

To help counter foreign exchange risk, firms developed internal techniques relating to accounting systems, payment and invoicing procedures. Governments of developed countries became involved, providing exchange rate guarantees and other forms of insurance, in effect subsidizing the foreign activities of their exporting firms.

Developments on international capital markets allowed firms to borrow more easily in foreign currencies. The growth of Eurocurrency markets allowed firms to obtain foreign currency overdrafts to offset long positions in major currencies.

Forward foreign exchange markets developed and banks began to use them more imaginatively, offering, for example, optional date forward contracts in which a firm is given an option regarding the maturity date within a specified period and is charged the premium or discount that applies to the most costly of the settlement dates within the period.

The great growth in derivatives is indicated by the very rapid increase in the number of exchanges on which they are traded. The world market is still dominated by the big Chicago Exchanges which started life as commodities markets, the Chicago Board of Trade and the Chicago Mercantile Exchange, but 46 new exchanges opened between 1980 and 1993 and derivatives are now traded on more than 60 exchanges worldwide, with almost all OECD

countries possessing at least one such exchange. The *Marché à Terme International de France*, which only opened in 1986, has become the leader in the European financial derivatives markets in the world.

The most important financial derivatives that managers of financial institutions use to reduce risk are: forward contracts, currency accounts, financial futures, options and swaps.

### *2.2.2 Forward exchange contracts*

**Forward contracts** are agreements by two parties to engage in a financial transaction at a future (forward) specified date for a specified price. They are:

- Firm and binding contracts between bank and customer for the
- Purchase or sale of a
- Specified quantity of a
- Stated currency at a
- Rate fixed at the time the contract is made for
- Performance at a future time
- Agreed at the making of the contract.

One of the parties to a forward contract assumes a long position and agrees to buy the underlying asset on a certain specified future date for a certain specified price. The other party assumes a short position and agrees to sell the asset on the same date for the same price. The specified price in a forward contract will be referred to as the delivery price. A forward contract is settled at maturity. The holder of the short position delivers the asset to the holder of the long position in return of a cash amount equal to the delivery price.

*Example: a forward contract in foreign exchange*

A unit enters into a forward contract to acquire yen in one month in exchange for US dollars at the current (spot) price of 95 US cents per 100 yen. The amount to be purchased and the delivery date are negotiated.

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On the settlement date, delivery will take place at the forward at the forward price, or expiration price, of 95 US cents per 100 yen. If the spot price of yen on the settlement date has increased to 110 US cents per 100 yen, the purchaser will acquire yen at 15 cents below the market rate.

If, on the other hand, the spot price has fallen to 90 US cents per 100 yen, the purchaser remains committed to the contract price of 95 US cents, 5 cents above the market rate.

The calculation of forward rates is based on the difference between the interest rates in the traders' own country and the foreign country. Normally, rates are quoted for a fixed number of months ahead, e.g. 1, 2, 3, 6 and 12 months. Contracts up to one month are known as short (value dates) contracts, e.g.:

- a) Overnight (O/N);
- b) Tomorrow/next day (T/N);
- c) Spot/next day (S/N);
- d) Spot/week (S/W);
- e) Spot/fortnight (S/F).

Assuming that today is 1 February, *overnight* would be 2 February, *spot/next day* would be 4 February, i.e. 2 working days plus one day; *spot/fortnight* would be 17 February, i.e. 2 working days plus fourteen days.

Forward rates are issued at *premium* or *discount*.

*When a currency is quoted at a premium* it means that it is more expensive to buy it in the future rather than now at *spot*, given the existing differentials in interest rates in each country. It is referred to as a "*strong*" currency.

*A currency quoted at a discount* is cheaper to buy in the future as opposed to the spot rate now, and is known as a "*weak*" currency.

In order to calculate the rate applicable for the transaction the bank operates on the following basis:

- (a) *Premium*: The *premium* for the currency is deducted from spot to calculate the applicable rate.

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(b) *Discount*: To discount is added to the spot rate to calculate the rate applicable.

*Example*:

The financial press quotes a spread for the day in the US dollar at (buying – selling price):

1,8410	-	1,8430 (spot)
<u>0,0029</u>	-	<u>0,0026</u> (premium)
<u>1,8381</u>	-	<u>1,8404</u> - one month forward rates

Thus, if the bank is selling US 10000 at either spot or one month forward it will cost the customer:

US\$ 10000 @ 1,8410 (spot)	= pounds 5431,83
US\$ 10000 @ 1,8381 (one month forward)	= <u>pounds 5440,40</u>
	difference = <u>pounds 8,57</u>

I.e. more expensive at one month forward

*Types of forward contracts*<sup>3</sup>:

- (a) fixed;
- (b) option;
- (c) close out;
- (d) extension;
- (e) liquidation;
- (f) hedging.

*Fixed*. It means performance on a specified date.

*Option*. It means performance between two specified dates and certainly by the end date. The rate chosen is that most advantageous to the bank.

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<sup>3</sup> Davis A & Kearns M – Banking operations, The Chartered Institute of Bankers, Pitman, 1992

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The rate quoted by the dealer for such a contract will be determined by the possibility of the customer selling the contract on the least favourable date from the bank's point of view.

### *Example*

US\$/£ spot rate	= 1,4565 - 1,4575
1 month margin	= 0,0047 - 0,0042
3 month margin	= 0,0079 - 0,0070

The currency is at premium, therefore for a three-month option forward of US\$1m, the best calculation would be:

<i>Bank sells @</i>	1,4565
<i>Less</i>	<u>0,0079</u>
	1,4486 = £690 322

(if spot or option forward up to 3 months, so the bank would receive more sterling than if it sold at spot)

or

*The bank buys at:*

(a) 1,4574 = £686 106

(if spot or option to 3 months, so that the bank would pay less sterling than if it bought at one or three months forward)

or

(b)	1,4575
<i>Less</i>	<u>0,0042</u>
	1,4533 = £688 089

(if option is 1 to 3 months, so that the bank would pay less sterling than if it bought at three months forward).

To summarize:

	<b>Premium</b>	<b>Discount</b>
Bank selling	Premium charged to last date	If option from spot, no discount given. If option between dates, discount given to first date.
Bank buying	If option from spot, no premium given. If option between two dates, premium given to first date.	Discount charged to last date.



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The customer has lost the difference between:

The close out price	=	£ 694 927
The original forward contract	=	<u>£ 688 089</u>
		£ 6838

### *Liquidation*

A forward contract may have to be liquidated before maturity. It is achieved by a “swap” transaction. If the example above was to be liquidated after, say, 2 months and today’s rates are:

US\$/£ spot rate	=	1,4465 - 1,4475
1 month margin	=	0,0032 - 0,0027

(a) The original contract would be cancelled at the original rate:

$$1,4533 = \text{£}688\,089$$

(b) A replacement forward deal would be struck at the 1 month forward selling rate:

	1,4465
Less	<u>0,0032</u>
	1,4433 = <u>\$692 857</u>

£ 4768 (cost to customer)

### *Hedging*

Like the Stock Exchange “stag” an investor may establish a forward exchange contract to sell in the belief that the currency may devalue in the meantime. In such event, the currency will be bought at spot for delivery against the forward contract.

Under the International Monetary Fund’s statistics<sup>4</sup>, *the most common forward instruments are:*

- **Forward rate agreements (FRAs)** are forwards used mostly in inter-bank markets to set an interest rate (usually the London Inter-bank Offered Rate - Libor) at a future date. At settlement, a payment is made between counter parties equal to the difference between the actual interest rate and the rate specified in the FRA multiplied by a “notional”

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<sup>4</sup> IMF – Manual on monetary and financial statistics, Washington 1996

principal (it is a value used for calculation purposes that is not actually exchanged between counter parties).

- **Interest-rate swaps** are financial instruments in which contraries exchange streams of payments of interest, usually on a net payment basis. The floating interest rate leg of an interest-rate swap is a single contract constructed out of a series of FRAs. Usually, payments on a swap are calculated based on a “notional” principal amount specified in the contract that is not actually exchanged between the counter parties.
- **Currency swaps** are contracts to exchange currencies at a specified exchange rate, and then re-swap the currencies at a later date (usually at the original exchange rate). They involve exchange of principal and interest payments in one currency for principal and interest payments in another currency.
- **Currency interest rate swaps** or **Cross-currency interest rate swaps** are contracts to exchange interest rate streams denominated in different currencies.
- **Commodity swaps** are contracts that pay the difference between a fixed reference price for a commodity and an index of the market price of the commodity.
- **Other swaps include** any swap contracts that are not based on interest rates or currencies.

### ***2.2.3 Currency accounts: the Eurocurrency market, loans***

#### *a) The Eurocurrency market*

A Eurocurrency is any currency owned and traded outside its territorial borders. Such currency accounts are used for a variety of reasons, such as:

- To avoid exchange risk for a future transaction;
- To collate a number of transactions in the same currency prior to conversion;
- To ease trade transaction;
- As a speculative hedge;
- To earn interest.

Eurocurrency is so called because Europe was the centre where the trading of these currencies originated.

Transactions are deposits and loans in currencies other than the domestic currency of the country where they are held.

Interest rates on Eurocurrencies are normally quoted on a 360-day year basis. There are exceptions when calculating the benefits and drawbacks to a customer investing or borrowing on currency accounts.

The correspondent banks may arrange deposits or loans. Sometimes, it may seem more attractive for a customer to borrow in a low interest rate currency or, conversely, to invest in a high interest rate currency.

*b) Loans*

It should be mentioned the situation when banks may be faced with requests from some customers for loans to be available to them in foreign currency.

For example, a company with expected dollar income in two months' time could borrow today US dollars and convert that to sterling to assist with working capital. When the dollars are received in two months' time, they are used to repay the dollar borrowing, thus eliminating any exchange risk during the two months. The cost to the customer is the interest on the US borrowing, less the cost of interest, which would have been incurred by borrowing sterling for working capital. A significant reduction in borrowing costs could be achieved through this means when currency interest rates are lower than sterling – *providing there is going to be income in that currency.*

**2.2.4 Options**

Two other instruments whose use has grown rapidly on financial markets in recent years have been options and swaps. Both instruments help firms hedge risk.

An option gives the right to buy or sell a given amount of a financial instrument or commodity at an agreed price (known as the exercise or strike price) within a specified time, but does not oblige investors to do so.

Options contracts are drawn up between two counter parties, the purchaser and the writer (seller) of the option, and are registered with and traded through a futures trading. The seller of the option is obliged to buy or sell the financial instrument to the purchaser if the owner of the option exercises the right to sell or buy.

Options contracts are offered both on cash securities (short- and long-term interest rates, exchange rates, equities of individual companies, and stock exchange indices) and on futures contracts. For options on cash securities (premium paid options), the buyer pays the full price or premium of the option at the time of purchase. For options on futures contracts (premium margined options), buyers and sellers are margined and marked to market in the same way as with futures themselves.

Banks may construct non-tradable, custom-made options for their customers. These are known as over-the-counter (OTC) options and continue to make up a high proportion of the total value of options sold.

It should be emphasized that an option gives the holder the right to do something. The holder does not have to exercise this right. This fact distinguished options from forwards and futures where the holder is obliged to buy or sell the underlying asset.

*Example: exercise of an option*

An option to purchase yen grants the purchaser the right to purchase yen at a price of 95 US cents par 100 yen. The premium is 3 US cents per 100 yen.

On the settlement date, if the spot price of yen is 110 US cents per 100 yen, the option is “in-the-money” and will be exercised. The purchaser will buy yen for 95 cents from the option seller rather than pay the spot market price of 110 cents. The option seller, who must supply the yen, on net loses 12 cents per 100 yen on this transaction (the loses 15 cents per 100 yen supplied, but retains the 3 cents per 100 yen premium).

However, if the spot market price of yen is 90 US cents per 100 yen on the settlement day, the purchaser will not exercise the option to buy yen at 95 cents, but will purchase yen in the cheaper spot market for 90 cents. In this case, the option seller pockets the 3 cent premium as his profit.

There are **two main types of options**<sup>5</sup>:

- a) **call option**, which gives the customer the right to buy the underlying currency. For example, an investor who thinks that the DM will rise against the US dollar could buy a DM/\$ option, giving the right to buy

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<sup>5</sup> Howells P&Bain Keith – The economics of money, banking and finance, Pearson Education Limited, Edinburgh, 1999

DMs at a specified price, say \$0,59=DM1. The holder of the option then has the right to acquire DMs at that price at any time during the life of the option and is thus in a position to benefit from a rise in the spot price of the DM. If the spot exchange rate were to rise to \$0,65 = 1DM, the option holder could acquire DMs at \$0,59 under the terms of the option and sell them on the spot market at \$0,65. The buyer of a call option thus assumes a long position in the underlying instrument (in this case DMs). As the price of the underlying instrument rises, so will the profit, which can be made from exercising the option. Consequently, the premium, which must be paid to acquire that option, rises and this allows the holder of a call option to realize her profit by selling the option on, rather than by exercising it.

- b) **put option**, which gives the customer the right to sell the underlying currency, and thus assumes a short position in the specified instrument. That is, the buyer of a put option stands to gain from a fall in the price of the underlying currency. Therefore, someone who buys a put option at \$0,59=DM1 will be hoping that the value of the DM will fall below the level. They will then be able to buy DMs in the spot market at, say, \$0,57=DM1, and then exercise the option in order to sell the DMs at \$0,59 each. In this case, as the DM falls, the profitability of a put option in DMs will rise and the premium that other investors are prepared to pay in order to acquire such an option will increase. As above, the holder of the put option may realize her profit by selling the option on, rather than exercising it.

There are many variations of the simple call and put options. They are known as **exotic options**. We explain some of them:

- **Barrier options** are over-the-counter options designed to meet the particular needs for customers. They are also known as knock-in or knockout options which means that they come into being or lapse when specified prices of the underlying currency are reached.
- **Look-back options**: options that give the right to buy or sell at the lowest price reached by the underlying currency during the life of the options;
- **Asian options**: option whose intrinsic value is calculated by comparing the strike price with the average spot price over the period of the option.
- **Options an options**: an option that gives the right to buy an option etc.

Other types of options<sup>6</sup> are:

- **Exchange-traded options.** All options traded on exchanges or organized markets are financial assets. Exchange-traded options tend to be limited to instruments for which broad liquid trading can be established.
- **Warrants** are financial assets. They are negotiable options that trade like securities that grant the purchaser the contingent right to sell to, or purchase from, the issuer a debt or equity security. They are often attached to bond issues, but can be detached and resold on financial markets.
- **Conversion options attached to bonds, which** permit the holder to convert the bond into shares.
- **OTC options.** Over-the-counter (OTC) options are derivatives that are not traded on organized markets, and they include:
  - *Privately-arranged options*, which can cover bank loans, foreign exchange transactions, and many other financial transactions, and which can hedge interest rate movements, modify exchange rates exposures, purchase foreign exchange, exchange financial instruments, or purchase commodities, etc.
  - *Call options embedded in securities* on long-term liabilities and securities, which permit the borrower to repay the loan under specified conditions prior to maturity.
  - *Swaption, which is an option to enter into a swap.*
  - *Caps* A cap places an upper limit on interest rates on a floating rate loan.
  - *Floors* A floor places a lower limit on interest rates on a floating rate loan.
  - *Collars* A collar is a combination of a cap and floor that places upper and lower bounds on the interest rate on a floating rate loan. A synthetic fixed rate loan is created if the upper and lower bounds are set equal.

Options are used in the following situations:

- When there is exchange or interest rate exposure;
- For protecting investments;

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<sup>6</sup> IMF – Manual on monetary and financial statistics, Washington 1996

- For flexibility;
- Tendering for contract in a foreign currency;
- International trading of price-sensitive goods.

The following should use options:

- Corporate treasures dealing in multi-currencies;
- Banks and financial institutions for trading and hedging;
- Any other company which needs to hedge.

**It should be mentioned that foreign currency options are particularly useful during periods of high exchange rates and volatility. In this case, customers can choose the price, the period and whether to exercise the option contract, because it gives them flexibility and choice.**

### *2.2.5 Swaps*

Swaps<sup>7</sup> are financial contracts that obligate one party to exchange (swap) a set of payments it owns for another set of payments owned by another party.

Swaps are exchanges of cash flows. They are attempts by firms to manage their asset/liability structure or to reduce their cost of borrowing. Cash flows generated by many different types of financial instruments may be swapped.

Simple swaps such as interest rate and currency swaps are sometimes known as plain vanilla swaps. There are many variations of these.

***Interest-rate swaps*** involve the exchange of one set of interest payments for another set of interest payments, all denominated in the same currency.

An ***interest rate swap*** is an exchange of a cash flow representing a fixed rate of interest on a notional capital sum with that representing a floating rate on the same sum in the same currency. There is no exchange of the principal amount. They are potentially useful because the fixed and floating capital markets are distinct markets and firms wishing to borrow may not have equal access to both.

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<sup>7</sup> Howells P&Bain Keith – The economics of money, banking and finance, Pearson Education Limited, Edinburgh, 1999;

Interest-rate swaps are an important tool for managing interest-rate risk, and they first appeared in the United States in 1982 when there was an increase in the demand for financial instruments that could be used to reduce interest-rate risk.

The most common type of interest-rate swap<sup>8</sup> specifies:

1. the interest rate on the payments that are being exchanged;
2. the type of interest payments (variable or fixed-rate);
3. the amount of notional principal, which is the amount on which the interest is being paid;
4. the time period over which the exchanges continue to be made.

**Currency swaps** involve the exchange of a set of payments in one country for a set of payments in another currency. These are simply traders simultaneously buying one currency at spot and selling forward, or selling at spot and buying forward.

A currency swap has three stages, as follows:

1. an initial exchange of principal: the two counterparts exchange principal amounts at an agreed exchange rate. This can be a notional exchange since its purpose is to establish the principal amounts as a reference point for the calculation of interest payments and the re-exchange of the principal amounts;
2. exchange of interest payments on agreed dates based on outstanding principal amounts and agreed fixed interest rates;
3. re-exchange of the principal amounts at a predetermined exchange rate so the parties end up with their original currencies.

There are many variations on simple currency swaps.

In a **cross-currency basis swap** two floating-rate cash stream are swapped. This may be possible because the banks that have made the two loans are using a different basis rate for the calculation of their floating interest rates. The most commonly used basis rate on the London market is LIBOR (the London Inter-Bank Offered Rate). The US\$ prime rate is also widely used.

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<sup>8</sup> IMF – Manual on monetary and financial statistics, Washington 1996

A ***cross-currency coupon swap*** is a currency swap involving a fixed interest stream and a floating interest stream. In other words, it is a combination of an interest rate swap and a fixed rate currency swap – both the interest rate structure and the currency are exchanged.

Other types of swap include ***equity swaps***, ***which*** are agreements to exchange the rate of return on equity or an equity index for a floating or fixed rate of interest.

In a ***commodity swap*** the counter-parties exchange cash flows, at least one of which is based on a commodity price or commodity price index.

### ***2.2.6 Financial futures***

The first Future Exchange in the world was established in Chicago in 1972 (called the International Monetary Market - IMM), designed to trade financial futures contracts.

In the early 1980s several other financial centres opened up their own futures exchanges. The London International Financial Futures Exchange (LIFFE) started trading in September 1982 and deals in futures contracts in currencies, interest rates and the value of quoted ordinary shares. Only members of the Exchange are allowed to conduct trading and before dealing a prospective buyer or seller must first open an account with a member firm. The Exchange's Clearing House acts as a guarantor to both parties, taking a security deposit (margin) from buyer and seller. Settlements are made daily, when the Clearing House credits members' accounts with net gains and receives immediate payments from members with net losses. So, who are the participants in this market place?

The participants<sup>9</sup> are:

*Floor traders/brokers*

Every member on the floor is his own auctioneer and receives a small fee for each transaction achieved. Essentially they are speculators, trading for themselves.

*Futures commission merchants*

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<sup>9</sup> Mishkin F – The economics of money, banking and financial markets, sixth edition, Columbia University, USA 2001.

Intermediaries for the brokers and the customers provide a fast and efficient communication system, linking the customer quickly with the auctioneering situation.

*Speculators*

Their sole motive is profit by dealing with changes in the expected price levels over time. Normally they do not personally own the commodity in which they deal. They provide fluidity to the market and by their activities they help to set the price, allowing hedgers to buy or sell in volume without difficulty.

*Hedgers*

They use the Financial Futures Market as an insurance against possible adverse price movements, thereby reducing their exposure to the risk of losses. Hedging is of particular benefit to corporate customers, pension funds, brokers and dealers, banks and other financial institutions. The service also provides a mean of hedging for those who want to lock-in current exchange rates on future currency transactions.

**How does it work?**

A **financial futures contract**<sup>10</sup> is an agreement to exchange (buy or sell) a standard quantity of a specified currency or financial instrument at a specified future date at a price agreed between the parties. The instruments can be anything from three-month time deposits, twenty-year gilt-edged stock, and foreign currency to a 100-share index.

Thus, a financial futures contract is similar to an interest-rate forward contract in that it specifies that one party to another must deliver a financial instrument on a stated future date.

The buyer goes long on the cash market that is he contracts to take delivery of the underlying currency in the future. The seller goes short, contracting to deliver the instrument in the future.

Let us look at an example. It is 1 February. A borrower has a £500000 three-month rollover loan from the money market at a rate of 10 %, which is due to, be rolled over on April 1. The borrower is worried that rates will

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<sup>10</sup> Hull C.J. – Options, futures, and other derivative securities. Second edition, Prentice Hall, New Jersey, USA 1993.

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have risen by then. The borrower decides to use LIFE's Three-Month Sterling Interest Rate Contract to cover the risk of higher interest rates. This contract is for a three-month deposit facility of £5000000 commencing in March or June or September or December. At any time contracts for all these different months are being dealt in on the Exchange. The borrower selects the June contract because the March contract will have already matured before his rollover is due.

The contract is priced by deducting the interest rate to be paid on the deposit from 100. On February 1 the interest rate is 10,00% and the price of the contract is accordingly 90.00. The price of the contract changes up or down in minimum movements of 0,01 known as "ticks". The value of each tick is therefore:

$$0,01\% \text{ p.a. of interest} \times \text{the face value of the contract, i.e. } \pounds 500000 \times \text{one quarter of a year} = \pounds 12,50$$

Being worried that the interest rate will rise and hence that the price of the contract will fall, the borrower sells one June contract at a price of 90,00.

By 1 April when the borrowing is rolled over the interest has risen to 12%. The result of the hedge is shown in the table below:

Money market	Futures market
<p><b>1 February</b> He plans to rollover the £500000 three-months borrowing in April. Current rate on loan is 10%,</p>	<p>Sells one futures contract, June (£500000) Three-Month Sterling Interest Rate at a price of 90.00 (rate = 10%)</p>
<p><b>1 February</b> He rolls over the borrowing at the new rate of 12 %.</p>	<p>Buys back June futures contract at the new price of 88,00 (rate = 12%).</p>
<p>Extra cost: 2% on £500000 for one quarter = £2500</p>	<p>Gain: 200 ticks at £12,50 = £2500.</p>

The hedge worked out perfectly – the gain on futures was exactly equal to the extra interest paid. Thus, the hedger achieved a net borrowing cost of 10% per annum. In practice, such perfect matching will usually not be

achieved. Futures prices may not move exactly in line with money market rates. If interest rates had fallen the hedger's loss on his futures position would have been matched by lower interest payments so that his net borrowing cost would be 10% per annum.

**As a conclusion, it should be stipulated that this service provides major corporate customers with a method of hedging and speculating on future trends in a variety of exchange and interest rates through the London International Financial Future Exchange.**

### **2.3 Comparing different types of derivatives**

Exchange-traded derivatives have five principal advantages over over-the-counter (OTC) options, as follows:

- (1) the existence of the clearing house guarantees all trades and virtually eliminates the default risk present in OTC trades;
- (2) price discovery is easier from exchange-based trading than on OTC markets because futures and options contracts are reported immediately and prices are widely distributed;
- (3) markets for exchange-based derivatives are more liquid than bilateral OTC trades since there are many traders in each futures pit;
- (4) exchange-based futures and options are highly tradable because they are standardized whereas OTC options, being non-standard and redeemable only at the bank where they were bought, have a low resale value.
- (5) Exchange-based derivatives are lower in price than OTC derivatives since there will almost always be some irreducible residual risk that a bank is forced to take onto its own book, despite the fact that it will attempt to minimize its risks by arranging offsetting contracts with other customers/banks and by taking a position in exchange-traded options.

There may be too, important cash-flow differences between forward and futures contract because, whereas net profits on a futures hedge are accrued on a daily basis, the net profits on a forward hedge are only realized on the actual date of currency delivery. A different type of problem connected with the use of futures contracts to hedge an exposed currency position arises in cases where the lifetime of the futures contract continues beyond the

intended date of currency delivery. This problem stems from the fact that the difference between the futures and spot rates may not tend uniformly towards zero as they delivery date for the futures contract approaches, which is the assumption that underlies calculations of the forward rate.

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Since the launch of the Euro, there has been intense competition between LIFE, Eurex, and MATIF/MONEP (now incorporated as part of Paris Bourse)<sup>11</sup>. Traders in London are making a significant contribution to business not only on LIFE but also, remotely from London, on the continental exchanges.

- *Short-term interest rate contracts* (STIRs) EURIBOR futures contracts on LIFE are by far the most actively traded short-term Euro interest rate futures contracts.
- *Bond futures contracts* Eurex's Euro Bund futures contract currently accounts for 96% of turnover in the major 10-year Euro bond futures contracts.
- *Equity index contracts* The launch of the Euro has also led to an expansion in equity index contracts.



### *Progress test*

1. What are the main types of foreign exchange risk?
2. List the main steps for identifying foreign exchange risk.
3. Define the Financial derivatives.
4. What are the most important financial derivatives?
5. What are the Forward exchange contracts?

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<sup>11</sup> Bank of England – Practical issues arising from the Euro, December 1999

6. What is the difference between a long forward position and a short forward position?
7. How do you explain the expression “a currency is quoted at premium”?
8. How do you explain the expression “a currency is quoted at a discount”?
9. List and then define four types of forward contracts.
10. What are the currency accounts?
11. What is an Eurocurrency?
12. List the reasons for what the Eurocurrencies are used.
13. What are options and their main types?
14. Define the OTC options.
15. What is a call option?
16. What is a put option?
17. List a few exotic options.
18. Describe a swap operation.
19. What are currency swaps?
20. What is a financial future contract and how does it work?
21. Compare the different types of derivatives.

BANK.....  
 Date for which the reporting is made.....  
 Own funds (thousand lei).....

**SUPERVISION OF THE CURRENCY POSITIONS**

Foreign exchange	Elements taken into account				Currency position -money units- (+/-)	Exchange rate in lei	Individual currency position (thousand lei) (+/-)	The adjustment of the share capital and issue premiums (thousand lei) (-)	Long adjusted individual currency position (+)	Short adjusted individual currency position (-)	The weight beside the own funds
	On-balance sheet currency position (balance account 3721) -money units-		Off-balance sheet currency position (balance account 9361) -money units-								
	(+)	(-)	(+)	(-)							
0	1	2	3	4	5	6	7	8	9	10	11
<b>TOTAL</b>	X	X	X	X	X	X	X	X			

NOTE:  
 The next columns are calculated thus:  
 $5 = 1+2+3+4$   
 $7 = 5 * 6$   
 $9 = 7+8$   
 $10 = 7+8$   
 $11 = |x| / FP * 100$  ( in which x is the highest between 9 and 10)

Elaborated by.....  
 Name and surname.....  
 Phone/Extension.....

*The bank's manager,*

*The manager of the accounting-financial Department,*

(surname, name and signature)