

1 Context

1.1 Learning outcomes

After studying this text the learner should / should be able to:

1. Understand the context of the derivative markets.
2. Describe the basic fundamentals of the derivative markets.

1.2 Introduction

The purpose of this section is to provide the context of the derivative markets, which is the financial system and its financial markets, and the commodities markets. The following are the subsections:

- The financial system in brief.
- Ultimate lenders and borrowers.
- Financial intermediaries.
- Financial instruments.
- Spot financial markets.
- Interest rates.
- The derivative markets.

1.3 The financial system in brief

The financial system is essentially concerned with borrowing and lending and may be depicted simply as in Figure 1.

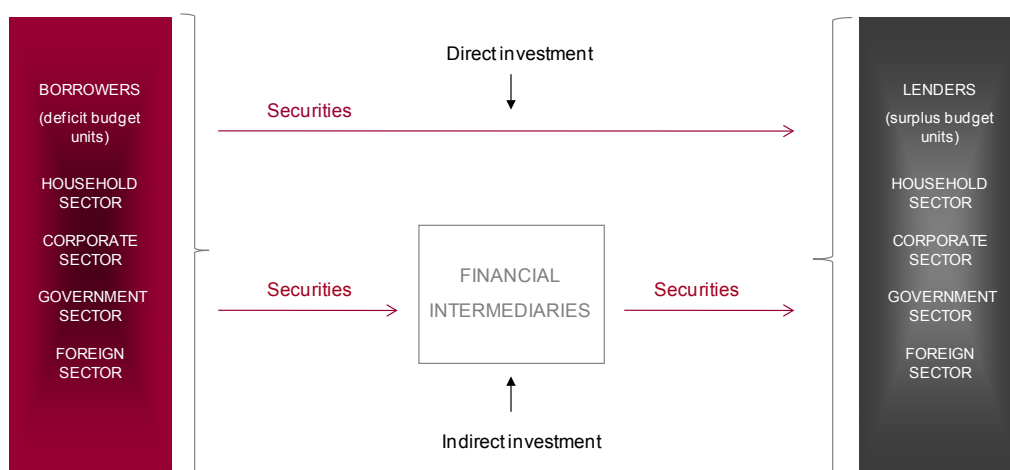


Figure 1: financial system (simplified)

The financial system has six essential elements:

- First: *ultimate lenders* (surplus economic units) and *borrowers* (deficit economic units), i.e. the non-financial economic units that undertake the lending and borrowing process.
- Second: *financial intermediaries* which intermediate the lending and borrowing process; they interpose themselves between the lenders and borrowers.
- Third: *financial instruments*, which are created to satisfy the financial requirements of the various participants; these instruments may be marketable (e.g. treasury bills) or non-marketable (e.g. retirement annuity).
- Fourth: the *creation of money* (= *deposits*) when banks loans are demanded and satisfied; banks have the unique ability to create money by simply lending because the general public accepts bank deposits as a medium of exchange.
- Fifth: *financial markets*, i.e. the institutional arrangements and conventions that exist for the issue and trading (dealing) of the financial instruments;
- Sixth: *price discovery*, i.e. the price of shares / equity and the price of money / debt (the *rate of interest*) are “discovered” (made and determined) in the financial markets. Prices have an allocation of funds function.

We touch upon these elements of the financial system below, because they serve as the context and foundation of the derivative markets.

1.4 Ultimate lenders and borrowers

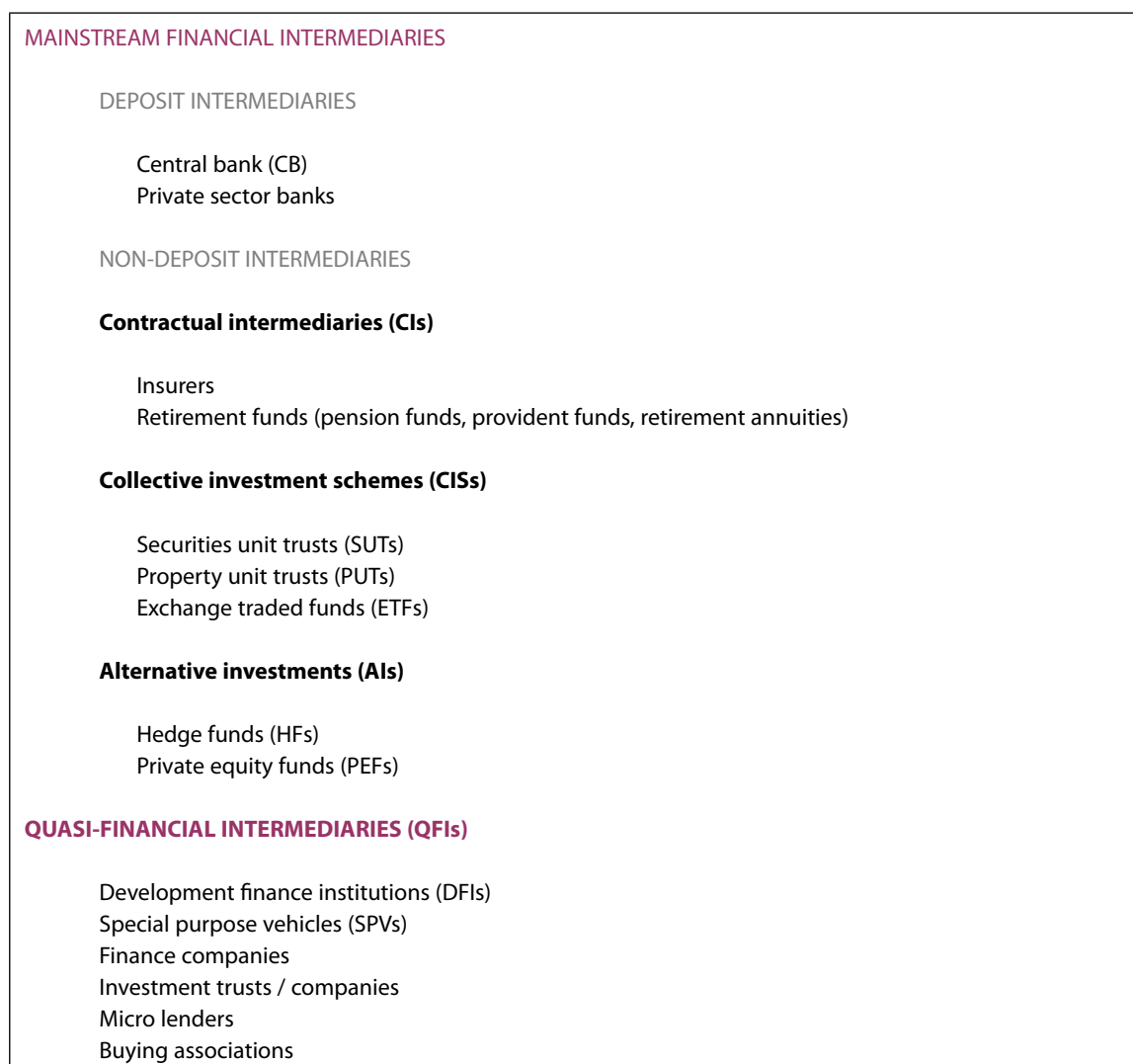
The ultimate lenders can be split into the four broad categories of the economy: the *household sector*, the *corporate (or business) sector*, the *government sector* and the *foreign sector*. Exactly the same non-financial economic units also appear on the other side of the financial system as *ultimate borrowers*. This is because the members of the four categories may be either surplus or deficit units or both at the same time. An example of the latter is government: the governments of most countries are permanent borrowers (usually long-term), while at the same time having short-term funds in their accounts at the central bank and/or the private banks, pending spending.

1.5 Financial intermediaries

Financial intermediaries exist because there is a conflict between lenders and borrowers in terms of their financial requirements (term, risk, volume, etc.). They solve this divergence of requirements and perform many other functions such as lessening risk, creating a payments system, monetary policy, etc.

Financial intermediaries may be classified in many ways. A list of the financial intermediaries found in most financial systems, according to our categorisation preference, is as shown in Box 1.

The main financial intermediaries (or categories) and their relationship to one another may be depicted as in Figure 2.



BOX 1: Financial intermediaries

1.6 Financial instruments

As a result of the process of financial intermediation, and in order to satisfy the investment requirements of the ultimate lenders and the financial intermediaries (in their capacity as borrowers and lenders), a wide array of financial instruments exist. They can be split into three categories:

- Equity / share instruments.
- Debt instruments, which can be split into:
 - Short-term debt instruments (= money market).
 - Long-term debt instruments (of which the bond market is a part).
- Deposit instruments (which can be seen as a form of debt instrument; the majority of which are short-term).

The instruments are either non-marketable (e.g. bank overdraft, bank mortgage advance) (called non-marketable debt or NMD), which means that their markets are only primary markets (see next section), or marketable debt (MD), e.g. treasury bills, which means that they are issued in their primary markets and traded in their secondary markets (see next section). The financial instruments (also called securities) that exist in the Local Country’s¹ financial markets (defined in the next section) are revealed in Figure 2.

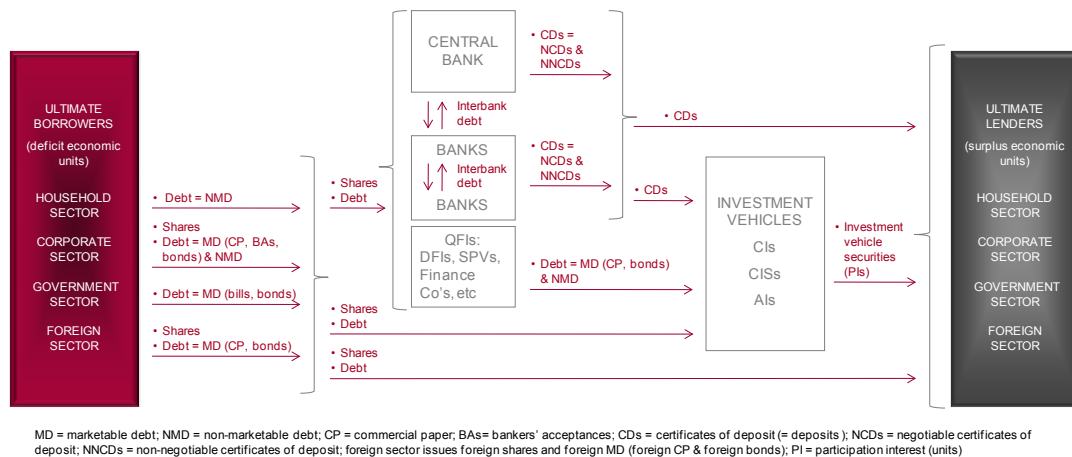


Figure 2: financial intermediaries & instruments / securities

1.7 Spot financial markets

1.7.1 Introduction

Spot (also called cash) markets are distinguishable from the derivative markets. *Spot* means to settle the deal as soon as possible and there are different conventions for the debt, share and forex markets as shown in Figure 3. The derivative markets settle (obligation or option) the underlying (described later) instruments in the future.

This section covers the spot markets under the following headings:

- Primary and secondary markets.
- Debt markets.
- Share / equity market.
- Foreign exchange market.

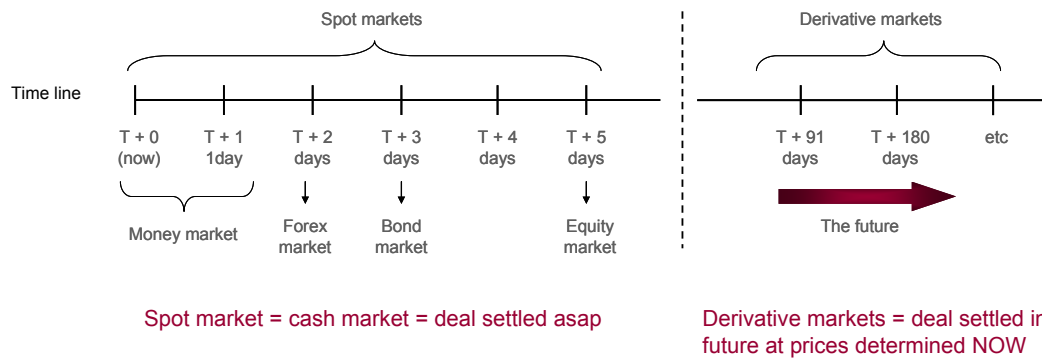


Figure 3: financial markets: spot & derivatives

1.7.2 Primary and secondary markets

As noted, there exist primary and secondary markets. The former are the markets that exist for the issue of new securities (marketable and non-marketable), while the latter are the markets that exist for the trading (i.e. exchange) of existing marketable securities. It should be evident that in the primary markets the issuers (borrowers) receive money from the lenders (investors), while in the secondary markets the issuers do not; money flows from the buyers to the sellers. This is depicted in Figure 4 and Figure 5 (shares used as example).

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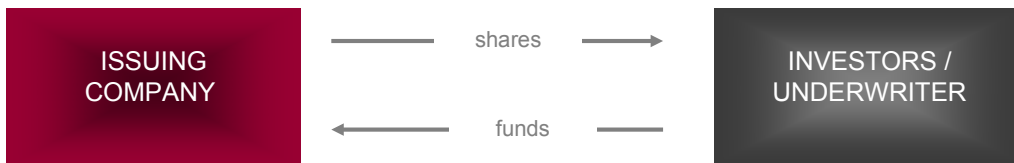


Figure 4: exchange of value in primary equity market

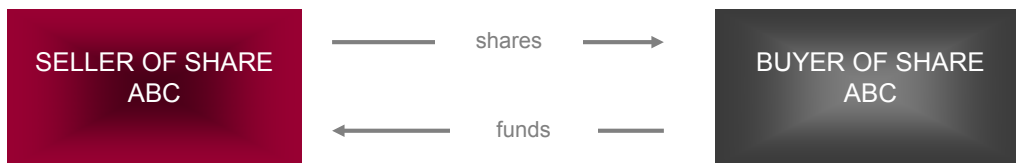


Figure 5: exchange of value in secondary equity market

The secondary financial markets evolved to satisfy the needs of lenders (investors) to buy and sell (exchange) securities when the need arose. Some markets naturally exist in a safe (i.e. low risk) environment, while for others a safe environment has been created. The former markets are called over-the-counter (OTC) markets, and the latter the formalised (or exchange-driven) markets. The OTC markets are the foreign exchange and money markets (in some countries partly exchange-driven), which essentially are the domain of the well-capitalised banks, while the exchange-driven markets are the equity / share and bond markets (the latter in some cases). These markets may be depicted as in Figure 6.

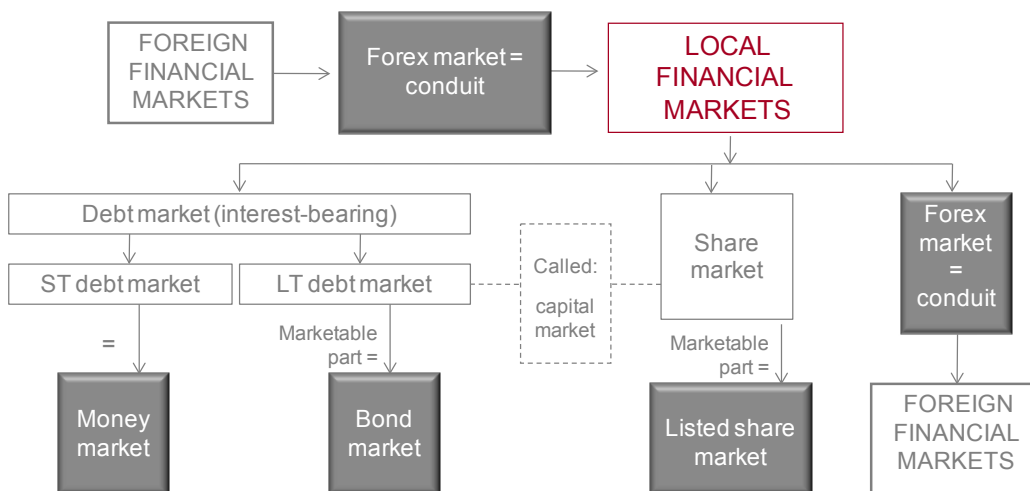


Figure 6: financial markets

1.7.3 Debt market

There are two financial markets: the share market and the debt market. The debt market is the market in which debt instruments are issued (primary market) and exchanged (secondary market). Interest is paid on debt instruments (hence the other name: interest-bearing market), as opposed to dividends that are paid on shares / equities. The debt markets are also called the fixed-interest markets, but this is a misnomer because interest may be floating, i.e. reset at intervals, during the life of the instruments.

The debt market and it can be split into the short-term debt market (STDM) and the long-term debt market (LTDM). The money market can be defined as the short-term marketable securities market or as the market for all short-term debt, marketable and non-marketable. Some scholars also term the market as the market for wholesale debt. Our preference is to define the money market as the market for *all* short-term debt, marketable and non-marketable – and the reason is that in this market the volume of non-marketable debt (ST-NMD) far outstrips the volume of marketable debt (ST-MD). Also the genesis of money market interest rates takes place in the ST-NMD (specifically the interbank markets – there are three interbank “markets”, but we will not cover this detail here).

As seen, the other part of the debt market is the LTDM, which is (obviously) the market for the issue and trading of long-term debt instruments. The trading of long-term debt only applies to the MD securities of the LTDM, and this applies to bonds. Thus the bond market is the market for the issue (primary market) and trading (secondary market) of marketable long-term debt securities.

The money and bond markets are differentiated according to term to maturity: the cut-off maturity is arbitrarily set at one year. Thus, the money market is usually defined as the issue and trading of securities with maturities of less than one year and the bond market as the issue and trading of securities with maturities of longer than one year (called bonds). The bond market is part of the LTDM (the marketable part).

The definition of the bond market is acceptable but the money market is much more than the issue and trading of securities of less than one year. It encompasses:

- The primary markets that bring together the supply of retail and wholesale short-term funds and the demand for wholesale and retail short-term funds.
- The secondary market in which existing marketable short-term instruments are traded.
- The creation of new money (deposits) and the financial assets that lead to this (loans in the form of NMD and MD securities).
- The central bank-to-bank interbank market (cb2b IBM) and the bank-to- central bank interbank market (b2cb IBM) where monetary policy is played out and interest rates have their genesis (i.e. where interest rate policy is implemented).
- The b2b IBM where the central bank's key lending interest rate (KIR²) has its secondary impact, i.e. on the interbank rate.
- The money market derivative markets (= an addendum).

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It is in the money market that money (= bank deposits of the non-bank private sector³) is created by the banks by simply lending (= bank assets). It does not appear proper that the banks are able to do so, but *it is so* because the general public accepts bank deposits as a means of payment (= the definition of money apart from bank notes and coins), assuming a low inflation environment.

Because of this unique ability of the banks, a referee is required to ensure that the money stock does not grow too rapidly (since high money growth is related to inflation). The referee is the central bank and its weapon is the KIR.

The central bank operates in the debt and foreign exchange (forex) markets through buying and selling debt instruments and forex (called open market operations) with a specific purpose: to ensure that the banks borrow from it at all times. This is called the “liquidity shortage” but it is simply loans to the banks at a rate of interest called the KIR. (This happens in the so-called interbank market.)

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The ultimate outcome of the level of the KIR is the level of bank lending rates. This is monetary policy which can be summarised as follows:

- Borrowings from the central bank at all times means that the KIR affects the banks' deposit rates.
- The banks endeavour to maintain a healthy margin (because they are profit-maximisers) between what they pay for deposits and what they charge for loans (the high profile loan rate is the prime rate).
- Thus if the KIR affects the banks' deposit rates it affects the banks' lending rates via a "static" margin.
- The level of the banks' prime rates (which are the same) (and their other lending rates which are benchmarked on prime rate) affects the demand for bank loans (= bank credit).
- The demand for credit by the household sector, the corporate sector and the government sector, when satisfied by the banks (which they happily do if the creditworthiness of the borrower is sound), "creates" bank deposits.⁴
- Bank deposit growth is money stock growth, and the "cause" is bank loan growth.⁵
- The money stock growth rate generally reflects the demand for goods and services.
- If the demand for goods (as largely reflected in the bank credit / money stock growth rate) is high and the economy cannot expand quickly enough to satisfy the demand, inflation makes its menacing appearance.
- Thus the job of the central bank is to ensure that the money stock (bank deposits) does not grow beyond the economy's capacity to satisfy the demand (that underlies it).
- This it executes via the one weapon it has: the KIR and the ability to ensure that the banks borrow from it at all times.
- Inflation, if high and sustained, ultimately impairs economic growth because economic agents (individuals and business – the household and corporate sector) devote their attention to hedging their wealth. The foreign sector's involvement in the local economy is also affected.
- A change in money market rates has an almost immediate impact on the pricing / valuation of assets (bonds, equities and property), and therefore on the perception of wealth (which has an effect on expenditure, the main driver of economic growth).

The reason for this exposition is the significance *interest rates*. They have their genesis in the money market in the form of the KIR. This rate (essentially one-day rate) should be seen as having a direct effect on the one-day interbank rate and therefore on the one-day deposit rate; this rate radiates to all other longer-term rates (deposit and borrowing). *The money market rates are a vital input in the pricing of derivative instruments.*

1.7.4 Share / equity market

The share market is the market for the issue and trading of shares. The term *equity* refers to the capital of a company; it is made up of three parts:

- Ordinary shares. These shares are permanent capital in the sense that they represent a share in the ownership of a company
- Preference shares. These shares are long-term capital if they have a maturity date (they usually do), or permanent capital if they are perpetual, i.e. have no maturity date.
- Retained profits.

Ordinary and preference shares are marketable, whereas retained profits are not. Preference shareholders have preference over ordinary shareholders, and creditors (e.g. bonds, bank loans) enjoy preference over preference shares, in the event of the liquidation of the company.

1.7.5 Foreign exchange market

The forex market, strictly speaking, is not a financial market.⁶ However, since residents (ignoring exchange controls for a moment) are able to borrow or lend offshore, and foreigners are able to lend to or borrow from local institutions, the forex market (which allows these transactions to take place) has a domestic and foreign lending or borrowing dimension, and can be viewed as being closely allied to the domestic financial market.

When we focus on the ultimate lenders and borrowers in our depiction of the financial system shown earlier, we observe that these sectors include the *foreign sector*. This is where the foreign exchange market fits in. The foreign sector is able to supply funds locally, domestic institutions are able to lend to the foreign sector, and the foreign sector is able to borrow funds in the local market (i.e. issue securities in the local market). The unbound forex markets of the world allow this to take place. As indicated above, the forex market should be seen as a conduit for foreigners to the local financial and goods / services markets and for locals to the foreign financial and goods / services markets.

It will be apparent that in order for a forex market to function there needs to be a demand for and a supply of forex. *Demand* is the demand for, say, US dollars, the counterpart of which is the *supply* of rand. This cannot be satisfied without a *supply* of forex (say US dollars), the counterpart of which is a *demand* for rand. The forex market brings these *demanders* and *suppliers* together.

1.8 Interest rates

As we have seen, interest rates have their genesis in the money market, starting with the KIR. The KIR is made effective by the existence of a borrowed reserves condition (also called “money market shortage” and “liquidity shortage”), which in most countries is a permanent feature of the financial landscape. The KIR has an almost direct influence on the bottom end of the yield curve, which may be depicted as in Figure 7.

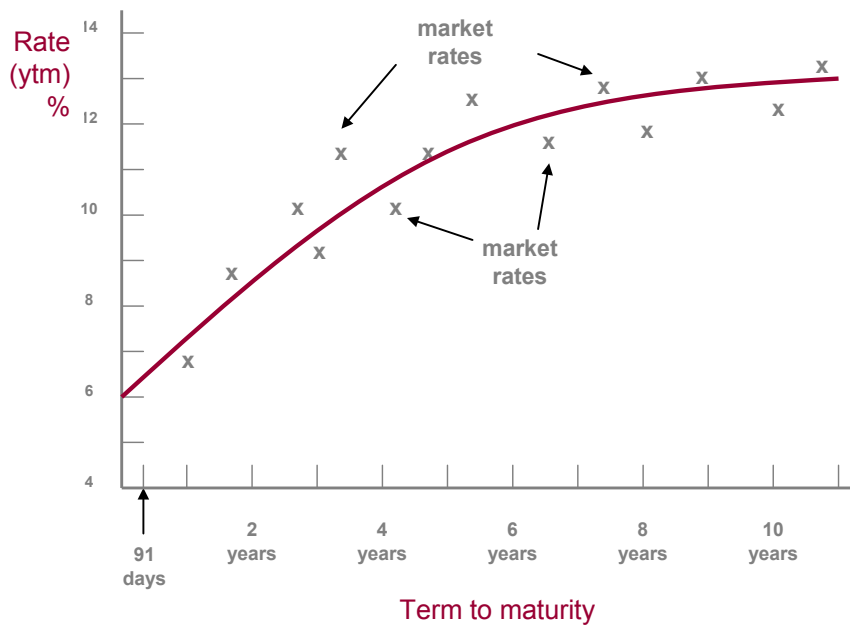


Figure 7: market rates and constructed yield curve

The yield curve is a representation of the relationship between interest rates and term to maturity. The money market is represented in the lower end of the yield curve and the bond market the part after one year to maturity. In this respect the bond market can be seen to be an extension of the money market.

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1.9 The derivative markets

The word “derivative” means that the product that it describes is “derived” from something. The “something/s” are financial market instruments and the indices (i.e. indices of prices and interest rates) of financial instruments. The latter are debt instruments, share market instruments and forex.

This means that the derivatives cannot exist on their own, i.e. they piggyback on the ordinary financial market instruments or indices. However, it must be rapidly added that there are derivatives that piggyback on other derivatives. Examples are options on futures and options on swaps.

Derivatives are contracts between two parties to buy, sell or exchange (optional or obligatory) a standard or non-standard quantity and quality of an asset or cash flow at a pre-determined price on or before a specified date in the future. The value of the underlying security or index (the spot market instrument that underlies the derivative) changes continuously, and this means that the value of the derivative almost always also changes. For example, the value of a future on a share index changes as the index changes in value. Also, the value of an option on a bond changes because the rate on the bond changes in the secondary market.

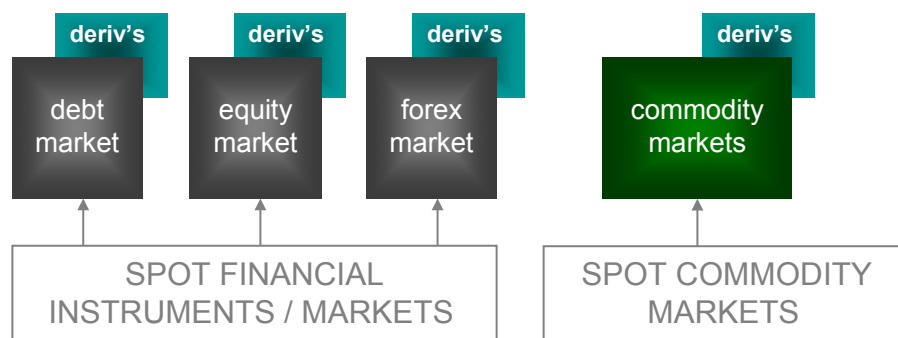


Figure 8: derivative markets

The terminology of the derivative markets can be confusing (caps, floors, collars, options, futures, options on futures, FRAs, repos, swaps, swaptions, and the like) and this leads to the need to categorise these markets in a sensible fashion. The derivative markets may be broadly categorised according to:

- Commodity derivative markets.
- Financial derivative markets.

The term *financial* or *financial markets* refer to the debt, share and forex markets. Thus we can depict the derivative markets as shown in Figure 8.

This broad categorisation makes sense because there is a fundamental difference between these markets in terms of underlying assets and market turnover. The underlying assets in the commodities derivative markets are various, such as gold, maize, oil, etc., which are fundamentally different to the financial assets or notional financial assets that underlie financial derivatives. Turnover on the latter market dwarfs the turnover on the former.

However, there is much overlap in terms of the types of derivatives that are found in both markets. For example, in both market types forwards, futures, options, and swaps are to be found.

It may also make sense to categorise these markets according to whether they are:

- formalised derivative markets (i.e. exchange-traded), as opposed to
- informal derivative markets (i.e. OTC).

For example, there are *formalised markets* in futures and options on futures; and there are *informal OTC markets* in forwards, interest rate caps and floors, forward rate agreements, interest rate and currency swaps, etc. However, this is not the ideal categorisation because there are derivatives that have feet in both the formal and the OTC markets (for example forward rate agreements).

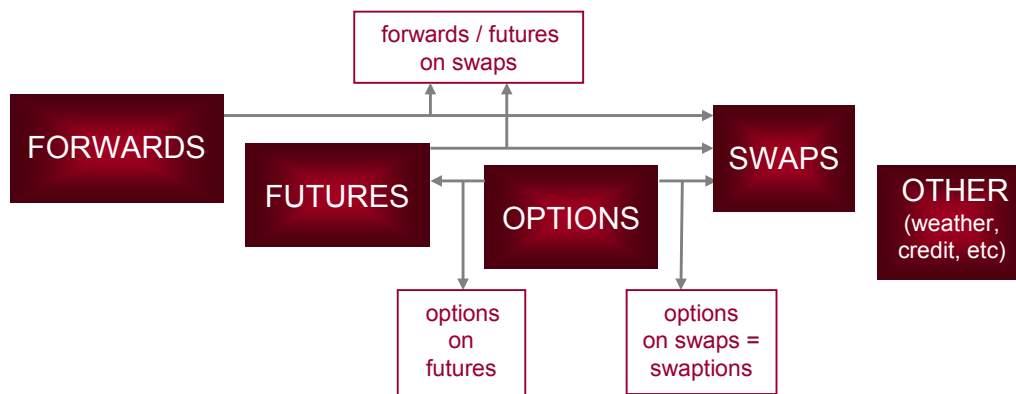


Figure 8: derivative instruments / markets

Another way in which one may categorise derivatives is according to the broad types of derivatives: *forwards*, *futures* (which are similar), *options* (which include options on futures and swaps), *swaps*, and *other* (such as credit and weather derivatives). This classification may be depicted as in Figure 8.

However, this is not ideal because there is a need to relate them to the spot (cash) markets. This is shown in Figure 9. This illustration is also not ideal because it cannot capture the finer distinctions of the derivative markets (for example forwards actually do not apply to all the markets). Table 1 provides the detail of the derivative markets and how they relate to the spot markets.

Even the classification offered in Table 1 is not foolproof, because further explanation is required in some cases to make it absolutely clear. This type of information cannot be captured in an illustration or a table; it requires explanation.

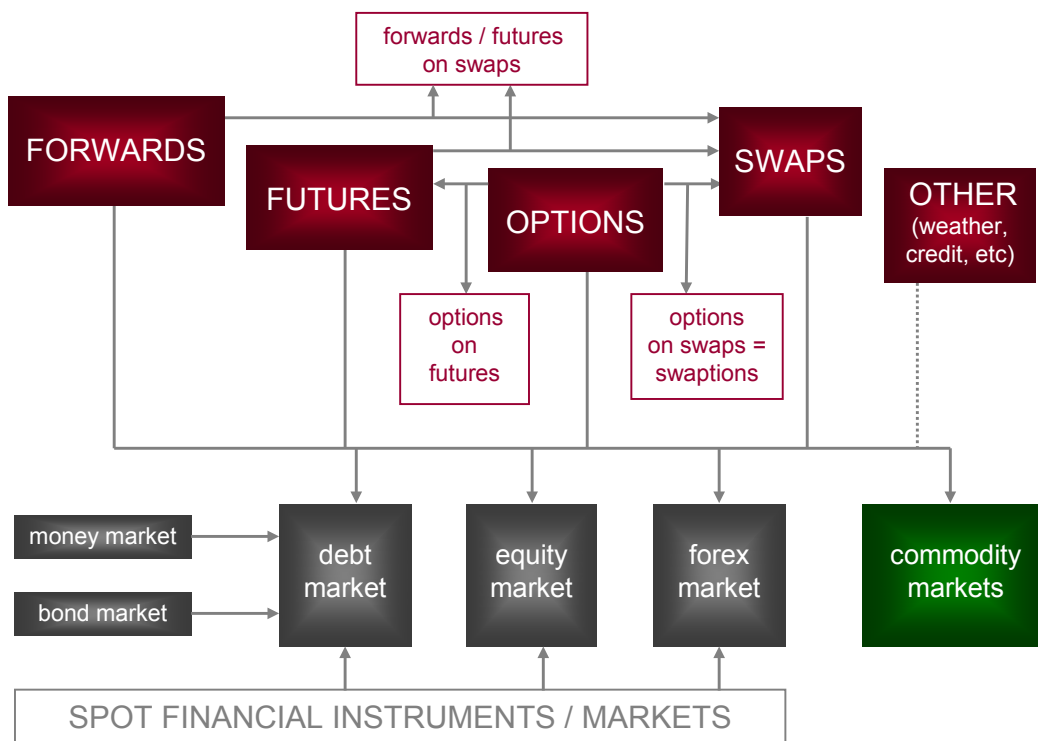



Figure 9: derivatives and relationship with spot markets

However, Figure 9 and Table 1 do provide an overarching view of the types of derivative instruments and provides a logical framework for discussion. Taking the above as a cue it makes sense to categorise and discuss derivative instruments in the following order:


- Forwards.
- Futures.
- Swaps
- Options.
- Other derivatives.

Derivatives	Debt market	Share market	Forex market	Commodities market
Forwards	Yes	Yes	Yes	Yes
Futures	Yes	Yes	Yes	Yes
Options:				
Options on "physicals" ¹	Yes	Yes	Yes	Yes
Options on futures	Yes	Yes	Yes	Yes
Options on swaps	Yes	Yes	Yes	Yes
Warrants ²	Yes	Yes		
Caps and floors	Yes			Yes
Swaps ²	Yes	Yes	Yes	Yes
Other:				
Credit derivatives ³	Yes			
Weather derivatives ³				
1. The actual spot market instruments and indices. 2. Requires explanation (done later). 3. Do not apply to specific financial or commodity markets.				

Table 1: Spot markets and derivative instruments

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1.10 Summary

The financial system provides the context of the derivatives markets. The instruments and their rates, prices and indices underlie the derivative instruments. The most important input in derivatives' pricing is the rate of interest (which has its genesis in the money market).

The sound classification of derivatives is forwards, futures, swaps, options and other derivatives (and hybrids).

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