Module 11: Treasury Operation and Structure

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Train for Employment
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Importance

During the last two decades, an important development has been the growth of corporations that do business on a global basis, including foreign branch operations and subsidiaries. This has caused an expansion of the volume of import and export transactions and this lead to the huge expansion of the foreign exchange market.

Learning Objectives

- List the main participants in the foreign exchange market
- Discuss the money market and the concept of yield curves
- Describe options and the related pricing techniques
- Describe forward contracts and the related pricing techniques

Participants in the Foreign Exchange Market

Unlike most markets, where all participants have access to the same prices, the FOREX market is divided into several levels of access. At the top is the inter-bank market, which is made up of the largest investment and commercial banking firms. Within the inter-bank market, spreads, which are the difference between the bid and ask prices, are razor sharp and usually unavailable, and not known to players outside the inner circle. The difference between the bid and ask prices widens (from 0-1 pip to 1-2 pips for some currencies such as the EUR). This is due to volume. If a trader can guarantee a large number of transactions for big amounts, he can demand a smaller difference between the bid and ask prices. This is referred to as a better spread. The levels of access that make up the FOREX market are determined by the amount of money with which they are trading. The top-tier inter-bank market accounts for 53% of all transactions. After that there are usually smaller banks, followed by large multi-national corporations (which need to hedge risk and pay employees in different countries), large hedge funds, and even some of the retail FOREX market makers. Central banks also participate in the FOREX market to align currencies to their economic needs. Some of those most important participants are:

Banks

The interbank market caters for both the majority of commercial turnover and large amounts of speculative trading every day. A large bank may trade billions of dollars daily. Some of this trading is undertaken on behalf of customers, but much is conducted by proprietary desks, trading for the bank's own account.

Until recently, foreign exchange brokers did large amounts of business, facilitating interbank trading and matching anonymous counterparts for small fees. Today, however, much of this business has moved on to more efficient electronic systems, but turnover is noticeably smaller than just a few years ago.

I. Commercial Companies

An important part of this market comes from the financial activities of companies seeking foreign exchange to pay for goods or services. Commercial companies often trade fairly small amounts compared to those of banks or speculators, and their trades often have little short term impact on market rates. Nevertheless, trade flows are an important factor in the long-term direction of a currency's exchange rate. Some multinational companies can have an unpredictable impact when very large positions are covered due to exposures that are not widely known by other market participants.

II. Central Banks

National central banks play an important role in the foreign exchange markets. They try to control the money supply, inflation, and/or interest rates and often have official or unofficial target rates for their currencies. They can use their often substantial foreign exchange reserves to stabilize the market. Milton Friedman argued that the best stabilization strategy would be for central banks to buy when the exchange rate is too low, and to sell when the rate is too high — that is, to trade for a profit based on their more precise information.

The mere expectation or rumor of central bank intervention might be enough to stabilize a currency, but aggressive intervention might be used several times each year in countries with a dirty float currency regime. Central banks do not always achieve their objectives. The combined resources of the market can easily overwhelm any central bank. Several scenarios of this nature were seen in the 1992–93 ERM collapse, and in more recent times in Southeast Asia.

III. Hedge Funds

Hedge funds have gained a reputation for aggressive currency speculation since 1996. They control billions of dollars of equity and may borrow billions more, and thus may overwhelm intervention by central banks to support almost any currency, if the economic fundamentals are in the hedge funds' favor.

IV. Investment Management Firms

Investment management firms (who typically manage large accounts on behalf of customers such as pension funds and endowments) use the foreign exchange market to facilitate transactions in foreign securities. For example, an investment manager bearing an international equity portfolio needs to purchase and sell several pairs of foreign currencies to pay for foreign securities purchases.

V. Retail FOREX Brokers

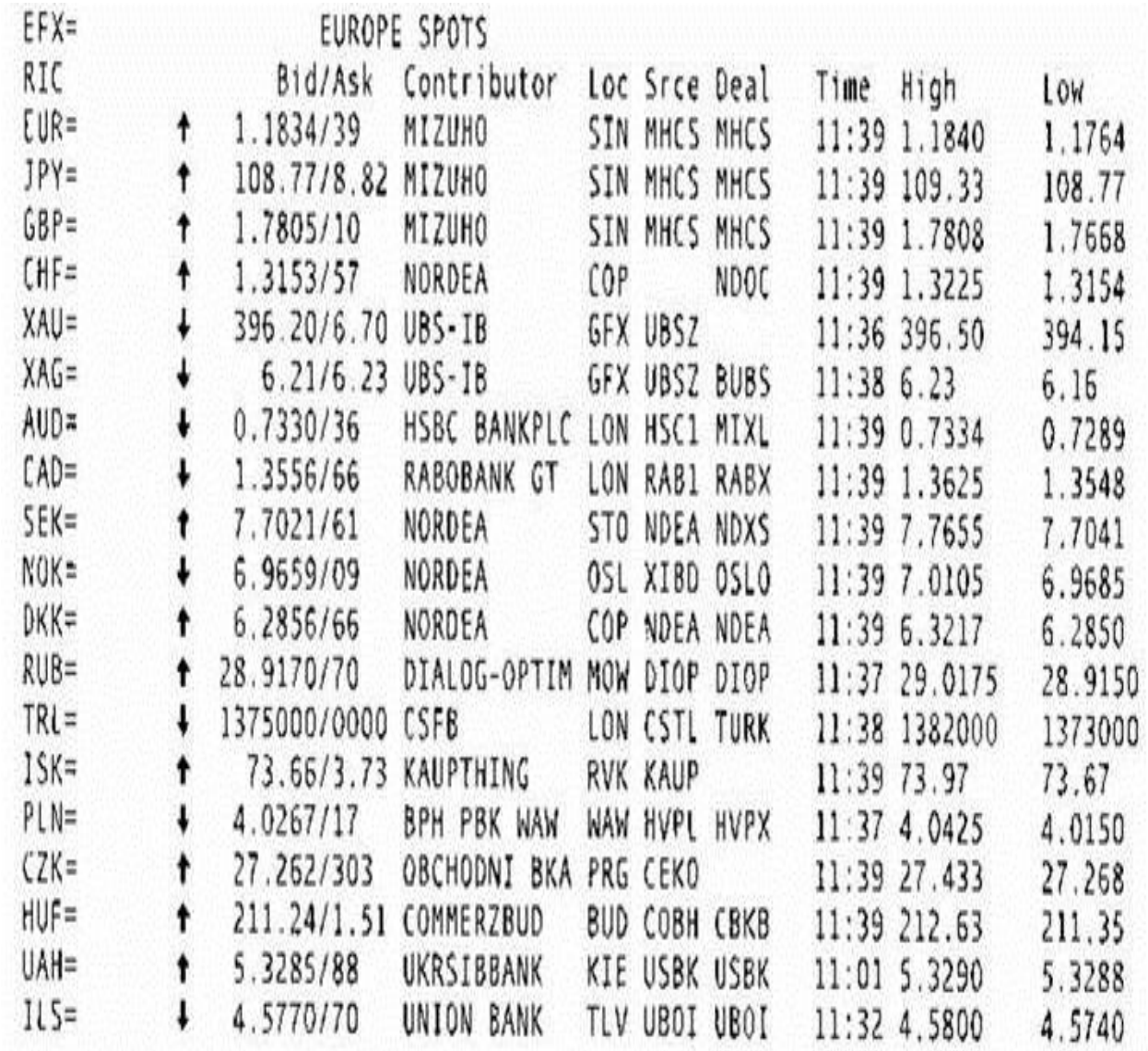
There are two types of retail brokers offering the opportunity for speculative trading: retail FOREX brokers and market makers. Retail traders (individuals) are a small fraction of this market and may indirectly through brokers or banks. As a result many of the smaller, and perhaps questionable brokers are now gone.

How Does the Market Work

The foreign exchange market is known to be a perfect market. Simply because it has the following characteristics:

- It has a homogenous product.
- There are many buyers and many sellers.
- Freedom of entry to the market.
- Freedom of information. But this doesn't imply equality of information. Good information is expensive.

Prices of foreign exchange in a given country are expressed in the same way as the price of any good or service in that country - in terms of dollars. One can say that the price of a car is $4,000 or the price of one euro is $1.23



EFX=		EUROPE SPOTS							
RIC		Bid/Ask	Contributor	Loc	Srce	Deal	Time	High	Low
EUR=	↑	1.1834/39	MIZUHO	SIN	MHCS	MHCS	11:39	1.1840	1.1764
JPY=	↑	108.77/8.82	MIZUHO	SIN	MHCS	MHCS	11:39	109.33	108.77
GBP=	↑	1.7805/10	MIZUHO	SIN	MHCS	MHCS	11:39	1.7808	1.7668
CHF=	↑	1.3153/57	NORDEA	COP		NDOC	11:39	1.3225	1.3154
XAU=	↓	396.20/6.70	UBS-IB	GFX	UBSZ		11:36	396.50	394.15
XAG=	↓	6.21/6.23	UBS-IB	GFX	UBSZ	BUBS	11:38	6.23	6.16
AUD=	↓	0.7330/36	HSBC BANKPLC	LON	HSC1	MIXL	11:39	0.7334	0.7289
CAD=	↓	1.3556/66	RABOBANK GT	LON	RAB1	RABX	11:39	1.3625	1.3548
SEK=	↑	7.7021/61	NORDEA	STO	NDEA	NDXS	11:39	7.7655	7.7041
NOK=	↓	6.9659/09	NORDEA	OSL	XIBD	OSLO	11:39	7.0105	6.9685
DKK=	↑	6.2856/66	NORDEA	COP	NDEA	NDEA	11:39	6.3217	6.2850
RUB=	↑	28.9170/70	DIALOG-OPTIM	MOW	DIOP	DIOP	11:37	29.0175	28.9150
TRL=	↓	1375000/0000	CSFB	LON	CSTL	TURK	11:38	1382000	1373000
ISK=	↑	73.66/3.73	KAUPTHING	RVK	KAUP		11:39	73.97	73.67
PLN=	↓	4.0267/17	BPH PBK WAW	WAW	HVPL	HVPX	11:37	4.0425	4.0150
CZK=	↑	27.262/303	OBCHODNI BKA	PRG	CEKO		11:39	27.433	27.268
HUF=	↑	211.24/1.51	COMMERZBUD	BUD	COBH	CBKB	11:39	212.63	211.35
UAH=	↑	5.3285/88	UKRSIBBANK	KIE	USBK	USBK	11:01	5.3290	5.3288
ILS=	↓	4.5770/70	UNION BANK	TLV	UBOI	UBOI	11:32	4.5800	4.5740

Base and Quote Currencies

Some of the prices are expressed in the form of 1 USD (US dollar) equals number of units of the currency.

For example: 1 USD = 110 JPY (Japanese yen).
In this case, USD is called the **base currency** and JPY is the **quote currency**.

Others are expressed in the form of 1 unit of the currency equals number of units of USD. For example: 1 GBP (Sterling Pound) = 1.85 USD.
In this case GBP is the base currency and USD is the quote currency.

The market has its pre-agreed forms for all currencies and when spot rates are quoted, the first currency always represents the base currency (base currency) and the second currency is the quote currency or the variable currency.

Value Date

The delivery day of a spot transaction is called value date. Business days do not include Saturdays, Sundays or bank holidays in either of the countries of the two currencies involved. If the "normal" value date (two days after the dealing date) falls on a public holiday in one of the centers of the currencies involved, the next working day is taken as the value date for the transaction.

There are however some exceptions to these general rules: USD-CAD (Canadian dollar) transactions are often dealt on a so-called "funds"-basis. This means that delivery will be done 1 working day after the dealing date. Another exception is when FX markets in some Middle East countries are closed on Fridays but open on Saturdays. A USD-SAR (Saudi Riyal) transaction could therefore have a split settlement date, with the USD delivered on Friday and the SAR delivered on Saturday. This is not the case with the EGP (Egyptian pound) however.

Example: A USD/JPY spot transaction - with dealing date on Wednesday the 4th of January, would normally have a value date of Friday the 6th of January. If however the 6th of January is a public holiday in Japan or in the US, the value date will be deferred to Monday the 9th of January.

Bid and Offer Rates

Spot rates are usually quoted in two rates, the bid rate and the offer rate.

EUR/USD is 1.2250/1.2260 or EUR/USD is 1.2250-60 or EUR/USD is 50-60

The **bid rate** (1.2250) is the rate at which the bank quoting the price (the market maker) is ready to buy the base currency from the market user (the counterpart asking for a price).

The **offer rate** (1.2260) is the price at which the market maker will sell the base currency to the market user.

Market User and Market Maker:

The **market user** is the counterpart asking for prices. The market user may be a company, an institutional investor, a bank or the central bank. If a dealer receives a call from another bank, in order to make a quote, he acts as the **market maker**. If the same dealer is calling another bank in order to ask for prices he acts as the market user.

Example 1: You want to buy EUR 10 m against USD. Four different banks quote you the following prices:

Bank A:	1.2230 - 40
Bank B:	1.2250 - 60
Bank C:	1.2200 - 10
Bank D:	1.2290 - 00

Where do you buy your EUR?

Answer: The base currency is the EUR. You want to buy EUR so you buy the base currency.

You ask for the rate. You act as market user and buy EUR at the lowest offer rate at 1.2210 from Bank C.

Example 2: You want to buy YEN 100 m against USD. Four different banks quote you the following prices:

Bank A:	110.30 - 40
Bank B:	110.50 - 60
Bank C:	110.00 - 10
Bank D:	109.90 - 00

Where do you buy your JPY?

Answer: The base currency is the USD. You want to buy JPY, meaning you sell USD.

You ask for the rate. You act as market user and sell USD at the highest bid rate at 110.50 to Bank B.

Long and Short Positions

All participants of the foreign exchange market have a long, short or square position in the different currencies. A long position in a currency means that the dealer has bought more of the currency than he has sold. If this position is taken purposely the dealer expects the currency to rise. If the dealer has sold more than what he bought, the dealer is said to be having a short position in a currency. The expectation will normally be that of a declining rate. A square or a flat position in one currency means that the dealer has bought and sold the same amount of currency and has no risk if the rates change.

Direct and Indirect Quotes:

In the international markets most currencies are quoted against the USD.
In this case the USD is usually the base currency (e.g. USD/CHF, USD/NOK, USD/EGP, USD/SAR, USD/JPY, etc). However there are some exceptions to this rule: e.g. GBP/USD, EUR/USD, and AUD/USD.
In the home market it is sometimes more convenient to reverse the quoting conventions. The method to quote CHF against USD may in this case be in New York different to Zurich.
In a direct quote the home currency is the quote currency and the foreign currency is the base currency.

Example: Direct quote for CHF in Zurich: USD/CHF 1.1000 while direct quote for CHF in New York is CHF/USD 0.9091 (i.e. 1 / 1.10). In an indirect quote the home currency is the base currency and the foreign currency is the quote currency.

Pips and Big Figure:

An FX quote usually consists of five digits:

EUR/USD 1.2510
USD/CHF 1.1160
AUD/USD 0.6765
USD/JPY 107.15

The last two digits of the spot rate are called pips. The rest of the spot quotation is called big figure. In the coming rate, 1.15 is the big figure, and 10 are the pips.

EUR/USD 1 . 1 5 1 0

In general, a pip is 1/10000 of a currency, with some exceptions like the USD/JPY quotation, where a pip is 1/100 of the currency.

Cross Rates:

A cross rate is the quote for a currency pair which does not include the USD (e.g. EUR/EGP, GBP/JPY etc.). In the professional spot markets most of the deals are done with the USD as the base currency. Recently however, cross deals have increased in importance. Every cross rate can be computed by using the corresponding USD quotes.
Following rates are quoted in the market:

USD/CHF: 1.4980-1.4985
USD/EGP: 5.5070-5.5090

Using the quote of CHF and EGP against the USD, the EGP/CHF cross rate can be calculated.

Rules for calculating cross rates:

The simple case: USD is the base currency for one currency pair and quote currency for the other currency pair (cross-over)

EUR/USD: 1.1500-10
USD/CHF: 1.4980-85

You want to quote EUR/CHF

As EUR is the base currency and CHF is the quote currency, you do not have to change the quotes above.
EUR/CHF bid is the multiplication of the 2 bid rates: 1.1500 x 1.4980 = 1.7227 .Similarly,
EUR/CHF ask is the multiplication of the 2 ask rates: 1.1510 x 1.4985 = 1.7248
(If you had to quote CHF/EUR, you would have to calculate as stated above and then compute the reciprocal rate in the end)

The complex case: USD is the base currency (or quote currency) for both currency pairs:

USD/CHF: 1.4980-85
USD/EGP: 5.5070-90

You want to quote EGP/CHF

Step 1: Conversion USD/EGP in EGP/USD
To make EGP the base currency, calculate the reciprocal quotation of USD/EGP (if you had to quote CHF/EGP you would have to compute the reciprocal value of USD/CHF)
EGP/USD bid = 1/5.5090 = 0.18152 and EGP/USD offer = 1/5.5070 = 0.18159

Step 2: After Step 1 the currency is quoted (cross over) again.
Thus you can proceed like in the above simple case:
EGP/CHF bid is the multiplication of the bid rates: 1.4980 x 0.18152= 0.27193
EGP/CHF ask is the multiplication of the ask rates: 1.4985 x 0.18159= 0.27211

Exercises

Instructions:

These rates are quoted in the market:

Currency	Bid	Ask
EUR	1.1834	1.1839
JPY	108.77	108.82
GBP	1.7805	1.7810
CHF	1.3153	1.3157
AUD	0.7330	0.7336
CAD	1.3556	1.3566

A. You go to the market and ask for quotations. What prices can you deal with and when?

- *You sell STG against USD.*
- *You buy YEN against USD.*
- *You sell EUR against USD.*
- *You buy STG against USD.*
- *You buy CAD against USD.*
- *You buy AUD against USD.*
- *You sell CHF against USD.*
- *You sell USD against EUR.*

B. This time you are asked for a quotation. What prices will you quote and when?

- *Client sells STG against USD.*
- *Client buys YEN against USD.*
- *Client sells EUR against USD.*
- *Client buys STG against USD.*
- *Client buys CAD against USD.*
- *Client buys AUD against USD.*
- *Client sells CHF against USD.*
- *Client sells USD against EUR.*

C. Take 50 pips and quote the client:

- *Client sells STG against USD.*
- *Client buys YEN against USD.*
- *Client sells EUR against USD.*
- *Client buys STG against USD.*
- *Client buys CAD against USD.*
- *Client buys AUD against USD.*
- *Client sells CHF against USD.*
- *Client sells USD against EUR*

What Determines the Price?

Most theories describing the movement of currency prices do not apply in the day-to-day trading. Instead, these theories tend to explain this movement on the medium and long term. It is important though to try to highlight the factors that mostly affect currency prices movement, keeping in mind that day trading is most of the time affected by supply and demand at each point of time.

The main economic theories found in the foreign exchange deal with the concept of "parity conditions". A parity condition explains economically the price at which two currencies should be exchanged, based on factors such as interest rates and inflation. When this parity condition does not hold, there will be an arbitrage opportunity for market participants. However, arbitrage opportunities, as in many other markets, are quickly discovered and eliminated before even giving the individual investor an opportunity to make any profits. Other theories are based on economic factors such as capital flows, trade, and the way a country runs its operations. Analyzing these factors is known as "fundamental analysis". On the other hand, many traders – especially those interested in the short term – believe in what is known as the "technical analysis". In the following lines, we will be discussing these two ways of looking at things in the FOREX market:

First: The Fundamental Analysis

The fundamental analysis is meant to be dealing with numbers and statistics about currencies and countries. It mainly deals with factors that will affect the demand and supply of each currency as a result for changes in the economies of the two countries involved. This could be illustrated by the following theories:

Purchasing Power Parity (PPP)

The PPP theory indicates that two identical goods should be sold for the same price in all countries after the exchange rate adjustment. In other words, exchange rate between two currencies should reflect equal prices for the same article in the two concerned countries. Based on the theory, if there is a huge difference in prices between two countries for the same product after exchange rate adjustment, an arbitrage opportunity is created, because the product can be obtained from the country that sells it for the lowest price.

1. Interest Rate Parity

The **Interest Rate Parity** (IRP) is similar to PPP. Assets in different countries should yield the same return as long as they have the same risk. If one of the two assets yields higher returns while their risk is the same, this will force investors to abandon the country (currency) of the lower returns to that of the higher returns, getting interest rates back to the equilibrium level. This is again an application of the law of one price.

2. Balance of Payments (BOP) Theory

The balance of payment of any country measures the inflow and out flow of foreign currencies as a result of its transactions – including goods and capital - with other countries. This includes the current account and the capital account. If a country is running a large current account **surplus** or **deficit**, it is a sign that a country's exchange rate is out of equilibrium. To bring it back into equilibrium, there will have to be an adjustment in the exchange rate over time. If a country is running a large deficit (more imports than exports), the domestic currency will depreciate. On the other hand, a surplus would lead to currency appreciation.

3. The Asset Market Model

The asset market approach views currencies as asset prices traded in an efficient financial market. Consequently, currencies are increasingly demonstrating a strong correlation with other markets, particularly equities. Recently, the proportion of foreign exchange transactions stemming from cross border-trading of financial assets has dwarfed the extent of currency transactions generated from trading in goods and services.

4. Monetary Model

The Monetary Model focuses on a country's monetary policy to help determine the exchange rate. A country's monetary policy deals with the money supply of that country, which is determined by both the interest rate set and amount of money printed by central banks. Countries that adopt a monetary policy that rapidly grows its monetary supply will see inflationary pressure due to the increased amount of money in circulation. This leads to a devaluation of the currency.

These economic theories, which are based on assumptions and perfect situations, help to illustrate the basic fundamentals of currencies and how they are impacted by economic factors. However, the fact that there are so many conflicting theories indicates the difficulty in any one of them being 100% accurate in predicting currency fluctuations. Their importance will likely vary by the different market environment, but it is still important to know the fundamental basis behind each of the theories.

5. Economic Data:

Economic theories may move currencies in the long term, but on a shorter-term, day-to-day or week-to-week basis, economic data has a more significant impact. Economic data, such as the latest gross domestic product (GDP) numbers are considered as very important indicators for the economic performance of a country. In the same way, news and information about a country can have a major impact on the direction of that country's currency. Changes in interest rates, inflation, unemployment, consumer confidence, GDP, political stability etc. can all lead to extremely large gains/losses depending on the nature of the announcement, the current state of the country, and what markets expected for these data before announcement.

Second: The Technical Analysis

A method of predicting price changes by analyzing statistics generated by market activity, such as past prices and volume. Technical analysts use charts and other tools to identify patterns that can suggest future activity. They believe that historical performance of markets is an indication of future performance.
The interpretation of technical analysis remains the same regardless of the asset being monitored. It is thought to be discounting everything; especially in the FOREX market. The trend and flow of capital is what becomes important, rather than attempting to identify a mispriced rate.

One of the greatest goals of technical traders in the FX market is to determine whether a given pair will trend in a certain direction, or if it will travel sideways and remain range-bound. The most common method to determine these characteristics is to draw trend lines that connect historical levels that have prevented a rate from heading higher or lower. These levels of support and resistance are used by technical traders to determine whether or not the given trend, or lack of trend, will continue.

The subject of Technical Analysis tends to gain the widest possible range of reactions from those involved in financial markets. Some believe in the techniques to the extent that they can be regarded as disciples, others are skeptical, to say the least. What is clear, however, is that these methods cannot be ignored. Too many traders pay too much attention to them and they can have too great an impact on markets to be disregarded by anyone.

Trading Limits

Trading currencies involves some risks. This arises mainly from the change in price of one currency against another. Whenever investors or companies have long or short positions in any currency, they face currency risk if their positions are not hedged. This is known as currency risk.

Currency risk is the risk that exchange rates will change unfavorably over time. It can be hedged against using forward currency contracts;
For banks to avoid huge losses on their foreign currency position, traders are not allowed to keep open positions above certain limits. These limits are part of the market risk limits set by the bank's management or the governing authority for banks in a country (usually central banks).

Limits Set by the Bank's Management

These limits are always set for the following:

- **Daylight open position limit**: this is the maximum open position allowed during working hours. If the dealer was hit by a client or counterparty with a position that exceeds this limit, he is allowed only 5 minutes to get below that limit. I.e. he has to close out the amount that exceeds the allowed limit in the market, even if this makes a loss to the bank.
- **Overnight open position limit**: this is the maximum open position allowed at the end of the working hours for the bank. This limit cannot be exceeded at the end of any day, although it can be exceeded during working hours. This limit is usually less than the daylight open position limit.
- **Stop-loss limit**: this is the maximum loss accepted by the bank's management resulting from any open currency position. It is mainly set to protect the bank from huge losses. When currency dealers hold a losing position, they are always unable to make the right decision. The stop-loss limit will help the bank avoid huge losses under such conditions. The stop-loss limit is always set for the day, month, and year.

Limits Set by the Central Bank

Central banks usually set similar limits to those set by the bank's management. These limits are always relevant to any bank's capital and are observed by the central bank on a daily basis. Failing to comply with those limits might expose the bank to huge penalties imposed by the central bank in the country where they work.

Hedging

It is the kind of trade that is done for the intention of protecting an anticipated position from an unwanted move in the foreign currency exchange rates. When someone expects to have a long position in a specific currency at a certain date in the future (an exporter for example who gets paid in foreign currencies) or who expects to have a short position in a specific currency at a certain date in the future (an importer who will have to pay for his imports in foreign currencies). By utilizing the hedge properly, he can protect himself from downside or upside risk. One of the most popular hedging tools in the currency market is what we call the “forward contract”.

Money Markets and Yield Curves

Introduction

Did you hear about auctions? Have you attended any of them? Have you ever visited any “Souk” where corps of fruits and vegetables is sold to wholesalers before we see them in any of the local markets? Did you see any stock exchange or currency exchange trading rooms? I am sure this should be a great experience. However, you sure know that in every case people were just selling and buying something.

This is what a market is all about. The foreign exchange market was no exception, and the money market will not be an exception too. The degree of noise and colorfulness may be different from market to market, but at the end the fact remains that in every market, people are buying and selling certain articles. In the fruits and vegetables market, buyers and sellers face one another in a given physical place. One the other hand and in the foreign exchange market, dealers were just making a market in foreign exchange, pieces of banknote denominated in foreign currencies and all transactions are done through electronic communication devices that cover a geographical area called “the whole world”.

No market is totally isolated. In addition to the interaction among traders in each market, there exist other markets that have an impact on the performance of other markets. In the case of the foreign exchange market, the other market that is truly essential to understand and deal with is the money market. The foreign exchange market and the money market are so interlocked and tied up to the extent that it is impossible to understand one without understanding the other. In this module, we shall introduce the money market in some detail.

Importance

The money market is the financial market for short term borrowing and lending obligation. The money market is the market where the treasury bills and commercial papers are bought and sold. It supplies short-term liquidity financing for the financial system.

Overview

The objective of this module is to help participants enter the world of money markets; we will start by briefly explaining what this market is all about. We will then be speaking about the main participants in this market are, with some concentration on central banks and their objectives. We will be using some of the terminology used in this market to help you be familiar with them. We will also get you introduced to the “hedging” concept in the money market with a brief explanation of one of the hedging tools. And near the end of this module we will get you introduced to the world of yield curves and exploration.

- What are the money markets?
- Participants in the money markets
- Central bank objectives
- Hedging
- Yield curves
- Interpolation

What are the Money Markets?

Anybody who has a current, saving, or call account is a participant in the money market. The article that is bought and sold in this market is "money" or "near-money". This is basically nothing more than financial paper representing a sum of money that one person (or enterprise) owes to another. In the case of currency banknote, that is, cash in your pocket, it is the government that owes the money to you as the bearer of the banknote. Treasury bills are not so different from the banknote. It is also the government that owes an equivalent value of the Treasury bill face value to its owner. Here, however, a specified time has to elapse before the piece of financial paper – the treasury bill- becomes payable in cash by the government, i.e., before the date of the maturity of the document. In the case of currency banknote, the government currency is actually money. In the other case, the Treasury bill is only near-money. It would not be very hard to sell the Treasury bill to another person; however, the government itself is not obliged to pay the money represented by the bill before its maturity date.

Most financial assets traded in the money market have a maturity date that is usually shorter than a year. However, active trading is possible for documents of up to five years' maturity. Anything above five years is pretty much the domain of the investors in the capital markets where these longer-term securities are traded (those are called bonds).

Interest calculations

he interest rate is only a way to calculate the amount of money that will be paid by the borrower to the lender – in addition to the principal amount borrowed – as a price for using his funds for a period of time. Obviously this amount will be dependent on the principal, interest rate, and the period of time, as per the following formula:

$$I = P \times \frac{R}{100} \times \frac{T}{Basis}$$

Where:

I: is the interest amount

P: is the principal amount

R: is the interest rate (annual)

T: is the number of days

And the basis is the conventional number of days of in a year by which we divide the number of days of the transaction. This could be different from a currency to another.

Participants in the Money Market

The major actors in this market are commercial banks, central banks, large corporations, institutions that make a market in specialized instruments such as Treasury bills, and individuals at large that use money for various purposes. Let's have a look at how each of them participates in the market.

Commercial Banks:

The large role these institutions play in the money market can be easily understood by looking at their balance sheets. For sure a large portion of their liabilities are demand deposits, which, by definition, is money itself. Another big portion of banks' liabilities are time deposits, which are considered to be near-money. As for the asset side, and in addition to loans, banks have part of their assets invested in marketable securities.

Thinking of why commercial banks operate in the money market, one can put the objectives in the following order:

1. To maintain the liquidity, and therefore the solvency of the bank.
2. To make use of excess funds in the best way they can, so that they produce the highest possible return, given the constraints imposed by the previous objective.
3. To borrow funds (financing their needs) at the lowest possible coast.

It is obvious that commercial banks must deal a lot in the type of paper that we call money market instruments. Let's see, in more detail, how these institutions are triggered to enter the money market. Let's take one example.

If Company A, which keeps its cash balances with National Bank of Egypt, makes a check payment to Company B in the amount of EGP 100 million. Company B deposits the check drawn on National Bank of Egypt in the bank that it usually deals with, Arab Bank for example.

Assuming that both banks were happy with their cash positions before Company A decided to pay Company B, and Company B deposited the check; we see that each of the two banks now has its cash position changed. National Bank of Egypt will feel that its liquidity has been impaired by the loss of EGP 100 million. On the other hand, Arab Bank has to find a profitable use for the EGP 100 million it has received. These are the forces that will push the two banks into the money market. In this simplified example, where no other changes take place, the easiest solution will be for Arab Bank to lend its excess funds to National Bank of Egypt. By doing so, the cash position of the two banks will be brought back into balance.

Central Banks:

In most countries, the government regulates the country's monetary system, including banking operations, through its central bank such as the Central Bank of Egypt. These institutions not only print the pieces of paper that we call money; they also operate - directly or indirectly - in the money market**.**

To achieve the desired monetary objectives, such as a decrease or increase in the money supply, the central bank has a whole set of tools that can easily change the situation in the market? These tools include the following:

1. Open market operations; such as buying and selling money market instruments (mainly Treasury bills).
2. Voluntarily Intervention in the local currency market; against foreign currencies.
3. Changing the cost at which commercial banks can borrow money from the central bank (the discount rate or Repo rate).
4. Changing the reserve amounts that commercial banks are required to keep against their clients' deposits.
5. Regulating the types of assets and liabilities banks are allowed to hold. It is obvious from what we mentioned here that the central bank not only operates directly in the money market through open market operations, but that it also controls the commercial banks, which are the major institutions in the market. Sometimes the central bank uses big banks (probably owned by the government) to apply its monetary policy in the market.

Non Financial Businesses:

Every large company has a treasury department that often operates in the money market in a way very similar to a commercial bank. It has a liquidity position to maintain, but it also has to make sure that every piaster is invested at the highest possible return. In this sense we can say that the objectives of large companies, when operating in the money market are similar to those of commercial banks.

To see the forces that trigger the participation of these companies in the money market, we can pursue the example of the Company A, presented earlier. In that case, after the payment was made, the amount of liquid assets, or cash, of the company decreased, and that of Company B increased. Assuming other things remained unchanged, if the payment had not been fully anticipated, Company A will now need to sell some of its liquid assets. Company B will have to find a profitable use for its newly acquired funds.

Non Bank Financial Institutions

The situation in non bank financial institutions (mainly money market funds) is similar to that in commercial banks, except that these institutions tend to concentrate their assets and liabilities in instruments different from those used by commercial banks. However, the rationale behind the participation by these institutions in the money market is pretty much the same as that of commercial banks.

Individuals:

As mentioned before, anybody who owns a saving, current, or call account is a participant in the money market. The same goes for the person who owns a time deposit or a Treasury bill. The buying and selling of these instruments (by writing a check or by actually acquiring or disposing of the relevant piece of paper) constitute participation in the money market.
The participation of those individuals in the money market depends on their attitude toward holdings of cash and near-cash. The classic motives for holding cash and near-cash instruments are as follows:

1. For payment of their purchases of desired articles.
2. For precautionary purposes, in case some unforeseen event takes place.
3. For trading purposes, to profit from expected changes in interest rates of different money market tools.

Central bank Objectives

Most classic monetary policy books speak about four main objectives for the central bank of any country. Those objectives are the well-known goals that every politician has promised and that every policymaker has wrestled with: real economic growth, price stability, equilibrium in the balance of payments, and full employment. When these objectives are translated into practical decisions at the central bank, they are called monetary policy. (This is in contrast with fiscal policy, which is the set of policies based on government taxation and expenditure.) Monetary policy is usually phrased in terms of some desired level of interest rates and money supply. Some of these objectives are contradicting in the way they are achieved. For example, achieving economic growth needs interest rates to be low. On the other hand, higher interest rates are needed to fight inflation and achieve price stability. The way any deficit or surplus in the balance of payment is dealt with also affects employment and price stability. This means that central bank should be very cautious when trying to achieve these objectives to avoid any drawbacks resulting from concentrating on one objective and ignoring the other.

Hedging

The idea of hedging discussed in the Foreign exchange module is also valid for participants acting in the money market. A money market participant who expects to be borrowing or lending in the future, and who is worried about interest rates fluctuations in the market before he makes his borrowing/lending, can hedge against those fluctuations. This participant can go in the money market and make a “forward-forward” deal. i.e. he can do a simple money market transaction (borrow or lend), that starts at a certain date in the future and ends at a further date in the future, with all deal details fixed in advance (the amount & currency, the forward rate, and the start & maturity date). By doing so, the participant is said to be covered (or hedged) against market fluctuations. He fixed the cost of his borrowing (or the return on his investment) and is so unconcerned with changes in interest rates in the market.

How is the Forward-forward rate determined?

The forward-forward rate (or simply the forward rate) is derived from rates available in the money market. Money markets are known to be active in the known money market tenors (1-2-3-6-9-12 months). Obviously rates for such tenors will always be available in the market. Forward rates could be derived from those spot rates available in the market. For example if we are looking for a 3 months rate that starts in 6 months time (6 vs 9 forward), this could be derived from the 6 months deposit rate together with the 9 months deposit rate, as per the following formula:

$$= \frac{1 + (iL\% * L\ DAYS / year)}{1 + (iS\% * S\ DAYS / year)} \times \frac{year}{L\ days - S\ days} - 1$$

Exercise: Forward-Forward

Instructions:

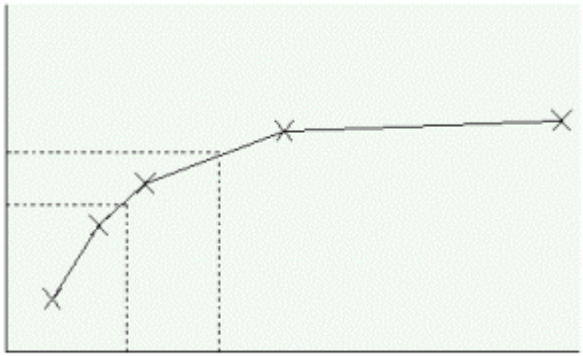
Using interest rates provided, calculate the 9 vs. 12 forward rate

O/N	*9%*
T/N	*9%*
S/N	*9%*
S/WK	*9.05%*
2 WK	*9.10%*
1 MTH	*9.15%*
2 MTH	*9.20%*
3 MTH	*9.30%*
6 MTH	*9.50%*
9 MTH	*9.75%*
12 MTH	*10%*

Interpolation

It is the process of determining the interest rates for broken dates that are not usually quoted in the normal run. One very well known way for getting those rates is what we call straight line interpolation.

In the following diagram, we will try to determine the interest rate for the 7 months (213 days), from the rates we have, which are the 6 months interest rate (182 days) and the 9 months interest rate (273 days).



182 days interest rate is 3% and 273 days interest rates is 4%. To get the 213 days interest rates we have to do the following:

- The difference between the two rates is 4%-3% = 1%.
- This difference takes place over a period of 91 days (273-182)
- Noting that this is a straight line interpolation (i.e. a constant rate of increase over this period of time), then the increase rate per day is 1%/91 = 0.011% approximately.
- After 31 days of increase (213-182), the magnitude of increase is 31*0.011% = 0.34%
- This means that the 213 days interest rate should be 3%+0.34% = 3.34%.

It is worth mentioning though that straight line interpolation is not usually present in the market. Simply because they are called yield curves and not yield lines. The process of producing the exact figure.
For the broken dates' interest rates is a science of its own. We might be speaking about this in more details in future courses.

Exercise:

Instructions:

If the 2 month (62 days) rate is 3% and the 3 month (91 days) rate is 4%,
What is the rate for an 81 day period?

Options

Introduction

Warren Buffet once thought that the most important rule for successful investment is not to lose money. If you believe that, do not read what is written in this module. Yes options made a lot of people lose money, but on the other hand, they made a lot of people millionaires. The only thing I am sure of here is the magnifying effect of options.

Options have enjoyed an increasing popularity in recent years. This is expected to go on for a while, we can say at least till the end of the financial crises hitting the world these days. Cash is really scarce and investors are expected to increase their investments in leveraging instruments – including options – as a way to overcome liquidity problems, and maximize their returns.

This characteristic – that we thought here to be attracting many investors to the world of options – is the very exact characteristic that might frighten people and keep them away from trading options. The huge amounts of money that can be gained or lost in short periods of time with options make them intriguing and frightening to a lot of investors.

Importance

Options is a very important an as a hedging tool and as a leveraging instrument. Options can significantly amplify losses and in the same time they do amplify gains.

Overview

Options can be a hard subject to understand because of their unfamiliar concepts and terms and also because of the need to be familiar with a lot of other sciences (including mathematics, statistics, finance, and economics) to be able to understand how options work and how their prices move, because of this, we will not be going too deep in options. The objective of this module is to give you a brief idea about how options work and how they can be used as an investment or hedging tool.

- Options overview
- Options strategies
- Expiration, exercise and assignment
- Options pricing

Options Overview

An option is a financial product that gives its holder (buyer) the right but not the obligation to buy or sell an underlying instrument (currency, bond, share or commodity) known as the “underlying” at a predetermined price (the strike price or exercise price) in an agreed quantity or amount for delivery on or before an agreed future date, known as the expiry date of the option.
The holder of an option is the buyer, who has the right to exercise the option. He pays a premium to the writer (seller) of the option. The seller has the obligation either to deliver the underlying to the holder (if it is the right to buy) or accept delivery from the holder (if it is the right to sell), when the option is exercised.
Options are classified according to style, type, or market. Options in a single market could also be classified according to class of option.

Styles

It is either an American style option or a European style option. An American style option gives its holder the right to exercise at any time before maturity or expiry date. The European style option could only be exercised at maturity. Exercising the option means buying or selling the underlying as per the contract.

Types

It is either a call option or a put option. A call option is the right to buy the underlying (currency, stock, bond, or commodity) at the strike price, while a put option is the right to sell the underlying at the strike price.

Markets

Options are either traded in formal organized exchanges or over the counter. In formal organized exchanges, options are sold and bought in standardized contracts by open outcry on the floor of the exchange or electronically thought trading screens. Traders in this case are dealing on behalf of themselves or their clients. Over the counter markets (OTC) are much more customized and flexible to meets the clients’ needs. This market is offered by banks and other investment houses.

In the money, out of the money, and at the money options:

In-the-money

An option is said to be in the money when the payoff from exercising it is positive. For call options, this is when the underlying asset's market price is higher than the strike price.

Out-of-the-money

An option is said to be out of the money when the payoff from exercising it is negative (so you will not exercise it). For call options, this is when the underlying asset's market price is lower than the strike price.

At-the-money

An option is said to be at the money when the underlying asset's market price is equal to the strike price.

Uses of options

Users of options are mainly divided into traders and hedgers. A trader is someone who follows some plans or strategies to make money from buying or selling options for profit. Traders use plain or complex (exotic) options for these purposes.
For example, a trader will buy an option as an investment because he believes that the value of that option will increase in the future due to market changes.
On the other hand, hedgers use options to protect positions that they already have or expect to have in the future in currencies, securities, or commodities. A hedge is a structure (composition) that protects its user against losses in the underlying in which they are dealing. It is usually seen as an insurance policy.
Many hedging techniques like forward currency contracts, futures, or swaps can provide similar protection against adverse market movements. The problem with these hedging techniques is that – while providing the needed protection - they eliminate the ability to profit from beneficial market movements. This is the beauty of options. They enable a risk position to be hedged against adverse market movements (the so-called downside risk), while keeping chances of making profits with the so-called upside potential).

Suppose an investor owns some shares in a car manufacturer. During the year, the shares increased in value as the business was improving. The next year the economy moved into recession, automobile sales fell and share prices started to fall. At this point of time, there were rumors of a market fall. As a hedging strategy against losing his capital gains, the investor bought an option to sell his shares (a put option) at a specific price. This would allow him to sell at a predetermined price if the share price fell. However, if share prices did not fall and instead they continued to rise, it would allow him to continue to benefit, until the option expires. The premium he paid reduces his share profits, but this will be regarded as a price he is paying for the peace of mind. When an option is purchased, it could be resold at any time during its life (i.e. before expiration) if it has residual value

Forward Contracts

Introduction

A forward contract is used as a financial instrument to hedge risk. The majorities of the forward contracts don’t have standards and aren't traded on exchanges.

Importance

Forward contracts can be used to protect the present value of a particular currency from exchange rate volatility or the present value of certain goods or raw material form price fluctuations.

Forward Contracts

A forward contract is an agreement to buy or sell a currency, for a certain price, at a certain date in the future. It is done to meet a future obligation.
The rate at which this transaction is done is called the forward rate. The forward rate is a combination of spot rate and interest rate differential between the 2 currencies involved.

Another form of this exact type of hedging consists of buying one currency and selling the other in the spot market, borrowing the sold currency, and investing the bought one till the forward date. The forward rate is reached by reflecting the cost/return of this borrowing/investment on the spot rate.

Suppose that you work in the cement industry and that a big portion of your revenue comes from the cement you export to one of your big clients who live in Japan. Suppose also that you expect to receive 100 million Japanese Yen in six months time being the value of the most recent shipment you made to your client. You will be paid in Yen, while you live and work in the States. This means that you are facing an FX risk.

When you priced the cement you are shipping to the Japanese client, the price was based on the value of the USD/JPY at the time you quoted the client. You don’t have a clue what will the rate of the USD against the JPY be when you receive the JPY in your account. Waiting till you receive the JPY before changing it to USD; means that you might lose on your trade. You will receive a fewer amount of dollars if the JPY depreciates in value during the coming six months (and before you receive the JPY). This is the FX risk we will deal with in this module.

In this sense, banks provide forward contracts to their clients to help them avoid such losses. These forward contracts provide the needed protection (Hedge) for clients who expect to deal in the foreign exchange market in the future.

Pricing Forward

Forward exchange rate is the rate at which exchange contracts can be made for delivery on a fixed date in the future, with the rate being determined at the present.
The forward rate consists of two parts: the present spot rate plus (or minus) a margin. This margin represents interest differential between the two currencies involved.
How is the forward rate calculated?

Forward rate = Spot rate *

$$\frac{1 + \dfrac{\text{Interest rate quote currency} * \text{day count}}{\text{Annual basis}_{\text{quote currency}}}}{1 + \dfrac{\text{Interest rate}_{\text{base currency}} * \text{day count}}{\text{Annual basis}_{\text{base currency}}}}$$

Example

- $/JPY = 120.10/20
- USD 182 days int. rate = 2%
- JPY 182 days int. rate = 0.5%

You want to sell JPY value 182 days
= 120.15 * ((1+ (0.5%*182/360)) / (1+(2%*182/360))) =
Fwd rate = 119.25

Exercise: Pricing Forward

Instructions:

- *Eur/$ = 1.4010/20*
- *Eur 3 months int. rate = 2.5%*
- *$ 3 months int. rate = 1.5%*
- *You go to the market and sell Euro 3 months forward, at what rate?*

Summary

- List the main participants in the foreign exchange market
- Discuss the money market and the concept of yield curves
- Describe options and the related pricing techniques
- Describe forward contracts and the related pricing techniques