Financial Derivatives Module

The Official Learning and Reference Manual


This Workbook relates to syllabus version 7.0 and will cover examinations from 1st April 2007 to 18th November 2007.
Welcome to the Financial Derivatives Module study material for the Securities & Investment Institute’s Certificate Programme. This manual has been written to prepare you for the Securities & Investment Institute’s Derivatives examination.

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Ruth Martin
Managing Director

January 2007
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It is estimated that this workbook will require approximately 100 hours of study time. For each chapter the approximate number of study hours has been given above.
INTRODUCTION TO DERIVATIVES

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This syllabus area will provide approximately 8 of the 70 examination questions
I. GENERAL INTRODUCTION

Mention ‘derivatives’ and people tend to think of dangerous instruments that are impenetrably complex. Derivatives can be dangerous, after all it was mainly trading in derivatives that brought about the collapse of Barings Bank and massive monetary losses at many other organisations. However, it is not necessarily true that these instruments are inherently dangerous – they are chiefly designed to be used to reduce the risk faced by organisations and individuals (technically referred to as ‘hedging’). In fact, many of these derivatives are not particularly complex either. To illustrate the underlying simplicity, imagine that you wanted to purchase a new sofa from a furniture showroom.

You make your choice of sofa and see that it will cost £1,000. On enquiry, you discover from the sales assistant that the sofa is currently out of stock in the warehouse. However, you can sign a contract to accept delivery of the sofa in two months’ time (when the stock will be replenished) and at that stage the store will charge the £1,000 to your credit card. If you sign, you have agreed to defer delivery for two months – and you have entered into a derivative (it is derived from something else, here, a sofa). This is very similar to a ‘futures contract’. You have contracted to buy an underlying asset (the sofa) and pay a pre-agreed sum of money (£1,000) in two months’ time (the ‘future’ date). As far as the furniture store is concerned, they have contracted to sell the underlying (the sofa) in exchange for £1,000 in two months’ time.

So, this is an example of a futures-type contract that we could refer to as a ‘sofa future’. In the jargon of the derivatives markets, you are ‘long’ a sofa future because you have agreed to buy at a future date. The furniture store is ‘short’ a sofa future because they have agreed to sell at a future date.

Futures are not the only type of derivative - there are also ‘options’. To illustrate how options differ from futures, we can use the same example of a sofa in a furniture store. This time, the sales assistant tells you the sofa you want is not in stock at present, but there is a small batch of ten sofas due for delivery in two months’ time. Of these ten sofas, nine have been pre-sold. You cannot make up your mind whether to go ahead and commit to buy the tenth sofa or to try a few other stores to see if anything else catches your eye. Noticing this, the sales assistant makes you an offer. If you pay £30 now he will give you the right to reserve the tenth sofa. It will become yours on the payment of £1,000 in two months’ time and, in the intervening period, the sales assistant cannot sell it to anyone else.

Again, this is a derivative transaction (derived from something else – the sofa). If you agree to it you will be paying a non-returnable sum of money (£30) that gives you the right to buy the sofa for £1,000 in two months’ time. This is a ‘sofa option’ and, using derivatives jargon, you are ‘long’ the option because you have the right to do something (here, the right to buy the sofa for £1,000). However, you are not obliged to buy the sofa, but if you decide not to buy then you will lose the £30 you paid over at the outset. As far as the furniture store is concerned, they are ‘short’ the option because they have granted the right to do something (by giving you the right to buy the sofa for £1,000) in return for the receipt of an agreed sum (here £30).
2.1 What is a Future?

An appropriate definition of a future is that it is a legal agreement between two parties to make or take delivery of a specific quantity of a specified asset on a fixed future date at a price agreed today.

Unlike our example of a ‘sofa future’ above, futures are often described as ‘futures contracts’ because they are traded on organised exchanges, such as Euronext.liffe (in London) or the Chicago Mercantile Exchange (CME) in the US.

The terms of each contract are standardised in a legal document called the ‘contract specification’. This is because it would not be financially viable for an exchange to satisfy every single trader’s requirements regarding particular underlying assets precisely. The aim of the contract specifications is to allow participants to take positions on general price movements in any given market.

Futures originated in the agricultural market, where they were based on commodities, such as grain. Euronext.liffe still trades Wheat futures, where the contract is based on Feed Wheat and the specific quantity is 100 tonnes, i.e., each individual contract represents 100 tonnes of wheat. The specified asset is obviously wheat, but of what quality? The contract specification goes to great lengths to detail precisely what is acceptable under the terms of each contract. For example, in Euronext.liffe’s wheat future the grain must be ‘sound and sweet and in good condition and to contain not more than 3% heat damage, natural weight to be not less than 72.5kg per hectolitre, moisture content not to exceed 15%’. It also specifies what form of delivery is acceptable by stating that ‘it must be delivered to the buyer’s lorry in bulk, from a registered store in mainland Great Britain’.

The price is agreed between buyer and seller. In fact, it is the sole element of the futures contract that is open to negotiation. However, the exchange does specify the minimum permitted movement in price and the method of quotation. For the Euronext.liffe wheat future the quote is on a per tonne basis and the minimum movement is 5p per tonne (known as the ‘tick size’) and, because each contract represents 100 tonnes, the value of the minimum price movement per contract (the ‘tick value’) is 100 x 5p = £5.

The fixed future date is also laid down by the exchange. Although it is a set day within the month, the fixed future date is often referred to as the ‘delivery month’, and for the Euronext.liffe wheat future there are delivery months in January, March, May, July, September and November each year.
Alongside these ‘commodity futures’ there are also ‘financial futures’, which are based on interest rates, currency exchange rates or stock market indices.

For all futures contracts, the contract specification standardises the futures product and, as long as the contracts have a common underlying asset and a common delivery date, the contract is said to be fungible, ie, identical to, and substitutable with, others traded on the same exchange.

For example, all March Long Gilt futures on Euronext.liffe are fungible.

A March Long Gilt future on Euronext.liffe is NOT fungible with a June Long Gilt future on the same exchange (because the delivery dates are different).

The consequences of standardisation and fungibility are:

• traders know what they are trading;
• traders know what their delivery obligations are (buyers know the cost of the asset they have bought and sellers know the amount they will receive and the quality of the asset they have sold);
• contracts are easy to trade because activity is concentrated in a single contract;
• it is possible to trade large volumes (multiple contracts); and
• the concentration of activity provides liquidity and, therefore, efficiency to the market.

The fungible nature of contracts also means that a trader can remove any delivery obligations by taking an equal and opposite position. For example, a trader who has bought a future and is required to buy a specified quantity of the underlying asset can simply sell a fungible future. The result is that they have agreed to both buy and sell the same item at the same future date. The trader is described as having 'closed out' his position.

2.2 How do Futures Work?

Futures positions are opened by going long (buying) or short (selling).

By opening a long futures position, the trader becomes exposed to changes in the futures price and the position will incur profits or losses as a result of the movement in price.

Holding the contract to expiry will oblige the trader to meet the delivery obligations. If the price of the asset rises, the futures buyer will have made a profit. The trader will take delivery at the lower price and be able to sell the asset in the cash market at the higher price.

Conversely, if the price is lower than the agreed price, the trader’s counterparty (the futures seller) will make a profit.
2.3 Contracts for Differences

LEARNING OBJECTIVES

1.1.1 Understand the basic concepts and fundamental characteristics of contracts for differences

Some futures contracts are based on tangible goods such as grain and oil. If the contract is carried through to expiry there will be an exchange of the underlying for the pre-agreed cash sum. These contracts are described as being ‘physically deliverable’.

However, many people trade in futures contracts where the underlying is intangible – a stock market index, for example. At the end of the contract physical delivery of the underlying is either impossible or impractical. These contracts, where the underlying is intangible, are known as ‘contracts for differences’ and are cash-settled.

Example 1

An investor buys a FTSE 100 future at an agreed ‘price’ of 5600 points and at expiry the index stands at 5800 points. The investor has made a profit, not by selling on a tangible asset such as grain, but by receiving a set amount of cash for each point gained. The amount of money for each point is specified in the futures contract.

In the case of Euronext.liffe traded FTSE 100 futures that amount is £10, so the seller of the future simply pays the buyer 200 points multiplied by £10, ie, £2,000.

2.4 Spread Betting

LEARNING OBJECTIVES

1.1.1 Understand the basic concepts and fundamental characteristics of spread betting contracts

An alternative way of entering into a contract for difference is to place a bet with a spread betting firm.
2.5 Uses of Futures

There are three ways futures can be used:

2.5.1 Speculation

Speculators seek to make a profit from price movements by buying or selling futures contracts. Speculative investments involve a high degree of risk and usually have short holding periods. If an investor feels the price of the underlying is going to go up, he can speculate by buying the underlying asset itself or, alternatively, by buying futures contracts on that underlying. Futures are often seen to be more attractive than the underlying asset itself because they are highly ‘geared’. Put simply, this means that a small expenditure/initial investment gives the holder a big exposure to a market, i.e., the potential for large profits or losses.

2.5.2 Hedging

People who want to guard themselves against adverse price movements hedge using futures. A hedger seeks to protect a position, or anticipated position, in the spot market by taking an opposite position in the futures market. A perfect hedge is a risk-free position. For example, a fund manager can remove his exposure to a stock market fall that will affect the portfolio of shares he manages. He does this by taking a temporary short position in futures in an equity index. It will deliver profits to offset the impact a fall in the stock market would have. Fund managers often use these hedging strategies as temporary ‘shields’ against market movements.

2.5.3 Arbitrage

An arbitrageur observes that the same underlying asset or financial instrument is selling at two different prices in two different markets. He undertakes a transaction whereby he buys the asset or instrument at the lower price in one market and sells it at the higher price in the other market. Arbitrage gives him a risk-free profit that will be realised when the prices in the two markets come back into line and the arbitrageur closes out the position.
2.6 Futures Profit & Loss Profiles

LEARNING OBJECTIVES

1.1.3 Understand the risks and rewards associated with futures

2.6.1 Long Futures

The outcome for a buyer or seller of a future when it reaches its expiry date is driven by the price of the underlying asset at that time. Because the market price can vary, this is known as the ‘market risk’. A futures buyer commits to buy at a pre-agreed price (eg, £115) and will make a profit as long as the underlying asset is trading above this price at expiry. This can be represented graphically as follows:

As shown, the risk to the buyer of a futures contract is maximised when the value of the underlying at expiry falls to zero. In that case, the buyer would pay the pre-agreed sum (£115) for an asset worth nothing, losing the £115. The reward to the buyer is, theoretically, unlimited - the higher the price of the underlying at expiry, the higher the profit made by the futures buyer.

2.6.2 Short Futures

Because the seller of a future is the other side of the transaction from the buyer of the future, the outcome is a mirror image of the outcome for the buyer. It is driven by the price of the underlying asset at expiry and a profit is made if the underlying asset’s price falls below the pre-agreed level. A loss will be made if the underlying asset at expiry is priced above the pre-agreed futures price. This can be represented graphically as follows:
The risk to the seller of a futures contract is, theoretically, unlimited. As the price of the underlying asset rises above the pre-agreed level at expiry, the futures seller suffers loss since he must pay the higher market price and sell at the lower pre-agreed price to the futures buyer. The futures seller’s reward increases as the price of the underlying asset falls below the pre-agreed level and is limited to the futures price, where the seller can deliver the underlying asset that has cost nothing in exchange for the pre-agreed futures price.

In addition to the market risk, there is another risk that arises on futures contracts. Whenever a buyer or seller enters into a futures contract, there is a risk that the other side (the counterparty) of the contract does not or cannot honour their obligations. This is known as ‘counterparty risk’.

As will be developed later in this workbook, counterparty risk exists between:

- the broker and their client; and
- the broker and the clearing house.

3. OPTIONS

LEARNING OBJECTIVES

1.1.2 Understand the basic concepts and fundamental characteristics of options contracts: Puts and calls; American, European and Asian styles; Options on futures

3.1 What is an Option?

An option is a contract that gives the buyer the right, but not the obligation, to sell or buy a particular asset at a particular price, on or before a specified date. The seller of the option, conversely, assumes an obligation in respect of the underlying asset upon which the option has been traded. As illustrated by the ‘sofa option’ in the introduction to this chapter, an option is a contract that allows an investor to buy (or sell) a product for a fixed price, on or before a future date.
Options are available on a variety of underlying assets – physical assets, like oil or sugar, and financial assets, such as shares. The option may be based on a futures contract, where the underlying asset is a future; these are known as ‘options on futures’.

As with futures, investors attempting to make money by investing in options are known as ‘speculators’, but options can also be used to hedge existing positions. As will be seen later in this workbook, options are trading and risk management tools which offer an extremely wide set of choices for investors and fund managers with differing attitudes to market direction and volatility and with differing appetites for risk.

### 3.2 Options terminology

A **call option** is an option to buy an asset (the underlying) for a specified price (the strike or exercise price), on or before a specified date. Remember this by thinking that the buyer can **call** away the asset from the seller.

A **put option** is an option to sell an asset for a specified price on or before a specified date. Remember this by thinking that the buyer can **put** the asset on to someone else (the seller of the option), demanding the pre-agreed sum in exchange.

The buyer of an options contract is said to be **long**, or the **holder** or **owner** of the contract. The **seller** of an options contract is said to be **short**, or the **writer** of the contract.

An option’s **premium** is the cost of the option. Premiums are non-returnable and are paid by the option holder to the option writer.

The **exercise style** of an option describes how it may be exercised. A **European-style** option is an option that can be exercised on its expiry day only (remember ‘E’ for ‘European’ and ‘Expiry day’). An **American-style** option is an option that the holder can exercise on any day during its life (remember ‘A’ for ‘American’ and ‘Any day’). An **Asian-style** option is an option where pricing is based on an average price over a period, rather than a price at a particular point in time.

### 3.3 Options - Risks, Rewards and Profit & Loss Profiles

The following examples are based on American-style options on the shares of two fictional companies - ABC plc and XYZ plc.

1. **Buying a call**
   
   eg, March ABC plc 700 Call @ 30
The buyer of the option pays the premium (30), which is the amount due per share, quoted in pence to the seller. The buyer is the holder of the option (and said to be long a call). The holder now has the right, but not the obligation, to buy one share in ABC plc for 700 pence. He can do this at any point on any business day during the published trading times until the defined time on the expiry day in March. The option premium is paid up-front and is non-returnable. As will be developed later in this workbook, the premium is paid by the buyer via his broker and then on to the clearing house for the account of the counterparty’s broker.

What happens at expiry?

It will depend on the price of ABC shares on the expiry day.

- If the share price prevailing in the market is below 700 pence, the option is worthless and the holder will abandon the option. Would you pay 700p for the share if you could buy it for less in the market?
- If the prevailing share price is above 700p, the holder has the right to buy the shares for 700p, a lower price than in the cash market. He will, therefore, exercise the option paying 700p for the share and then may sell it in the market for the higher price. Even if the market price is 701p the option is worth exercising as the holder will make a profit of 1p, which can then be used to offset the up-front cost of the premium.

The potential for gain or loss can be represented diagrammatically, with profit or loss shown on the Y axis and the price of the underlying at expiry on the X axis.

In summary:

- The maximum cost to the buyer is limited to the premium paid, which is paid regardless of the outcome at expiry.
- A net profit will be made by the buyer if the profit on exercise exceeds the premium paid.
- The breakeven point is strike plus premium.
- The maximum potential profit is unlimited as the long call option will become increasingly valuable to the buyer as the share price rises above the exercise price.

2. Selling a call

    eg, March ABC plc 700 Call @ 30
The seller of the option immediately receives the premium (30p) from the buyer, which is the amount due per share. The seller is now under an obligation to supply the share should the holder of the option decide to exercise at any time up to and including expiry (as it is an American-style exercise).

What happens at expiry?
- If the share price prevailing in the market is below 700p, as indicated in the first example, the holder will abandon the option and the seller/writer will no longer hold any obligation. The premium has already been received and provides the seller’s profit.
- If the prevailing share price is above 700p, the holder will exercise the option against the writer. The writer is obliged to deliver the share for 700p. He may not already own the share and have to acquire it in the market at a higher price and take the loss. As long as the loss is lower than the premium received, the writer will still make an overall profit.

Dramatically:

In summary:
- The maximum loss for the seller is potentially unlimited.
- A net loss will be made by the seller if the loss on exercise exceeds the premium already received.
- The seller’s breakeven point is strike plus premium.
- The seller’s maximum potential profit is limited to the premium received.

3. Buying a put

**eg, March XYZ plc 450 Put @ 17**

Similarly to the earlier examples, the buyer of the option pays the premium (this time, say, 17p) to the seller and becomes the holder of the put option (he is now long a put). The holder now has the right to sell one share in XYZ plc for 450p, again under American-style terms.

What happens at expiry?
- It will depend on the price of XYZ shares on expiry day.
If the share price is above 450p, the holder will abandon the option. The option is worthless. Would you sell the share for 450 pence if you could sell it for more in the market?

If the share price is below 450p, the holder can buy the share in the cash market at the lower price, then exercise the option at the 450p strike price, thus selling the share at the higher price (450p) to make a profit. Even if the market price is 449p, the option is worth exercising as the holder will make a profit of 1p, which can then be used to offset the cost of the original premium.

Dramatically:

In summary:
- The maximum loss to the buyer is limited to the premium paid.
- A net profit will be made by the buyer if the profit on exercise exceeds the premium paid.
- The breakeven point is strike less premium.
- Maximum potential profit will arise if the share price falls to zero, and is the strike price less the premium.

4. Selling a put

**eg, March XYZ plc 450 Put @ 17**

The seller of the option receives the premium (17p) from the option buyer and is the writer of the option. The writer is now under an obligation to buy XYZ plc shares for 450p each if the holder decides to exercise.

What happens at expiry?

As you might by now expect, it will depend on the price of XYZ shares on expiry day.

- If the share price is above 450p, the holder will abandon the option (as he can receive a higher price in the market for the share, as explained earlier).
- If the share price is below 450, the holder will exercise the option (as the holder can achieve a higher price by exercising than is possible in the market). The option writer will be obliged to buy the share for 450 and sell it on in the market at the lower price and take the loss. As long as the loss is lower than the premium received, the writer will still make an overall profit.
Dramatically:

In summary:
- The seller’s maximum profit is limited to the premium received.
- A net loss will be made by the seller if the loss on exercise exceeds the premium received.
- The seller’s breakeven point is strike less premium.
- Maximum potential loss will arise if the share price falls to zero, and is the strike price less the premium.

### 3.4 Risk and Reward Summary

The following table summarises the potential risks and rewards that arise in each of the four option positions.

<table>
<thead>
<tr>
<th>Position</th>
<th>Risk</th>
<th>Reward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long call</td>
<td>Limited to premium</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Short call</td>
<td>Unlimited</td>
<td>Limited to premium</td>
</tr>
<tr>
<td>Long put</td>
<td>Limited to premium</td>
<td>Strike less premium (asset price would have to fall to zero)</td>
</tr>
<tr>
<td>Short put</td>
<td>Strike less premium (asset price would have to fall to zero)</td>
<td>Limited to premium</td>
</tr>
</tbody>
</table>

### 3.5 Profit & Loss ‘Calculator’

The following table provides the formulae for calculating the profit or loss made on each of the four positions at expiry.
3.6 Flex Options

<table>
<thead>
<tr>
<th></th>
<th>Expiry price &lt; strike</th>
<th>Expiry price &gt; strike</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long call</td>
<td>Loss = premium</td>
<td>Gain/(loss) = (Expiry price – strike) – premium</td>
</tr>
<tr>
<td>Short call</td>
<td>Profit = premium</td>
<td>Gain/(loss) = (Strike – expiry price) + premium</td>
</tr>
<tr>
<td>Long put</td>
<td>Gain/(loss) = (Strike – expiry price) – premium</td>
<td>Loss = premium</td>
</tr>
<tr>
<td>Short put</td>
<td>Gain/(loss) = (Expiry price – strike) + premium</td>
<td>Profit = premium</td>
</tr>
</tbody>
</table>

**LEARNING OBJECTIVES**

1.1.2 understand the basic concepts and fundamental characteristics of options contracts - flex options

The FLexible EXchange option concept was pioneered by the Chicago Board Options Exchange (CBOE) in 1993. Since then a number of other options and derivatives exchanges have launched similar products. They are hybrid exchange-traded products which introduce some over-the-counter (OTC) features. OTC features are negotiated between the two parties to the contract, rather than standardised in the contract specification. The concept is to provide an exchange-traded product which will offer greater flexibility by mixing the strengths of classic exchange-traded (ie, fully standardised) options with OTC (freely negotiable terms) options.

They differ from standardised exchange products by allowing users to specify certain parameters that are normally specified by the exchange within the terms of the contract. They give the ability to customise key contract terms like exercise price, exercise style and expiry date. For example, flex options are available on the FTSE 100 Index on Euronext.liffe and the investors can specify the exercise price and expiry day of the contract.

FLEX options have the added benefit of reducing the credit-risk normally associated with OTC contracts. The credit risk is substantially reduced due to the exchange’s use of a central clearing house.
3.7 Options on Futures

LEARNING OBJECTIVES
1.1.2 understand the basic concepts and fundamental characteristics of options contracts - options on futures

Unlike an option on a physical asset, such as gold or a share, an option on a future gives the holder the right, but not the obligation, to become the buyer or seller (depending on whether the option is a call or a put) of a specified futures contract. All major derivatives exchanges offer options based on their futures contracts. In this way they are a derivative of a derivative - an option on a future.

If an investor were to hold a call option on a December Euribor future, he would become the buyer of the futures contract upon exercise at, or before, expiry depending upon the exercise style of the option. On exercise, the option seller would be assigned a sold futures contract.

4. GEARING

LEARNING OBJECTIVES
1.1.4 understand the significance of gearing

In the derivatives market, gearing is the measure of the amount of cash/initial investment spent on establishing a futures or options position, compared to the actual value of the underlying position.

At its simplest, gearing is the ability for the value of a derivative to rise by 100% in a very short timescale, when the underlying security has only risen by a far smaller amount, say 10%. The principle can be illustrated by looking at the gearing anyone with a mortgage faces.

Example 3 - Gearing Illustration

Assume a person buys a £100,000 flat by putting up £10,000 and taking out a mortgage for the remaining £90,000. If the flat increases in value by 10% to £110,000, and the individual still owes £90,000, their stake has risen to £20,000 - a 100% increase on their investment on a 10% increase in the underlying property.

Futures, options and warrants are all highly-geared and the principle is the same as in the above illustration – a small change in the price of the underlying asset can result in a much bigger, proportionate, change in the value of the derivative position due to the fact that the initial investment, such as the option premium, is relatively small compared to the face value of the underlying asset.
1. Options gearing

As the option premium is usually only a small fraction of the value of the asset, changes in the price of the underlying can produce disproportionate changes in the price of the option.

Example 4

You buy an XYZ plc 850 call for a premium of 20 when the share price is 800. On expiry, the share price is 880. You would exercise the option and crystallise a net profit of 10, ie, (880 - 850) – 20. Your return on investment is 10 ÷ 20, ie, 50%.

However, if you had bought the share for 800 and later sold it for 880, your return on investment would have been 80 ÷ 800, ie, 10%.

Buying the call option might appear to be a more attractive reward than buying the share, but it is also more risky. If the share price only rises to, say, 808, you would lose 100% of your investment, whereas holding the underlying would have produced a profit of 8 ÷ 800, ie, 1%.

The amount of gearing in an option is a direct function of the premium paid for it; the smaller the premium, the higher the potential gearing.

Options can also be volatile, offering high potential returns and losses (although the loss is limited to the initial investment) to investors. Time is also a factor as options and warrants have limited lives and their value tends to erode as the expiry date approaches.

2. Futures gearing

Gearing in a futures contract comes about through the margining system. When you buy a future, although you don’t pay for the asset you have to keep some collateral aside in case things go badly wrong. This collateral (initial margin) is a small fraction of the contract value, but you make any profits and suffer any losses on the whole contract value.
The gearing on a future is simply because the buyers or sellers of futures only pay a small proportion of the price of the underlying asset as initial margin, and potentially gain from the whole movement in the underlying asset.

Liquidity is a term used to describe how easy it is to trade without incurring excessive costs. It represents the market’s ability to absorb sudden shifts in supply and demand without dramatic price distortions.

Liquid markets are alternatively described as ‘deep’. A security is said to be ‘liquid’ if the spread between bid and asked price is narrow and trades of a reasonable size can be done at those quotes. In the market for shares it represents the ease with which shares can be converted into cash.

In principle, derivatives markets are the same. Market prices will be established by the process of price discovery, with buyers and sellers stating their bid and offer prices. The difference between the bid and the offer is the bid/offer spread (or dealing spread); the tighter this spread, the more liquid the market. Furthermore, if there is a high volume of willing buyers and sellers either side of the bid/offer spread, any changes in demand will not move the price significantly. This is technically referred to as a ‘low price elasticity’. A consequence of this is that it is cheaper to trade on liquid markets as a dealer has to give up less value when agreeing a trade with the other side of the market because dealing spreads are close.
One of the main goals of derivatives exchanges is to have contracts that are liquid and easily tradable. Liquidity encourages trading. This gives confidence that positions can be entered into and closed out (offset) without too much difficulty or expense. This creates a virtuous circle that encourages more investors, which further adds to liquidity.

The main elements of a liquid market are:

- many buyers and sellers;
- small bid/offer spreads;
- low commissions; and
- large amounts can be traded without causing major price movements.

Liquidity can be quantified by assessing the volume traded in a given period, or by looking at the amount of cumulative open positions (the ‘open interest’).

Volume typically quantifies the number of contracts traded on a particular day, with each contract being counted once. It is, therefore, either the total number of short positions entered into during that day or the total number of long positions entered into during that day.

Open interest looks at the total number of long positions (or short positions) that remain outstanding at the end of a particular trading day. These are contracts which remain open and must, by definition, eventually be closed out (or settled by delivery if remaining open at the date of final maturity of the defined contract), hence open interest is a good indicator of the market’s willingness to take and hold a position, and of long-term commitment to the market.

The higher the figures, the greater the liquidity.

6. EXCHANGE-TRADED VERSUS OTC-TRADED PRODUCTS

LEARNING OBJECTIVES

1.1.6 Understand the key features of OTC-traded products in contrast to exchange-traded products

Derivatives can be entered into via standardised contracts provided on derivative exchanges (such as Euronext.liffe) or they can be negotiated and entered into away from any exchange, directly between the two counterparties. These contracts entered into away from an exchange are referred to as ‘over-the-counter’ or OTC products.

The term ‘future’ is exclusively used for exchange-traded obligations, with the equivalent OTC derivative being termed a ‘forward’. You probably recall that the ‘sofa future’ encountered in the introduction was not traded on an exchange so, technically, it should have been described as a ‘sofa forward’.
The term ‘option’ is used for both on exchange transactions (exchange-traded options, or traded options for short) and OTC transactions.

As seen earlier, exchange-traded derivative products, like futures, require the participants to put collateral aside in the form of margin to lessen the risk of one of the participants not fulfilling their obligations under the contract. The margin is administered by a central counterparty (the clearing house, such as LCH.Clearnet). The use of margin is also common in OTC transactions, but here the margin approach is agreed between the parties and is managed without any third party involvement. The requirements for margin will be explored in more detail in Chapter 9.

The following table shows the fundamental points of comparison between exchange-traded and OTC derivatives.

<table>
<thead>
<tr>
<th></th>
<th>Exchange-traded</th>
<th>OTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract terms</td>
<td>Standardised, simple, quality and quantity defined in the product specification</td>
<td>Customised, specifically negotiated, totally confidential, flexible, large size possible.</td>
</tr>
<tr>
<td>Delivery</td>
<td>Standardised, under the exchange’s product specification. Fixed dates.</td>
<td>Negotiable.</td>
</tr>
<tr>
<td>Liquidity</td>
<td>Excellent on major contracts, fast order execution. Largely an electronic environment.</td>
<td>Can be limited, varies dramatically on the underlying asset. Slower execution. Some markets maybe made by fewer competing firms, perhaps only one.</td>
</tr>
<tr>
<td>Financial Integrity</td>
<td>Existence of central counterparty means counterparty risk is removed. Daily mark to market.</td>
<td>Counterparty default possibility exists, hence credit rating is important.</td>
</tr>
<tr>
<td>Margin</td>
<td>Margin is normally required.</td>
<td>Margin not always needed.</td>
</tr>
<tr>
<td>Documentation</td>
<td>Standard and concise</td>
<td>Once-off more complex, yet certain standard documentation provided by trade associates (eg, ISDA).</td>
</tr>
<tr>
<td>Regulation</td>
<td>Subject to significant regulation.</td>
<td>Less actively regulated.</td>
</tr>
<tr>
<td>Price quotes</td>
<td>Highly transparent, public dissemination.</td>
<td>Limited. Need to “shop around”.</td>
</tr>
<tr>
<td>Transaction costs</td>
<td>Standardised, lower.</td>
<td>Individually priced, higher.</td>
</tr>
</tbody>
</table>
7. BEAR AND BULL

A ‘bear’ expects the price of an asset to fall.

A ‘bull’ expects the price of an asset to rise.

---

Exercise 2

Fill in the remaining boxes in the following table.

<table>
<thead>
<tr>
<th>Position</th>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy a future</td>
<td>Bullish</td>
</tr>
<tr>
<td>Sell a future</td>
<td></td>
</tr>
<tr>
<td>Hold a call option</td>
<td></td>
</tr>
<tr>
<td>Write a call option</td>
<td></td>
</tr>
<tr>
<td>Hold a put option</td>
<td></td>
</tr>
<tr>
<td>Write a put option</td>
<td></td>
</tr>
<tr>
<td>Buy a call warrant</td>
<td></td>
</tr>
<tr>
<td>Buy a put warrant</td>
<td></td>
</tr>
</tbody>
</table>

The answers can be found in the Appendix at the end of this chapter.
8. OVER-THE-COUNTER PRODUCTS

LEARNING OBJECTIVES

1.1.7 Understand the differences between the OTC and exchange-traded markets

So far the focus has been on exchange-traded derivatives rather than over-the-counter (OTC) or off-exchange derivatives. Despite the lack of a central counterparty and their restricted liquidity, OTC derivatives have nevertheless proved extremely popular for hedging, speculation and arbitrage, principally because they are not standardised but constructed around the unique needs of users.

As seen in the previous sections, exchange-traded derivatives have standardised contract specifications that may not precisely meet the hedging or speculative needs of the investor. In the OTC market, the derivatives can be precisely tailored to the needs of the investor.

The OTC markets also provide confidentiality in that the only market participants aware of the deals that have been completed are the two counterparties and anyone else they care to inform. The exchange-traded derivatives markets are much more transparent, with the exchanges providing details of all prices and volumes traded in order to assist in the price formation process and to build confidence and liquidity.

The following table highlights the relative merits of exchange-traded contracts compared to entering into similar contracts over-the-counter.
The value of underlying instruments traded in the OTC markets is much larger than that traded on exchanges. Major OTC products include swaps and swaptions, forward rate agreements (FRAs), caps, floors, collars and a range of credit derivatives. The following sections look at each of these in turn.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Exchange-traded</th>
<th>OTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardisation and flexibility</td>
<td>The exchange standardises the expiry dates and underlying for each contract. As a result, the contracts are relatively inflexible.</td>
<td>Contracts are tailor-made between the participants, with expiry date and underlying agreed between the participants. Therefore relatively flexible.</td>
</tr>
<tr>
<td>Fungibility</td>
<td>Individual contracts (with the same expiry) are totally fungible.</td>
<td>The contracts are customised and are not as fungible.</td>
</tr>
<tr>
<td>Trading and liquidity</td>
<td>Contracts are easily traded on the exchange and therefore liquid. Trading can be conducted with any member of the market, and the fungible nature means that contracts can be opened with one member and closed with another.</td>
<td>Contracts are not standardised and are not easily traded – so liquidity can be restricted. The tailor-made nature of contracts mean that closing the contract will involve negotiating with the original counterparty. However some products (like interest rate swaps) are regularly traded between dealers in banks.</td>
</tr>
<tr>
<td>Counterparty risk</td>
<td>The counterparty in exchange-traded contracts is the central counterparty (the clearing house). The counterparty risk is relatively small.</td>
<td>The counterparty risk will be driven by the credit standing of the counterparty to the deal. However, some OTC products (eg, swaps and repos) are able to be cleared centrally through a clearing house.</td>
</tr>
<tr>
<td>Regulation</td>
<td>The Exchange’s rules result in relatively heavy regulation for exchange-traded products.</td>
<td>The regulation is relatively light for OTC products.</td>
</tr>
<tr>
<td>Public information</td>
<td>Trading activity and prices on the exchange are published on a real-time basis – so trading details are revealed to the market, although the identification of the participants remains confidential.</td>
<td>There is little or no real-time publication of trading activity on the OTC markets – resulting in more confidentiality, but a lack of information on the competitiveness of quoted prices.</td>
</tr>
<tr>
<td>Hedging</td>
<td>The standardised nature of contracts means that precisely hedging a particular position may not be possible due to the restricted contract sizes and expiry dates that are available.</td>
<td>The negotiation of the terms and conditions between participants can result in precisely hedging the underlying position.</td>
</tr>
<tr>
<td>Speculation</td>
<td>The available speculative exposures are restricted to exchange-traded products.</td>
<td>The availability to speculate is restricted only by the inability to find a suitable counterparty.</td>
</tr>
</tbody>
</table>
A swap is an exchange of cash flows between two parties over a defined period. For example, a straightforward interest rate swap (a so-called ‘plain vanilla swap’) involves one party exchanging a floating interest rate obligation for another party’s fixed rate obligation.

The plain vanilla interest rate swap, based on an agreed notional principal sum, will specify a particular start date and run for a set period. The swap will specify particular periods at the end of which the cash flow exchanges will take place.

For example, a 3-year plain vanilla interest rate swap might be arranged with quarterly payments based on a principal sum of £6m, effective from 1 January 2006, exchanging a fixed interest rate for a floating interest rate based on LIBOR (the London Inter Bank Offered Rate). The first payment under the swap will be at the end of March 2006, the second at the end of June 2006 and so on.

At each payment date a net payment will be made between the two participants based on the difference between floating rate (LIBOR) and the fixed rate on the underlying principal sum for the quarter. If LIBOR exceeds the fixed rate, the difference will be paid to the party that is due to receive LIBOR and pay the fixed interest. The payments will be made in the opposite direction if LIBOR is less than the fixed rate.

A swaption is an arrangement where the buyer of the swaption pays an upfront sum for the right to enter into a swap agreement by a pre-agreed date in the future. In other words, the buyer of a swaption has the option to enter into a swap. The concept is the same as we saw for options earlier.

Large corporates and other institutions use these interest rate swaps and swaptions to manage risk and, potentially, take advantage of cheaper and more appropriate funding. The arrangements are facilitated by financial institutions. It is a wholesale market not open to the private investor.
As they are OTC instruments, swaps come in a variety of forms. In addition to fixed for floating swaps (as illustrated above), there are also floating for floating swaps. These are alternatively referred to as ‘basis swaps’ and might enable a borrower to swap six-month LIBOR rates for three-month LIBOR rates. Basis swaps are considered in more detail in Section 8.1.1 below. As well as these interest rate swaps that are based on a single currency, there are also currency swaps (where there is an exchange of currency, as well as interest) and equity index swaps.

Currency swaps were one of the earliest types of swap. One of the first examples was between the World Bank and IBM in 1981. IBM wanted to borrow US dollars and World Bank wanted to borrow Swiss francs and German marks. However, because the World Bank was already a frequent issuer of European currency debt and IBM was not, the rarity value meant IBM could borrow Swiss francs and German marks more cheaply. So, IBM borrowed Swiss francs and German marks, the World Bank borrowed US dollars and they entered into a swap - the result being that they both saved money on their borrowings.

Currency swaps have continued to develop. It is possible to enter into currency swaps that exchange:
- fixed interest in one currency for floating interest in another currency;
- fixed interest in one currency for fixed interest in another currency; or
- floating interest in one currency for floating interest in another currency.

An illustration of the potential benefit of a currency swap is provided below.

**Example 6**

A UK company might expect to receive a stream of US dollars over the next five years from exports. It needs to convert US dollars into sterling. Rather than use a series of separate forward foreign exchange transactions to achieve this, it could instead use a currency swap. The series of US dollars flows are considered as a package and, in the swap, the company agrees to pay these flows to a counterparty over the five years, in return for a series of sterling cashflows. This would be a fixed-fixed currency swap without principal exchanges. The UK company has protected itself against its UK income being eroded by exchange rate movements depreciating against the US dollars. Conversely, if exchange rates improve, it will see no benefit.

As seen above, the uses of currency swaps include potentially reducing the cost of borrowing and replacing unpredictable future cash flows (due to exchange rate movements) with predictable cash flows agreed in a swap.

In an equity swap (or index swap), two counterparties agree to exchange the return on an equity index, or a specified basket of shares, for a fixed or floating rate of interest. This enables the creation of a synthetic portfolio of shares without the need to buy all of the individual underlying shares and incur the transactions costs for doing so.
8.1.1 Basis Swaps

A fixed/floating swap (as described above) is also known as a 'coupon swap'. An alternative is a floating/floating swap, known as a 'basis swap' or 'index swap', in which each of the two payment streams is based on a floating-rate. For example, an organisation might pay three-month LIBOR and receive six-month LIBOR.

Example 8

Suppose, for example, that a bank has transacted a five-year swap with a customer, whereby the bank pays a fixed-rate of 8.1% and receives three-month LIBOR. Suppose that the bank then also transacts a five-year swap with another customer whereby the bank receives a fixed-rate of 8.3% and pays six-month LIBOR. The bank has made a profit of 0.2% per year on the fixed legs (= 8.3% - 8.1%) but is at risk on the floating legs: if three-month LIBOR falls relative to six-month LIBOR over the next five years, the bank could lose money. To hedge this risk, the bank could undertake a basis swap to pay three-month LIBOR and receive six-month LIBOR.

Even without any such underlying existing positions, the bank could undertake such a swap speculatively, simply because it expects three-month LIBOR to fall relative to six-month LIBOR over the next five years.

A basis swap might also be a currency swap (see below) - for example, paying three-month LIBOR in one currency and receiving six-month LIBOR in another. The term 'basis swap', therefore, covers a range of possibilities. For example:

- Single-currency swap from one period LIBOR to another period LIBOR.
- Single-currency swap from LIBOR to an overnight interest rate.
- Single-currency swap from LIBOR to another interest rate, such as a commercial paper rate.
- Cross-currency swap from a floating-rate in one currency to a floating-rate in another currency.
8.2 Forward Rate Agreements

**LEARNING OBJECTIVES**

1.1.9 Know the definition of FRAs

A forward rate agreement (FRA) is an agreement to buy or sell an interest rate on a fixed amount to start at a point in the future and to run for a set time, eg, a rate of 5% to start in three months and to run for six months based on a nominal amount of £1m. This would be quoted as 3 versus 9, starting at the end of the third month and concluding at the end of the ninth month.

As with interest rate swaps, FRAs are used to manage interest exposures and are exclusively wholesale instruments arranged by the major banks.

**Example 9**

XYZ plc is budgeting to borrow £1m in three months’ time for a 6 month period and is concerned that an interest rate rise will increase the borrowing cost.

To hedge against this risk, XYZ plc buys a forward rate agreement from ABC Bank to cover the interest it will be charged for this 6 month period beginning in three months. In forward rate agreement terms this is known as a ‘3v9’ FRA and the agreed rate is fixed at 5%. This guarantees XYZ an interest-rate cost of 5% for the six months of the loan. If in three months’ time the 6 month LIBOR rate is greater than 5%, ABC Bank pays XYZ plc compensation for the extra cost: if it is less than 5%, XYZ plc must pay ABC Bank compensation. The compensation will be paid at the beginning of the FRA period. In summary,

1 January: XYZ plc buys 3v9 FRA for £1,000,000 at an agreed 5% interest rate from ABC Bank

1 April: 6-month LIBOR is 5.5%. ABC Bank pays compensation for the 0.5% difference in the interest rate over the 6 month period.

8.3 Caps, Floors and Collars

**LEARNING OBJECTIVES**

1.1.9 Know the definition of caps, floors and collars

Various OTC option-based products are offered by banks to their customers, some of which can be constructed from straightforward options. Caps, floors and collars are commonly employed with regard to interest rates.
A **cap** is an option product which can be used to protect the cost of a floating-rate borrowing over a series of settlement periods. Suppose that a borrower has a five year loan which he rolls over each three months at the three month LIBOR then current. He can buy a five year cap which will put a maximum cost on each of the rollovers. Whenever the rollover rate exceeds the cap strike rate he receives the difference. Suppose the strike rate on the cap is 3% and LIBOR sets at 3.5%. Then, at the end of the three month interest rate period, the purchaser of the cap will receive 0.5% accrued over the three month period. Whenever the rollover rate is lower than the cap strike rate, nothing is paid or received. The settlement for a cap is paid at the end of the interest period, exactly as for a swap.

**Floors** are options that enable the buyer to demand a minimum rate of interest paid on a deposit, regardless of a fall in the prevailing rate of interest. Floors can be used to protect the income on a floating-rate investment by putting a minimum return on each rollover. Whenever the rollover rate is lower than the floor strike rate, the buyer receives the difference. Whenever the rollover rate is higher than the floor strike rate, nothing is paid or received. The settlement mechanics for a floor are analogous to those for a cap.

**Collars** are contracts that incorporate both a cap and a floor. For a borrower, a cap provides a fixed worst-case level of interest but allows the customer to pay the market rate if this turns out better. A collar allows the customer to pay a better market rate in the same way, but only down to a certain level. Beyond that level the customer must pay interest at another fixed best-case level. In return for this reduced opportunity, the customer pays a lower premium for the option. Indeed, the premium can be zero (a ‘zero-cost option’) or even negative.

Diagrammatically:

![Diagram showing interest rate over time with cap, floor, and collar levels marked](image-url)
Caps, floors and collars tend to be the preserve of the wholesale participants and are arranged by the large banks.

8.4 Credit Derivatives

**LEARNING OBJECTIVES**

1.1.10 Understand the uses of credit derivatives and the main credit events (default and downgrading)

Credit derivatives are products designed to enable credit risk to be managed.

Simply, credit risk is the risk to a lender of money that the borrower is unable to repay and/or service the loan.

The simplest form of credit derivative is the **credit default swap (CDS)**. One participant (Bank A) holds an asset in the form of loans made to a corporate customer. Bank A is concerned that the corporate customer might default on their obligations to service and/or repay the debt. So, Bank A enters into a credit default swap with another bank (Bank B). In return for a regular payment based on a percentage of the face value of the loans, Bank B agrees to pay out in the event of the corporate customer defaulting.

Bank A is using the CDS to hedge. By buying a CDS, Bank A can manage its credit exposure and retain its relationship with this customer, including potentially valuable cross-selling opportunities.

Any payout from Bank B will be triggered by prespecified credit events that will typically result in the fall in the value of the loan. The ‘credit events’ that trigger a payout might be:

1. **actual default**, ie, the corporate customer failing to meet a payment obligation, such as an interest rate payment; and/or

2. a **credit-rating downgrade**, where an external credit rating agency, such as Moody’s or Standard & Poors, lowers the rating of the corporate customer below some pre-agreed threshold.
The International Swap and Derivatives Association Inc (ISDA) has developed extensive documentation that is used for swaps, credit derivative transactions and other OTC transactions.

8.5 Forwards

**LEARNING OBJECTIVES**

1.1.12 Understand the basic concepts and fundamental characteristics of forwards

*Forwards* are very similar to futures contracts as they are similarly legally binding agreements to make or take delivery of a specified quantity of a specific asset at a certain time in the future for a price that is agreed today. They may not be marked-to-market daily or, if they are, then the resulting profits are not paid out until maturity and any losses must be paid to the exchange clearing house if they are traded on-exchange. Forwards are, therefore, settled only on the delivery date. They are usually traded off-exchange (OTC) but can be traded on-exchange. The London Metal Exchange (LME) lists forward contracts.

**Example 11**

A forward contract could be an agreement to sell 1,000 tonnes (25 tonnes per contract) in three months’ time of LME Copper Grade A at a price of $3,500. If the price of copper is currently $3,750 then the seller is anticipating that sometime (1) before the delivery date, or (2) at delivery, that the price will fall below $3,500 and a profit will be made from (1) buying back the 40 contracts at a lower price or (2) selling physical copper at $3,500 which is higher than the market price at the time.

Most forwards are OTC contracts, usually with banks. Outright forwards are a common product traded in the foreign exchange (FX) market. Corporates, institutional investors and banks themselves use forwards to manage their FX transaction risks. If an organisation is importing or exporting goods (or investing) in a foreign currency, they can use forwards to protect against adverse currency movements. Forward contracts are also used to lock-in the price of physical commodities, such as energy, metals (see the example above) and foodstuffs.

In the physical markets, an airline might use forward prices on jet fuel to lock-in one of their major costs. They would agree a price today for delivery in a future month.

Forwards are derivatives - the future price agreed for a forward is based on the spot price of the underlying asset; in the case of a currency it would be adjusted for the interest rates in the relevant currencies.

The main advantages of forwards compared with futures (which are always, by definition, exchange-traded) are:

- flexibility (size, date etc);
- wide range of underlyings;
- easy to access - forwards are available from most commercial banks.
Their main potential disadvantages are counterparty risk, cost and, in some cases, liquidity. With exchange-traded futures, counterparty risk is reduced considerably by novation through the central clearing house (see Chapter 8).
Answers to exercises included in this chapter.

**Answers to Exercise 1**

a) If the share was worth 120p, then the buyer of the option would exercise and buy the share for 100p - making an immediate gain of 20p (120p - 100p), but having paid 10p as a premium. This represents a profit of 10p - a 100% return on the cash outlay compared to only a 20% return on the underlying. This is the essence of gearing.

b) If the share was worth 100p, then the buyer of the option would be indifferent whether to exercise or not, the share is no cheaper under the terms of the option than it is on the market. So, the buyer of the option would ‘lose’ the 10p premium - 100% of the ‘investment’, when the underlying share did not rise or fall.

c) If the share was worth 95p, then the buyer of the option would not exercise, the share is cheaper on the market. Again, the premium has been paid up front as required by the option contract. The buyer of the option would have paid the 10p premium - 100% of the ‘investment’, when the underlying share fell by just 5%.

**Answers to Exercise 2**

<table>
<thead>
<tr>
<th>Position</th>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buy a future</td>
<td>Bullish</td>
</tr>
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</tr>
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<td>Bullish</td>
</tr>
<tr>
<td>Write a call option</td>
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</tr>
<tr>
<td>Hold a put option</td>
<td>Bearish</td>
</tr>
<tr>
<td>Write a put option</td>
<td>Bullish</td>
</tr>
<tr>
<td>Buy a call warrant</td>
<td>Bullish</td>
</tr>
<tr>
<td>Buy a put warrant</td>
<td>Bearish</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>35</td>
</tr>
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<td>2. CUSTOMERS UNDERSTANDING</td>
<td>35</td>
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<td>47</td>
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</tbody>
</table>

This syllabus area will provide approximately 6 of the 70 examination questions.
This section covers aspects of regulations in relation to derivatives in the areas of customers understanding, information for customers and some US regulations.

There are many important regulatory requirements contained in the FSA’s Handbook, in particular the Conduct of Business rules (COB) and Client Assets rules (CASS). Most of these rules are designed to protect private customers and a number of the rules related to derivative products need to be understood for the purpose of the examination.

The examinable rules applying to derivatives fall into the following areas:

- Financial promotions;
- Risk warning notices;
- Margining;
- Information for customers;
- Collateral.

Additionally, the syllabus requires a broad understanding of the way derivatives are regulated in the US and how US regulations might affect UK firms.

2. CUSTOMERS UNDERSTANDING

2.1 Financial Promotions

LEARNING OBJECTIVES

2.1.1 Know the rule on prohibition of direct offer financial promotions of derivatives [COB 3.9.5]

A direct offer financial promotion gives the recipient the ability to respond by assenting and sending in a cheque. In this way, the recipient will become involved in the product subject to the promotion immediately. A direct offer promotion might be included within a magazine, newspaper or periodical, or might be sent to potential clients by direct mail.

The COB rules specify that a direct offer financial promotion must not relate to a derivative or a warrant unless the firm issuing the promotion has adequate evidence to suggest that the investment may be suitable for the person to whom the promotion is communicated.
2.2 Risk Warning Notices

LEARNING OBJECTIVES

2.2.1 Understand the importance of the customer’s understanding of the contingent liability of derivatives and the requirements of the risk warning notice [COB 5.4.6 + Annex 1]

The FSA requires that a firm takes reasonable steps to ensure that certain customers understand the risks involved when they enter into derivatives transactions. Part of this is satisfied by sending warrants and derivative risk warning notices to all private customers. This must be done before an FSA firm deals, recommends or acts on a discretionary basis in respect of derivative instruments. The customer must be given time to read and understand its contents, sign it and return it to the firm.

A firm need not undertake these requirements for a private customer who is ordinarily resident outside the UK and where the firm has taken reasonable steps to determine that the private customer does not wish to receive the notice.

Also, the notice need not be sent in relation to the realisation of a warrant that is already held by the private customer, or if the warrant is attached to another designated instrument (e.g., a bond).

While you do not need to memorise the contents of a standard FSA risk warning notice, you must be aware of its key points. The following is an illustration of a risk warning notice.

Futures
Transactions in futures involve the obligation to make, or take, delivery of the underlying asset of the contract at a future date, or in some cases to settle in cash. They carry a high degree of risk. The gearing, or ‘leverage’, can lead to large losses or gains. Futures transactions have a contingent liability and investors should be aware of the margining implications of this.

Options
There are many different types of options with different characteristics subject to different conditions.

• **Buying options:** this involves less risk than selling options because if the price of the underlying asset moves against the holder, he can simply allow the option to lapse. The cost, which could be regarded as the maximum loss, is the premium (plus any other transaction charges).

• **Writing options:** if you write an option, the risk involved is considerably greater. You may be liable for margin to maintain your position. By writing an option, you accept a legal obligation to purchase or sell the underlying asset if the option is exercised against you.

If you already own the underlying asset which you have contracted to sell (known as a ‘covered call option’) the risk is reduced. If you do not own the underlying asset (an ‘uncovered’ or ‘naked’ call option), the risk can be unlimited. **Only experienced persons should contemplate writing uncovered options.**
Contracts for Differences (CFDs)
Certain cash-settled agreements or instruments, including swaps, forwards, futures and options contracts, can also be referred to as ‘contracts for differences’, a term introduced in the UK in the Financial Services Act 1986. Similarly, CFDs can give a direct exposure to the market, a sector or to an individual security. CFDs can be options and futures on the FTSE 100 index or any other index. Unlike some other futures and options they can only be settled in cash. Investing in a contract for difference carries the same risks as other futures and options.

Off-exchange transactions
Your broker must make it clear if you are entering into an off-exchange derivatives transaction. While some off-exchange markets are highly liquid, transactions in off-exchange or ‘non-transferable’ derivatives may involve greater risk than investing in on-exchange derivatives. It may be difficult to close-out open positions. Bid and offer prices need not be quoted and it may be difficult to establish a fair price benchmark.

Foreign markets
Foreign markets will involve different risks to UK markets. In some cases the risks will be greater for a variety of reasons, including procedural differences, legal jurisdiction, tax regimes and local customs and practice. The potential for profits and losses on foreign markets or foreign denominated contracts will be affected by such factors and by fluctuations in exchange rates.

Contingent liability transactions
Contingent liability transactions which are margined require you to make a series of payments against the purchase price, instead of paying the whole purchase price immediately. If you trade in futures, contracts for differences or sell options you may sustain a total loss of the margin you deposit with your broker to establish or maintain a position. If the market moves against you, you may be called on to make substantial additional margin payments at immediate or short notice to maintain your position. If you fail to do so within the time required, your position may be liquidated and you will be liable for any resulting difference.

Commissions
Before you begin to trade, you should obtain details of all commissions and other charges for which you will be liable. In the case of futures, when commission is charged as a percentage it will normally be a percentage of the total contract value, and not simply as a percentage of the initial payment.

Collateral
If you deposit collateral as security with your broker the way in which it will be treated will vary according to the type of transaction and where it is traded. There could be significant differences in the treatment of collateral depending on whether you are trading on a recognised or designated investment exchange, with the rules of that exchange (and associated clearing house) applying, or trading off-exchange. Deposited collateral may lose its identity as your property once dealings on your behalf are undertaken. Even if your dealings should prove ultimately profitable, you may not receive back the same assets which you deposited and may have to accept payment in cash. You should ascertain from your broker how your collateral will be dealt with and have a clear understanding of the degree to which your assets are segregated.

Suspensions of trading
In certain trading conditions it may be difficult or impossible to liquidate an existing position as volatile price movements may lead to a suspension of trading according to the rules of the exchange. Placing a stop-loss order will not necessarily limit an investor’s losses to the intended amounts, because market conditions may make it impossible.
FSA Principle 3 (Management and Control) requires a firm to have adequate risk management systems, while Principle 6 (Customers’ Interests) requires a firm to pay due regard to the interest of customers and treat them fairly.

The Conduct of Business rules relating to margin requirements aim to ensure firms do not expose themselves to unacceptable levels of credit risk and that a firm manages a private customer’s exposure to contingent liabilities.

When customers enter into some derivatives trades they are required to deposit good faith collateral against their potential obligations, ie, margin. There may also be further margin payments necessary if positions are to be maintained. These are known as ‘contingent liability transactions’.

Long and short futures positions and short options positions have this contingent liability. **Buying an option is not usually a contingent liability transaction as the price of the option (the premium) is paid up-front and no further loss can be made by the buyer.**

### 3.1 Provision of Margin By A Private Customer
- A firm must obtain from a private customer any margin payable, whether at the outset or, subsequently, by or to the firm, for a transaction in a contingent liability investment.
- The minimum margin obtained from the private customer for an on-exchange transaction is an amount or value equal to the minimum margin requirements of the relevant exchange. Thus, if an exchange increases (or reduces) its requirement this will be reflected in the rates applicable between brokers and their customers.
3.2 Notification of Margin Requirements

Before conducting a transaction with or for a private customer, a firm should notify the customer of:

1. the circumstances in which the customer may be required to provide any margin;
2. the form in which the margin may be provided;
3. the steps the firm may be required or entitled to take if the customer fails to provide the required margin, including:
   a. the fact that the customer’s failure to provide margin may lead to the firm closing out his position after a time limit specified by the firm (see Section 3.3 below);
   b. the circumstances in which the firm will have the right or duty to close out the customer’s position;
4. the circumstances, other than failure to provide the required margin, that may lead to the firm closing out the customer’s position without prior reference to him.

3.3 Failure to Meet a Margin Call

A firm must close out a private customer’s open position if that customer fails to meet a margin call made for that position for five business days following the date to meet the call, unless:

1. a. the firm has received confirmation from a relevant third party that the private customer has given instructions to pay in full; and
   b. the firm has taken reasonable care to establish that the delay in its receipt is owing to circumstances beyond the private customer’s control; or
2. the firm makes a loan or grants credit to the private customer to enable that customer to pay the full amount of the margin call in accordance with the FSA’s restrictions on lending to private customers.

3.4 Margin Bank Accounts

**LEARNING OBJECTIVES**

2.5.2 Know the obligations associated with margined transactions [CASS 4.3.71 + 79-84]

Margin funds received from a client must be placed:

- In a client account operated by the firm, but segregated from the firm’s own funds. (The client accounts can be general ‘pooled’ accounts or individually designated accounts.)

or

- In an exchange account and credited to the account of the relevant customer.

Note, the more sophisticated clients (intermediate customers and market counterparties) can have their funds credited in the firm’s own account if they have waived their right to segregation.

Segregated accounts are subject to the FSA’s Client Money Rules.
Separate accounts are required for on-exchange and off-exchange transactions. Funds received from a client in connection with margin must be paid into an account no later than the end of the next business day. Member firms cannot use client money to offset liabilities or deficits on any other account, ie, the firm cannot use clients’ money to meet its own obligations. Funds held in client accounts must be reconciled regularly.

The firm must ensure that the client understands the forms in which margin may be provided and the consequences of failing to meet margin requirements. This would be clearly stated in the customer agreement, including the derivative warning notice, at the time of opening the account. The firm is required to notify the private customer of:

- When margin will be required.
- How the margin can be provided.
- The steps the firm may be required, or is entitled, to take if the customer fails to provide the required margin.
- The circumstances in which the firm will have the right, or duty, to close-out the customer’s position.
- The circumstances, other than failure to provide the required margin, which may lead to the firm closing-out the customer’s position without prior reference to him.

The firm must close-out a private customer unless:

- there is an agreed credit facility; or
- the firm has received confirmation from a third party that the customer has given instructions to pay in full and they have established that the delay in receipt is owing to circumstances beyond the private customer’s control.

Customers must understand that the firm will be required to close-out an undermargined account of a private customer after five business days, unless there is a prior agreement in place (signed by the customer) that allows the firm to extend credit facilities and those facilities are in accordance with the relevant exchange’s rules.

4. INFORMATION FOR CUSTOMERS

LEARNING OBJECTIVES

2.4.1 Know the requirements of confirmation notes and difference accounts for transactions in derivatives and confirmation on exercise of an option [COB 8.1.18/19]

4.1 Confirmation Notes

Confirmation notes are provided by firms to their clients after executing trades on their behalf. They include details of the transaction undertaken.
Confirmation notes for derivatives must contain the following:

- Firm’s name.
- Firm’s regulation by FSA.
- Customer’s name and account number, or other identifier.
- Date of transaction.
- Time of transaction, or that it is available on request.
- The investment concerned.
- Size of deal.
- Whether a purchase or a sale.
- Unit price.
- Delivery or maturity of the contract.
- Firm’s charges.
- Profit or loss to customer if closing a position (difference account).
- In the case of an option, a reference to the last exercise date, whether it can be exercised before maturity and the strike price.
- If the transaction involved, or will involve, the purchase of one currency with another, the rate of exchange involved or a statement that the rate will be supplied when the currency has been purchased, including the maturity or expiry date of any currency hedge, unless the currency hedge is separately reportable.

**Points to note:**

1. Firms’ or customers’ addresses or telephone numbers are not required.
2. Confirmation notes can be sent electronically.
3. They must be sent with due despatch.
4. For intermediate customers, unit prices and firm’s charges can be aggregated, but only if the customer has requested this.
5. Basis of charges is not required if the customer has previously been informed in writing.
6. Confirmation notes for overseas customers, at the customer’s direction, can be retained by the firm (by the compliance officer or another employee not involved in the deal).

### 4.2 Difference Accounts

Where a derivative transaction closes out a previously open position, the investor should be informed of the profit or loss associated with that transaction. The difference account states the profit or loss crystallised and is usually sent with, or is part of, the confirmation note and, therefore, sent with due despatch.

### 4.3 Exercise of Options

Whenever a customer exercises an option, or has an option exercised against them (assigned), the firm must formally notify the customer by sending an exercise/assignment notice.
The notice will include the following:

- Firm’s name and regulation by FSA.
- Firm’s charges.
- Customer’s name and account number or other identifier.
- Exercise date.
- Time, or that it is available on request.
- Details of investment concerned.
- Total consideration due from/to the customer.
- Cost in addition to firm’s charges.
- Currency rates used (if applicable).

### 4.4 Periodic Information

**LEARNING OBJECTIVES**

2.4.2 Understand the timing and content of periodic statements for account valuations for derivatives and additional information for contingent liability transactions [COB 8.2.10/13]

An FSA firm acting as investment manager for a customer in respect of derivatives transactions must send periodic reports, with intervals not greater than one month. The statements must be sent within 10 days of the date to which they relate and must include the following:

1. Payments received/made during the month.
2. List of transactions.
3. Realised and unrealised profits and losses.
5. Collateral held and its value.
6. Fees and commissions (and other expenses).
7. Option account valuations in respect of each open option contained in the account on the valuation date stating:
   a. the share, future, index or other investment involved;
   b. the trade price and date for the opening transaction, unless the valuation statement follows the statement for the period in which the option was opened;
   c. the market price of the contract; and
   d. the exercise price of the contract.

Option account valuations may show an average trade price and market price in respect of an option series if the customer buys a number of contracts within the same series.

8. Periodic statements must be kept by the firm for a minimum of three years.
When a firm holds collateral that belongs to a client, it must take reasonable steps to ensure that:

- it is properly safeguarded;
- it is identifiable as the client’s property and not the firm’s; and
- the firm maintains adequate records to enable it to meet any future obligations, including the return of equivalent assets to the client.

Note, where the right to use assets as collateral exists, but has yet to be used, for assets in the form of money, the Client Money Rules apply, and for assets in other forms the Custody Rules apply.

5.1 Client Money Rules

The FSA specifies a required level of client money that must be held by a firm. This is commonly referred to as the ‘client money requirement’. The client money requirement for transactions that are margined is broadly made up of two elements: the client’s equity balances less the firm’s equity balances.

Each individual client’s equity balance is the amount that the firm would be liable to pay to that client in respect of his margined transactions if each of his open positions were liquidated at the closing or settlement prices published by the relevant exchange (or other appropriate pricing source) and his account closed. In simple terms, this is the amount of cash collateral held on behalf of the client that is unnecessary.

The firm’s equity balance is the amount that the firm would be liable to pay to exchanges, intermediate brokers and OTC counterparties if the open positions of the firm’s clients were liquidated at the closing or settlement prices published by the relevant exchange (or other appropriate pricing source). In simple terms, this is the amount of cash liability that the firm would have to provide on behalf of its clients.
When establishing the total of the client’s equity balances, all of the positive balances are amalgamated and any negative balances are ignored. The resultant client’s equity balances total is then reduced by the net aggregate of the firm’s equity balance (where negative balances are deducted from positive balances). The result is the client money requirement. This calculation will exclude any non-cash collateral and refers only to the cash values.

### 6. US REGULATIONS

#### 6.1 Principal differences between US and UK Regulations

**LEARNING OBJECTIVES**

2.6.1 **Know the key differences between US and UK regulations affecting the segregation of accounts and wholesale and retail markets**

<table>
<thead>
<tr>
<th>UK</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulation</strong></td>
<td>Conduct of Business Regulation and prudential supervision under a single regulator, the Financial Services Authority.</td>
</tr>
<tr>
<td><strong>Segregation</strong></td>
<td>Segregation of funds is available to all, but only compulsory for private customers (predominantly retail clients).</td>
</tr>
<tr>
<td><strong>Documentation</strong></td>
<td>Only private customers need to sign and return risk warnings in respect of derivatives.</td>
</tr>
<tr>
<td><strong>Margining Practices</strong></td>
<td>Follow exchange minimum levels in line with clearing house practice.</td>
</tr>
<tr>
<td><strong>Statutory regulation plus a variety of regulatory bodies</strong></td>
<td>Similar but commonly use maintenance margin as the minimum level.</td>
</tr>
<tr>
<td><strong>SEC, CFTC, NFA</strong></td>
<td>All clients’ funds are segregated (both retail and wholesale).</td>
</tr>
<tr>
<td><strong>All clients sign and return two-way letters.</strong></td>
<td>All clients sign and return two-way letters.</td>
</tr>
</tbody>
</table>

#### 6.2 Role of US Regulators

**LEARNING OBJECTIVES**

2.6.2 **Know the role of the Securities and Exchange Commission (SEC) in the regulation of derivatives**

6.2.1 **The Securities and Exchange Commission (SEC)**

Although a major regulator of US securities markets, the SEC has a limited role in the regulation of derivatives markets.
The SEC regulates the following:
1. Options on currencies undertaken on exchanges (ie, currency options on PHLX).
2. Options on individual stocks.
3. Options on stock indices.
4. The Chicago Board Options Exchange (CBOE) – a major centre for equity-based options.
5. The International Securities Exchange (ISE) - the world’s largest equity options exchange.

Note, the SEC does not regulate any futures products or exchanges.

6.2.2 The Commodity Futures Trading Commission (CFTC)

The CFTC regulates all on-exchange derivatives transactions that are not covered by the SEC. It regulates all futures products and exchanges (including PHLX) and all of the options not covered by the SEC (including currency options on the CME).

It draws its powers from the Commodities Exchange Act and is also responsible for overseeing the National Futures Association (NFA).

6.2.3 The National Futures Association (NFA)

The NFA is a self-regulatory organisation registered by the CFTC and was formed in 1982.

The CFTC has delegated powers to the NFA to oversee firms operating in the derivatives industry and, as such, is similar to the UK’s FSA in this particular regard.

The NFA provides regulatory programmes that safeguard the integrity of the derivatives markets. It is a not-for-profit organisation, financed exclusively from membership dues and fees and assessments paid by users of the futures markets. Every firm or individual who conducts business with the public on any US futures exchange is required to be registered with the CFTC and be a member of NFA. The NFA has approximately 4,200 members and 50,000 associate members (salespersons employed by NFA member firms).
6.3 CFTC Part 30

**LEARNING OBJECTIVES**

2.6.4 Know the prohibitions of CFTC Part 30 (Foreign Futures and Segregation of Customer Funds)  
CASS 4.3.107 - 110

Within the CFTC rules, CFTC Part 30 specifies that it is illegal to trade with US customers on a US exchange without the relevant authorisation from the NFA, unless the trade is conducted via an NFA firm.

Non-US firms are prohibited from dealing with US customers on any non-US exchange, unless they trade via a US-registered firm or have been granted exemption.

Firms are prohibited from trading non-US products for US customers, unless the products have been approved by the CFTC.

The above restrictions are designed to give US customers an adequate level of protection.

6.3.1 Part 30 Exemption

Non-US firms can seek exemption from Part 30, but only in respect of derivatives trades on non-US exchanges.

To obtain the exemption, FSA firms must agree to the following:

- Funds from US clients must be placed into segregated accounts, ie, all clients' funds are subject to the Client Money Rules.
- All US customers must sign two-way risk disclosures.
- To abide by RIE/DIE rules and FSA Conduct of Business rules.
- Must provide the FSA with information and access to records that may be required under Part 30. The FSA can then provide these to the CFTC.
- Must consent to join the NFA arbitration scheme.

Note that a US customer is not simply a US national. US nationals living abroad are not automatically classed as US customers.
IAS 39 – ‘Financial Instruments: Recognition and Measurement’ became part of the mandatory International Financial Reporting Standards (IFRS) in 2005 and was adopted by the EU, with one exception that applies to hedge derivatives, which is explained below.

IAS 39 defines a derivative as a financial instrument:

- Whose value changes in response to the change in an underlying asset, such as interest rates, currencies, commodities, individual shares or an index. It later amended this to include weather and climate-related factors.
- That requires no initial investment, or one that is smaller than would be required for a ‘cash market’ contract, which had similar gains/losses to market/price movements. In other words, a ‘geared’ instrument.
- That is settled on a future date.

IAS 39 also includes embedded derivatives in this definition and treatment, if they produce a cash flow that is similar to a stand-alone derivative. Embedded derivatives require the same type of treatment as any other derivative.

The key requirement of IAS 39 as it pertains to derivatives for EU entities is that it requires that all derivatives held by an institution, except those that are designated as a hedge, must be stated in all accounting statements at their fair value. Fair value is defined as the value for which an asset or contract could be exchanged, or a liability settled, between knowledgeable and willing parties in an arm’s length transaction. In other words, all derivatives must be ‘marked-to-market’ and stated at their current market value in all financial reports.

The main exception to IAS 39’s fair value derivatives rule, that the EU ‘opted out’ of, is the requirement of stating those derivatives that are reported as a hedge on financial statements at their fair value. Therefore, any derivative that is stated to be a hedge does not have to be shown at its fair value, since they are expected to be held until maturity or the early settlement of the related transaction.
MARKETS

I. MONEY MARKETS

This syllabus area will provide approximately 1 of the 70 examination questions.
Whereas the bond markets are populated by issuers and investors seeking to raise and invest capital over the medium- to long-term, the money markets are geared towards short-term liquidity and providing a temporary safe haven for investment funds. Money markets are normally classed as covering cash and other instruments that mature within one year of the point of issue.

1.1 Cash Deposits

An ‘interbank market’ for money exists simply because banks’ balances with their central bank rise and fall as cash is received and paid. A bank with a shortfall will need to borrow from a bank with a surplus - hence there is an interbank market.

Cash deposits are made between banks in the ‘interbank market’ that includes deposits for periods from overnight to one year. Each bank quotes a ‘bid’ rate at which they will accept deposits, and an ‘offer’ rate at which they will make funds available. Every day the British Bankers’ Association (BBA) publishes LIBOR (the London InterBank Offered Rate), an average of the rates offered by a contributing panel of banks for each major currency for varying periods of time.

As well as calculating LIBOR, the BBA asks banks each day what their bid rates are, enabling the calculation of LIMA (the London Interbank Bid). LIMA is the average of LIBOR and LIMA.

The equivalent of BBA’s LIBOR in the US is the Federal Funds rate (abbreviated to the Fed Funds rate), although this only refers to the overnight rate at which US banks lend money to each other.

In the short-term euro market, EURIBOR (Euro Interbank Offered Rate) is the interbank rate, that is the equivalent of sterling’s LIBOR. It is the rate that one bank offers funds to other banks or borrowers within the market. The overnight equivalent is known as EONIA (Euro Overnight Index Average). EONIA is the effective overnight rate that is based on a weighted average of all overnight transactions transacted by the contributing panel banks in the euro overnight market.

Example 1

If 3-month sterling LIBOR (the rate at which banks lend) is 47/8 or 4.875%. LIBID might be 46/8 or 4.75%.

LIMA is simply the average, or mean, of LIBOR and LIBID. If LIBOR is 4.875% and LIBID is 4.75%, then LIMA is 4.8125%.
1.2 Treasury Bills

**LEARNING OBJECTIVES**

3.1.1 - Know the basic characteristics of UK Treasury Bills

**Treasury bills** are issued weekly by the Debt Management Office (DMO) on behalf of the UK government to cover its liquidity needs. They are typically issued with a maturity of 91 days (approximately three months), although some are issued with 182 day maturity (approximately six months). Since they are backed by the promise of the UK government, they are often referred to as 'promissory notes'. The yield they offer provides a benchmark level of risk-free returns available on other short-term, money market instruments. Treasury bills pay no coupon. They are issued at a discount to their nominal value with the discount providing the return to the investor. Treasury bills are simply redeemed at their par value.
FINANCIAL FUTURES AND OPTIONS

1. UK DERIVATIVES EXCHANGES 55
2. DERIVATIVES PRODUCTS 64
APPENDIX 78

This syllabus area will provide approximately 12 of the 70 examination questions
1. **UK DERIVATIVES EXCHANGES**

1.1 **Introduction to Euronext.liffe**

Euronext.liffe is an important derivatives exchange in the UK that lists financial and commodity products. In recent years, it has undergone major changes in its trading method and ownership.

Prior to 1999, the exchange was known as LIFFE, a mutual organisation owned by its members, who held various types of ‘seats’ which allowed them trading rights on the exchange. In 1999 the ownership structure was changed and trading rights were detached from membership rights.

In the current structure, LIFFE is owned by Euronext (a European cross-border exchange), having been acquired in 2001. It is referred to as Euronext.liffe but the name LIFFE is still commonly used. Membership of the exchange and, therefore, direct access to its trading systems, is now secured through member application. Member firms may act as brokers, dealers or both.

LIFFE has also been transformed from an open outcry market, based originally on the Chicago pit model, to a purely screen-based market, at the centre of which is its electronic trading platform called LIFFE CONNECT® which the exchange developed itself. This was introduced in phases between November 1998 and the end of 2000 by which time all LIFFE’s contracts had been converted to the new trading system.

LIFFE CONNECT® is a computerised system which operates an order book, a queuing system for orders, and is used for all of Euronext.liffe’s products. It has also been supplied to other exchanges including the Chicago Board of Trade (CBOT) and the Tokyo International Financial Futures Exchange (TIFFE).

The Euronext group has adopted LIFFE CONNECT® for derivatives trading across all of its exchanges.

1.2 **Membership Structure and Trading Rights**

**LEARNING OBJECTIVES**

**4.1.1 Know the membership structure of Euronext.liffe and its participants (public/non-public order members, clearing and non-clearing) and their principal rights**

Access to the Euronext.liffe market is via membership. Firms may join Euronext.liffe in a number of different membership categories.

**Brokers:** Brokers may only trade for third parties (including clients and other members). This category now replaces the old Public Order Member (POM) status which has been discontinued.

**Dealers:** Dealers may trade for their own account. They can also trade for other members provided that they are authorised by the appropriate regulatory body.
**Broker-Dealers:** Broker-dealers are entitled to trade both for third parties and their own account.

The forms of membership also depend on whether the firm wishes to clear business traded on the market, and for whom the contracts will be cleared.

Euronext.liffe uses LCH.Clearnet to act as central counterparty and clear its trades. All members of Euronext.liffe with access to the automated trading system must either be a clearing member or have entered into a clearing agreement with a clearing member. A clearing member is a member of LCH.Clearnet as well as a member of Euronext.liffe. **Non-Clearing Members** may be party to a maximum of two clearing agreements, one in respect of commodity contracts and one in respect of other exchange contracts. Clearing members can be **General Clearing Members (GCMs)**, able to clear for their own principal trades, on behalf of their clients and on behalf of other non-clearing members. Alternatively, they can be **Individual Clearing Members (ICMs)**, only able to clear their own principal trades and on behalf of their clients.

Diagrammatically:

LCH.Clearnet requires General Clearing Members to have a higher level of financial resources than it requires from Individual Clearing Members.

### 1.3 Systems, Order Types and Trading Strategies Accepted

**Learning Objectives**

4.1.2 Know the essential details of the trading mechanism - LIFFE CONNECT®
4.1.3 Know the matching and clearing arrangements requirements

Euronext.liffe trading is purely electronic via the LIFFE CONNECT® system. LIFFE CONNECT® is an anonymous, order-driven system, where traders are unaware of their actual counterparty, both pre-trade and post-trade. To access the system an order is submitted into the central order book by, or via, a member of Euronext.liffe.
On Euronext.liffe the trading hours on LIFFE CONNECT® vary according to the contracts being traded:

<table>
<thead>
<tr>
<th>Contract</th>
<th>Opening</th>
<th>Closing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Sterling future</td>
<td>07:30</td>
<td>18:00</td>
</tr>
<tr>
<td>Long Gilt future</td>
<td>08:00</td>
<td>18:00</td>
</tr>
<tr>
<td>FTSE 100 future</td>
<td>08:00</td>
<td>17:30</td>
</tr>
<tr>
<td>Universal Stock futures</td>
<td>08:00</td>
<td>17:00</td>
</tr>
<tr>
<td>Individual Equity options</td>
<td>08:00</td>
<td>16:30</td>
</tr>
</tbody>
</table>

Once the order has been received, the system stores the order on the central order book. Orders are matched on the basis of price, and then time, priority. After the trades have been executed, trade details are fed to the Trade Registration System (TRS). Once trades have been registered using TRS, they are passed automatically to the Clearing Processing System (CPS). An automatic feed then transmits all CPS details to LCH.Clearnet. The trade then ‘novate’ and LCH.Clearnet becomes the central counterparty to the buying and selling clearing members. (LCH.Clearnet and ‘novation’ are covered in more detail in Chapter 8 ‘Principles of Clearing’.)

As with all electronic trading systems, LIFFE CONNECT® accepts a variety of order types:

- **Normal limit orders** to be executed at the stated price or better.
- **Market orders** to be executed at the best price available.
- **Market on open orders** may be submitted prior to the opening of the day’s trading with the intention of being executed at the opening price for the day.
- **Contingent Multiple Orders (CMO)** containing two or more components. These are traded between different exchange products - say short sterling futures against Euribor futures (one trade being contingent upon the other). Hence, if one trade is missed the other is cancelled because any one component is contingent upon being able to trade the other component(s).

Some order types can be given certain periods of validity, such as ‘good ‘til cancelled’ (GTC). Additionally, they can be given certain quantity requirements, such as ‘immediate and cancel’ (do as much as possible now and cancel any remaining), ‘complete volume’ (do the whole order or none at all) or ‘minimum volume’ (only do the order if a certain minimum can be achieved).

‘Cross trades’ (where a match has been established by negotiation prior to entry in the system) are allowed as long as they are entered into the system as separate buy and sell orders.

The strategies that are recognised on LIFFE CONNECT® are many and varied. Amongst the acceptable strategies are all of the strategies covered in the syllabus, ie, spreads, straddles, strangles and synthetics (more detail on derivatives strategies can be found in Chapter 11 ‘Trading, Hedging and Investment Strategies’).

Additionally, LIFFE CONNECT® recognises two types of wholesale trade:

- **block trades**; and
- **basis trades**.
A ‘block trade’ is a large transaction made between a Euronext.liffe member and a wholesale client. The exchange specifies the size of the transaction that is required before it becomes a block trade. Block trades are allowed to be negotiated away from the central order book and reported into the exchange once they are agreed.

The block trade facility allows Euronext.liffe members and their wholesale clients (those with sufficient knowledge, expertise and understanding) to transact business as bilaterally agreed transactions without delay and with certainty of price and execution. The block trade facility complements Euronext.liffe’s central markets which continue to be the primary method for trading.

Most of Euronext.liffe's products can be block-traded, except commodities. The transaction sizes required to be classified as a block trade vary, for example, short sterling futures and gilt futures in a minimum of 500 contracts, or FTSE futures for 750 contracts. Block trades must be reported within three minutes and are denoted by the letter ‘K’.

A ‘basis trade’ is the simultaneous exchange of a financial asset or instrument (eg, a government bond or a basket of shares), together with an appropriate offsetting number of futures contracts, in a privately negotiated transaction between two parties. Similarly to block trades, the exchange allows the futures part of the basis trade to be executed outside the central order book. As with block trades, basis trades are reported into the exchange once they are agreed.

Euronext.liffe is the London derivatives exchange within the Euronext group of companies; and all of the derivatives exchanges within the group use the LIFFE.Connect® system. These exchanges are located in Paris, Brussels, Amsterdam and Lisbon, as well as London.

### 1.4 Contracts Traded on Euronext.liffe

**LEARNING OBJECTIVES**

4.1.4 Know the scope of contracts traded on Euronext.liffe

The scope of the contracts traded on Euronext.liffe are as follows:

- Short-Term Interest Rate (STIR) contracts, such as the 3-month Sterling (Short Sterling) Interest Rate Futures and the 3-month Euro (EURIBOR) Interest Rate Futures.
- Government Bond Contracts, such as the Long Gilt Futures (and options on the future) and Japanese Government Bond (JGB) Futures.
- Equity Contracts, such as index products including futures and options on FTSE 100, Eurofirst 80 and Eurofirst 100, as well as Universal Stock Futures and Individual Equity Options.
- Swap Contracts, certain derivatives designed to facilitate OTC swaps, such as the 10 Year $ Swapnote Future.
- Commodity Contracts, such as Cocoa, Coffee and White Sugar Futures.
1.5 FTSE 100 Index Futures

**LEARNING OBJECTIVES**

4.1.5 Know the FTSE 100 Index Future; and its associated option contracts

The quote for equity index futures is provided in index points, for example, the FTSE 100 index on Euronext.liffe might be quoted at 5200, representing 5200 index points. The size of each contract is based on a monetary value assigned to each index point, the index x £10 per point for the FTSE 100 future. The minimum movement in the contract (the ‘tick size’) is one half of an index point, with each tick having a value of £5.

The FTSE 100 futures expire on the third Friday of the delivery month, and the delivery months available are March, June, September and December each year.

The contracts trade between the hours of 8.00am and 5.30pm each business day, with the last trading day for each contract set as the third Friday in the delivery month. On the last trading day, trading is only allowed until 10.30am. The delivery day is the next business day after the last trading day.

Because it is impractical to take delivery/deliver the constituents of the index at expiry, equity index contracts are cash settled.

1.6 FTSE 100 Options

As well as the FTSE 100 future, there are also option contracts available on the FTSE 100 on Euronext.liffe. The standard option is European-style, based on £10 per index point, delivery for the nearest eight months of March, June, September, December plus such additional months that include the nearest four calendar months are always available for trading. The premium is quoted in index points.

Euronext.liffe also offers FLEX options on the FTSE 100 index, again based on £10 per index point and European-style. The delivery date is flexible and could be any business day up to five-and-a-half years from the date the contract is entered into.

Like the FTSE 100 future, these options are cash-settled.
1.7 Short Sterling Futures

LEARNING OBJECTIVES
4.1.5 Know the 3 month sterling (short sterling) interest rate future and its associated option contracts

The 3-month short sterling contract is a short-term interest rate (STIR) futures contract. It is traded on Euronext.liffe and is based on the interest payable/receivable on a three month fixed rate borrowing/lending on a notional amount of £500,000 that starts from the expiry of the contract. The tick size is 0.01 of a percentage point (a single ‘basis point’ or one one-hundredth of a percentage point) and the tick value is £12.50 (£500,000 x \(\frac{3}{12} \times 0.01 \div 100\)).

Example 1 - The Short Sterling Future

Each contract is based on a 3 month period with a notional underlying amount of £500,000. It is quoted based on 100 minus the interest rate. So if the interest rate was 5%, the contract would be quoted at:

\[100 - 5 = 95.\]

As short-term interest rates rise, the price of the future will fall, and vice versa. If interest rates increased to 5.5%, the contract would fall to 94.5.

The minimum movement (the tick size) is 0.01 and the value of each tick is £12.50.

For example, a March contract enables the buyer or seller to fix an interest rate on £500,000 for a three month period that starts in March and expires in June.

- The price of the future is quoted as \(100 - \text{interest rate}\) (to maintain the inverse relationship between prices and rates existing in bond markets).

- If interest rates are 5%, the price of the future will be 95.00. If rates rise, the price of the future will fall, and vice versa.

- As there is no physical asset to exchange, the contracts are cash-settled.

- The short sterling future is traded each business day between 7.30am and 6.00pm, with delivery months of March, June, September and December each year. The last trading day is the third Wednesday of the delivery month, where trading ends at 11.00am. The delivery date is the following business day.

- Options are also available on the 3-month short sterling futures contract on Euronext.liffe.

Note that STIR options are options on futures.
Because STIR and bond futures look at changes in interest rates, the trades will be identical for any given view or position. STIR derivatives relate to anticipated changes in short-term interest rates, whilst bond derivatives are driven by anticipated changes in long-term interest rates.

1.7.1 Speculation

If Eve believes short-term interest rates will rise, she should sell STIR futures. If correct, the price will fall and she will make money. Alternatively, Eve could sell calls or buy puts.

In contrast, if Adam believes short-term interest rates will fall, he will buy futures, buy calls or sell puts.

1.7.2 Hedging

A borrower (exposed to a rise in short-term interest rates) would sell futures, buy puts or sell calls to hedge the risk.

A lender (exposed to a fall in short-term interest rates) would buy futures, buy calls or sell puts to hedge the risk.

**Example 2 - Hedging with STIR Futures**

Suppose you will be borrowing £500,000 at a fixed rate for three months starting in two months’ time. Interest rates are currently 6% pa. With interest rates at 6%, the price of the nearest future should be about 94.00 (100 – 6).

If interest rates are unchanged, in two months’ time you will be able to borrow at 6%. The interest on the three month borrowing will cost:

\[ £500,000 \times 0.06 \times \left( \frac{3}{12} \right) = £7,500. \]

However, if interest rates rise your borrowing will be more expensive, so to hedge the exposure you sell one short sterling futures contract at 94.00.

Let’s say that interest rates have risen to 7% by the time you borrow the money.

The borrowing will cost you:

\[ £500,000 \times 0.07 \times \left( \frac{3}{12} \right) = £8,750 - \text{an extra £1,250}. \]

But since interest rates have risen to 7%, the price of the future drops to 93.00 (100 – 7), showing a profit on your short position.

The profit on the future is:

\[ 100 \text{ ticks} \times £12.50 \times 1 \text{ contract} = £1,250. \]

The profit on the future will offset the extra cost of borrowing, thereby effectively fixing your borrowing cost at 6% pa.

A lender would do the opposite to hedge against a fall in interest rates.

Note that if you had bought a put to hedge, your hedged borrowing cost would be slightly higher because of the premium paid for the option.
1.8 Long Gilt Futures and Options on Euronext.liffe

The long gilt future traded on Euronext.liffe is based on a notional underlying gilt, not a real gilt. Despite being based on a notional gilt, the contract is physically deliverable.

The long gilt future on Euronext.liffe specifies a coupon (currently 6%) and a maturity range (currently 8.75 to 13 years remaining) and the exchange lists a number of existing bonds (with similar features) that would be acceptable in order to fulfil the delivery obligations of the contract. This is known as the ‘deliverable basket’. The seller of the futures contract will decide which particular bond from the basket they will deliver – it is the seller’s choice.

The price quote of long gilt futures on Euronext.liffe is per £100 nominal value of the bonds in the contract. The contract size is £100,000 nominal value.

The tick size is a penny on the quote (ie, £0.01), with the tick value being £10, since a penny movement on the quote (based on £100 nominal value) needs to be multiplied by 1,000 to reach the contract size of £100,000 nominal.

The bonds within the deliverable basket will have different coupons and delivery maturity dates and will, therefore, have different market prices. If all sellers received the same amount on delivery, irrespective of which bond they delivered, some would be worse off than others. A system of price factors overcomes this problem by making an adjustment to the expiry price of the future to reflect which bond is actually being delivered against the contract by any particular party. In this way everyone gets the ‘correct’ price for the bond that they are delivering.

Despite this, the decision about which bond to deliver is more complex than simply picking one at random. One of the bonds within the basket is going to be the most attractive for futures sellers to deliver. This bond is defined as the ‘cheapest to deliver’ (CTD). The identification of the CTD bond is based on cash and carry arbitrage calculations on each of the bonds within the basket.

For exam purposes, remember that the CTD bond is the one with the highest implied repo rate.

Exercise 1

An investor is expecting to be able to deposit £1.5m starting in two and a half months’ time, for a period of three months. This coincides with the start of a short sterling futures contract that is currently trading at 95.2. The investor is concerned that interest rates might fall and wants to hedge using the short sterling future. How many contracts does he require, what interest rate will he be locking into and should he buy or sell the futures contracts?

The answers can be found in the Appendix at the end of this chapter.
The bond future is, therefore, effectively the future on the CTD bond and its price will correlate with that bond.

The delivery months for the long gilt future are March, June, September and December each year. Trading is between 8.00am to 6.00pm each business day. The last trading day for each contract is two business day prior to the last business day in the delivery month, with trading up to 11.00am. As seen, the seller chooses the deliverable gilt and also determines the delivery day, which can be any business day in the delivery month.

**Bond options** are options to buy/sell government bond futures, ie, on Euronext.liffe, gilt options are **options on the long gilt futures**.

Buyers of futures who take delivery of the bonds will receive an invoice stating how much they have to pay for the bond. This is known as the ‘**Invoice Amount**’.

The formula for the invoice amount is as follows:

\[
(EDSP \times \text{Price Factor} \times \text{Scale Factor} \times \text{No. of Contracts}) + \text{Accrued Interest}
\]

The **EDSP** is per £100 nominal based on the notional bond, this has to be multiplied by the **price factor** to adjust it to reflect the bond being delivered. Because the contract size is £100,000 nominal, the **scale factor** is 1,000 (uplifting the quote based on £100 nominal value to the contract size of £100,000 nominal value). This is then multiplied by the **number of contracts**. The final adjustment to reflect the invoice amount is to add the accrued interest (the quoted price for bonds excludes the accrued interest on the bond, in other words bond prices are quoted **clean**).

**Timing of delivery.** The Long Gilt futures specify that delivery against a contract can take place on any business day in the delivery month. The seller has the choice of when.

How does the seller decide?

Suppose you are short the future and own the bonds that you are going to deliver. You have two choices:

- hold the bond and benefit from the daily accrued interest; or
- deliver the bond, get your money and earn interest on the money.

Now it’s a simple decision. If the accrued interest exceeds the daily interest on the money, deliver as late as possible.

If the accrued interest is less than the daily interest, deliver at the first opportunity.

**Notice periods.** The seller can decide to deliver on any business day over a notice period. The notice period begins two business days prior to the commencement of the delivery month (the first notice day) and ends on the final business day of the month (the last notice day). Once the seller has made the decision and delivered the notice, the Exchange determines the EDSP. The EDSP is the price prevailing at 11.00am on the notice day. This EDSP will then be used to calculate the ‘invoice amount’, and settlement will occur two business days after the notice day.
However, this procedure is altered if the notice is given on the last notice day, when the EDSP is the price prevailing on the last trading day.

The last trading day is the penultimate business day of the month. The settlement is then made on the next business day after the last notice day.

2. DERIVATIVES PRODUCTS

This section of the examination syllabus covers in some depth the market for **single stock futures** – futures contracts based on the share prices of certain individual company shares. In addition, the syllabus requires knowledge of the **existence** of certain overseas futures and options contracts, including **where** they are traded.

2.1 Single Stock Futures

2.1.1 Introduction

Individual stock futures are futures contracts based on the price of an individual share, rather than an index. Generally, individual stock futures have the characteristics of index futures in that they are cash settled and long or short positions can be opened.

Like equity index futures they can be used to speculate on the price of the underlying, or to hedge against adverse price movements. The speculative uses of these futures is best illustrated by a simple example.

Individual stock futures are available on a variety of exchanges. Euronext.liffe in London has a range of individual stock futures referred to as ‘universal stock futures’. The Sydney Futures Exchange and MEFF in Madrid have also offered individual stock futures for some time.

EDX London is a joint venture between the London Stock Exchange and OMX AB. It is an electronic trading service for the Stockholm, Copenhagen and Oslo derivative exchanges. Its electronic trading platform offers trading in more than 150 standardised and flexible futures and options contracts on Swedish, Finnish, Danish and Norwegian individual shares and indices.
In the US, the Commodity Futures Modernisation Act 2000 paved the way for single stock futures to be listed on exchanges after many years of being prohibited by law. Single stock futures are regulated by both the Securities and Exchange Commission (SEC) and the Commodity Futures and Trading Commission (CFTC). The first exchange to trade single stock futures in the US was ‘OneChicago’, a joint venture between the Chicago Board Options Exchange (CBOE), Chicago Mercantile Exchange (CME) and the Chicago Board of Trade (CBOT). Another rival venture was set up jointly by NASDAQ and Euronext.liffe.

Contract sizes vary but are usually either 100 or 1,000 shares per contract, depending on the share. In Euronext.liffe, all Universal Stock Futures (USFs) are for 100 shares, with the exception of UK and Italian stocks which are set at 1,000 shares per contract.

**Example 3: Single Stock Future**

Stock A is currently priced at $10, the December future is priced at $10.20 and the contract size is 100 shares. An investor buys 1 futures contract.

A few days later, the stock price has risen to $11.00 per share and the future is now trading at $11.20. The investor closes her position. The profit from the transaction is as follows:

- Closing sale: $11.20
- Less, opening purchase: ($10.20)
- Profit per share: $1.00
- \( \times 100 \text{ shares per contract} = $100.00 \text{ profit} \)

Single stock options are also available in many markets around the world, for example, MEFF and Euronext.liffe. Euronext.liffe options are to buy or sell 1000 shares, physically delivered with the premium quoted in pence per share. The standard contracts last for three months, although there is some flexibility offered to wholesale participants to specify exercise prices and delivery dates out to three years. These are the FLEX options and only exist for the larger company shares.

### 2.1.2 Universal Stock Futures

**LEARNING OBJECTIVES**

4.5.3 Know the exchange and settlement characteristics of Universal Stock Futures on Euronext.liffe

In January 2001, Euronext.liffe introduced single stock futures which they styled ‘Universal Stock Futures’ (USFs). These are contracts to buy or sell shares at a predetermined date in the future. On Euronext.liffe, as of 2005, contracts were available on leading stocks, comprising 154 companies from three geographical regions - the UK, US and Europe. The products based on UK stocks, and all of the Europeans except Finland, Norway and Denmark, settle in cash. In contrast, US single stock futures are physically delivered.
Although there is a good deal of standardisation amongst the universal stock futures contracts on Euronext.liffe, there are some important differences to note. Cash-settled futures based on continental European shares are largely the same but there are some differences in respect of Borsa Italiana shares. The last trading day is an important reference day in defining not only the final date up to which stock futures can be traded but also its relationship with the delivery day upon which cash settlement takes place. The convention is that the third Friday of the delivery month is chosen as the last trading day and the EDSP is calculated on that day. Italian stocks are the only exception to this rule, where the EDSP is defined on the business day immediately preceding the third Friday. Delivery day for all cash settled stocks, except Italian stocks, takes place on the first business day following the last trading day. In the case of Italian stocks it takes place on two business days following the last trading day.

For those stock futures that are physically-settled the convention is that the US, Danish, Norwegian and Finish stocks will be settled through Euroclear on the fourth business day following the last trading day.

Another feature of the equity markets is the range of corporate actions undertaken by companies. This includes events such as stock splits, rights issues, mergers and takeovers. Where a corporate action occurs in an underlying stock, the Universal Stock Futures contract will be adjusted to reflect the changes to the underlying shares. The general rule is that contract terms will be adjusted so that, as far as possible, no-one gains or loses specifically as a result of the corporate action.

In Euronext.liffe all USFs are for 100 shares, with the exception of UK and Italian stocks which are set at 1,000 shares per contract. These are American-style options that can be exercised up to 17:20 on any business day; this is extended to 18:00 on its last trading/expiration day. They are traded on the LIFFE CONNECT trading platform and are cleared via LCH.Clearnet.

2.1.3 Example: Universal Stock Future

**LEARNING OBJECTIVES**

4.5.4 Be able to calculate the profit/loss on delivery of Universal Stock Futures on Euronext.liffe

The following example is based on the Universal Stock Futures contract, traded on Euronext.liffe.

**Example 4**

Stock A is currently priced at €10, the December future is priced at €10.20 and the contract size is 100 shares. An investor buys one futures contract.

On the last trading day, the stock price has risen to €11.50 per share. The profit from the transaction is as follows:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EDSP</td>
<td>€11.50</td>
</tr>
<tr>
<td>Less, opening purchase</td>
<td>(€10.20)</td>
</tr>
<tr>
<td>Profit per share</td>
<td>€1.30</td>
</tr>
<tr>
<td>x 100 shares per contract</td>
<td>= €130 profit</td>
</tr>
</tbody>
</table>
2.2 Summary of Overseas Equity Contracts

The following table outlines certain equity index futures and options contracts that are examinable and where they are traded.

<table>
<thead>
<tr>
<th>Region</th>
<th>Name of product</th>
<th>Exchange</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>S&amp;P 500 futures</td>
<td>Chicago Mercantile Exchange (CME)</td>
</tr>
<tr>
<td></td>
<td>S&amp;P 500 options (European)</td>
<td>Chicago Board Options Exchange (CBOE)</td>
</tr>
<tr>
<td></td>
<td>S&amp;P 100 options (American &amp; European)</td>
<td>Chicago Board Options Exchange (CBOE)</td>
</tr>
<tr>
<td>Europe</td>
<td>DAX futures (German equity index)</td>
<td>Eurex</td>
</tr>
<tr>
<td></td>
<td>DAX options (European)</td>
<td>Eurex</td>
</tr>
<tr>
<td></td>
<td>CAC 40 futures (French equity index)</td>
<td>Euronext Paris</td>
</tr>
<tr>
<td>Asia</td>
<td>Nikkei 225 futures</td>
<td>Osaka Securities Exchange (OSE)/ Singapore Exchange (SGX)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chicago Mercantile Exchange (CME)</td>
</tr>
<tr>
<td></td>
<td>Nikkei 225 options (European)</td>
<td>Osaka Securities Exchange (OSE)/ Singapore Exchange (SGX)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chicago Mercantile Exchange (CME)</td>
</tr>
<tr>
<td></td>
<td>Nikkei 300 futures</td>
<td>Osaka Securities Exchange (OSE)/ Singapore Exchange (SGX)</td>
</tr>
<tr>
<td></td>
<td>Nikkei 300 options (European)</td>
<td>Osaka Securities Exchange (OSE)/ Singapore Exchange (SGX)</td>
</tr>
</tbody>
</table>

Exercise 2

Stock B is currently priced at €22, the December future is priced at €22.40 and the contract size is 100 shares. An investor sells five futures contracts.

On the last trading day, the stock price has fallen to €21.40. What is the investors profit or loss?

The answer can be found in the Appendix at the end of this chapter.
2.3 Calculating the Profit/Loss on Equity Index Futures and Options

**LEARNING OBJECTIVES**

4.1.6 Be able to calculate the profit/loss on delivery of equity index futures

The syllabus requires that candidates are able to calculate the profit (or loss) on the delivery of equity index futures and options. This is best achieved by studying the following examples and then attempting the exercises.

**Example 5: The FTSE 100 Index Future**

An investor sells 5 FTSE 100 futures at 5378 and holds them to expiry. The Exchange Delivery Settlement Price (EDSP – the official price at the expiry of the contract) – is 5415.

As seen, the contract size for the Euronext.liffe FTSE 100 future is the index x £10 per point, tick size is 0.50 index points and tick value is £5 per tick.

The profit/loss is calculated by taking the number of ticks moved x tick value x number of contracts.

The investor’s position has moved against her by 37 index points (she has agreed to sell at 5378 something that costs 5415).

Since each index point represents 2 ticks, that is a movement of 37 x 2 = 74 ticks.

The investor’s loss = 74 x £5 x 5 contracts = £1,850.

The delivery obligations will be satisfied through the transfer of funds to the value of £1,850.

You will see in Chapter 9 that this is paid by market users to, and from, their brokers. Brokers settle via clearing members who, in turn, settle via the clearing house. Some of the above loss may have already been paid through the margining system.

**Exercise 3**

An investor buys 6 FTSE 100 contracts on Euronext.liffe at 5050. At expiry the EDSP is 5156. What is the investor’s gain or loss?

The answer can be found in the Appendix at the end of this chapter.

**Example 6: FTSE 100 Index Option**

An investor buys 3 FTSE call options with a strike of 5200 for a premium of 12. At expiry, the cash index stands at 5210.

The investor’s options are worth exercising because the value of the underlying (the cash index) exceeds the strike price at expiry. The gain on exercise will be 10 index points (5210 – 5200), but the investor has incurred a premium cost of 12 index points. So, the overall position is a loss of 2 index points per contract.

The investor’s overall loss is 2 index points x £10 x 3 contracts = £60.
### Exercise 4

An investor buys 7 FTSE put options with a strike of 5300 for a premium of 15. At expiry, the cash index stands at 5280. What is the gain or loss to the investor?

The answer can be found in the Appendix at the end of this chapter.

# 2.4 Uses of Equity Products

## LEARNING OBJECTIVES

4.1.7 Understand the use of equity derivatives for speculation and hedging

## 2.4.1 Speculation

For investors who believe they can correctly anticipate the way share prices and the equity market are going to move, equity derivatives provide an easy and highly geared way to speculate. As will be explored in more detail in Chapter 7, some options are more sensitive to underlying assets price movements than others. This is captured in the option’s ‘delta’.

**Bullish** investors anticipating a rise in prices, could **buy futures or buy call options** in individual shares or equity indices. Buying calls gives the possibility of unlimited profits with losses restricted to the premium paid. Those feeling generally positive, but believing prices will not increase greatly (i.e., **neutral/bullish** investors), are more likely to **sell puts**, where the premium will be retained if prices remain stable or rise slightly, rather than rise substantially. Selling puts gives the possibility of limited profits (the premium) if the underlying price rises and more substantial potential losses (the exercise price minus the premium) if the underlying price falls.

**Bearish** investors anticipating a fall in prices could **sell futures or buy put options** in individual shares or equity indices. Buying puts gives the possibility of substantial profits (potentially the exercise price minus the premium) if the underlying price falls, with losses restricted to the premium paid if the underlying price rises. Those feeling generally negative, but believing prices will not fall greatly (i.e., **neutral/bearish** investors), are more likely to **sell calls**, where the premium will be retained if prices remain stable or fall slightly, rather than requiring a substantial fall. Selling calls gives the possibility of limited profits (the premium) if the underlying price falls, and unlimited potential losses if the underlying price rises.

## 2.4.2 Hedging

Investors holding equities, or having sold equities they do not own (short selling), can use equity derivatives to hedge the risk they face. Futures will hedge the possibility of loss, but also remove the possibility of profit. In contrast, hedging by buying options will hedge the possibility of loss without removing the possibility of profit. However, buying options means that the investor incurs the cost of the premium.
For investors holding shares, the hedging strategies are either to sell futures or buy puts. Buying puts is commonly referred to as a ‘protective put’ strategy - if the shares held fall in value, the put option will become profitable and the investor mitigates the loss. For an investor with a poorly performing portfolio of shares, writing covered calls on the shares held is a further possibility. If the shares continue to perform poorly, the investor will keep premium on the options. Investors short selling shares will hedge by either buying futures or buying calls options.

2.4.3 Calculating Hedge Ratios

The number of contracts required to hedge (the ‘hedge ratio’) is calculated in the following ways:

1. Number of contracts needed to hedge a portfolio using stock index futures =
   \[
   \frac{\text{Portfolio value}}{\text{Futures price} \times \text{point value (£10 for FTSE 100)}}
   \]

2. Number of contracts needed to hedge a portfolio using stock index options =
   \[
   \frac{\text{Portfolio value}}{\text{Strike price} \times \text{point value (£10 for FTSE 100)}}
   \]

3. Number of contracts needed to hedge an individual share =
   \[
   \frac{\text{Number of shares}}{\text{Contract Size (1000 for most Euronext.liffe contracts)}}
   \]

However, hedging a portfolio must also take account of the beta of the portfolio. Beta is a measure of how a portfolio’s value moves in relation to the overall market - a volatility measure.

Thus a broadly based portfolio will have a beta of 1, indicating that the portfolio has the same level of volatility as the overall market. If the portfolio beta is more than 1 then a fall in the market would cause a larger proportionate fall in the portfolio. Conversely, the beta factor would be less than one if the portfolio is less sensitive than the overall market.

As an illustration suppose that three fund managers, each have a portfolio of £2m with differing betas, are using FTSE 100 futures when the future is trading at 5200. They will each have a different requirement for the number of futures contracts they need to hedge, as shown in the following table:

<table>
<thead>
<tr>
<th>Manager</th>
<th>Beta</th>
<th>Number of contracts required to hedge</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.0</td>
<td>£2m ÷ (52500 x £10) x 1.0 = 38.4, rounded to 38 contracts</td>
</tr>
<tr>
<td>B</td>
<td>0.9</td>
<td>£2m ÷ (5200 x £10) x 0.9 = 34.6, rounded to 35 contracts</td>
</tr>
<tr>
<td>C</td>
<td>1.1</td>
<td>£2m ÷ (5200 x £10) x 1.1 = 42.3, rounded to 42 contracts</td>
</tr>
</tbody>
</table>
As can be seen from the above, the higher the beta, the more contracts are required to efficiently hedge against adverse price movements.

Using the formulae for the hedge ratios, attempt the following exercise:

**Exercise 5**

1. Mrs Zed holds a portfolio of top 100 UK shares worth £3.5m with a beta of approximately 1. If the FTSE Index future is currently trading at 5250, how many contracts are required to hedge the portfolio? Should she buy or sell futures? How would this change if the portfolio beta is 1.2?

2. Mr Hay holds UK shares worth £1.5m and wants to hedge using the FTSE 100 index option. Currently the FTSE is standing at 5210 index points; options with a strike of 5200 are available for a premium of 14 points for the call and 12 points for the put. How many contracts are required to hedge the portfolio? Should he buy calls or puts?

3. Effe plc has short sold 6000 shares in M & S plc and is concerned that the value of the shares might increase before the position is closed. Individual equity options are available on M & S shares on Euronext.liffe, with each contract representing 1000 shares. How many contracts should Effe plc buy to hedge the risk, and should it buy calls or puts?

The answers can be found in the Appendix at the end of this chapter.

**2.4.4 Delta Hedging**

Delta is the measure how a change in the value of the underlying asset changes the value of an option. It is expressed within a range of 0 to 1, where 0.5 is the delta or hedge ratio for an option that is ‘at-the-money’ ie, the option’s strike price is the same as the asset's current market price.

Delta hedging is used by option writers (sellers) to hedge the risk exposure of their short options position by purchasing or selling the underlying asset in the cash market, in response to movements in the underlying's price.

**Example 7**

A trader is short 100 BP calls that have a delta of 0.3, BP shares are trading 10p higher to 655p. In order to hedge his risk to the price increase, the trader will buy 3000 shares.

Delta hedge = \((100 \text{ options} \times 1000 \text{ shares per option} \times 10p) \times 0.3 = 3000 \text{ shares}\).

Note: that since the trader is short the BP calls and the share price has increased, the trader must buy the shares in the cash market.

Delta hedge summary:

<table>
<thead>
<tr>
<th>Option’s delta hedge ratio</th>
<th>Option’s profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 1</td>
<td>In-the-money</td>
</tr>
<tr>
<td>0.5</td>
<td>At-the-money</td>
</tr>
<tr>
<td>0 to 0.5</td>
<td>Out-of-the-money</td>
</tr>
</tbody>
</table>
The same relationship between the Delta hedge and puts holds. If a trader is short a put and it moves deeper into the money ‘ITM’, which causes the delta to move from 0.6 to 0.7, the trader should sell a further 10% of the short put’s face value to maintain the hedge.

Additional information on delta and option hedging can be found in Chapter 11, Section 4.

2.5 Equity Warrants and Options

LEARNING OBJECTIVES

4.1.9 Understand equity warrants and equity options and know their differences
4.1.10 Understand the effect of corporate actions on equity options

2.5.1 Equity Warrants

Equity warrants are similar to individual equity call options, giving the buyer of the warrant the right to take up the underlying share at a defined strike price at some time in the future. The buyer pays a price for the warrant and then, if they elect to take up the right contained in the warrant, they will pay the agreed strike price for the shares. Like call options, warrants enable speculators to make geared returns on increases in the underlying share price.

Warrants are usually longer dated than stock options and can be listed on exchanges (such as the LSE), as well as traded over-the-counter.

Historically, equity warrants have been issued by the company on whose shares they are based, e.g., ABC plc issues warrants on ABC plc shares to raise capital. ABC releases no shares on the issue of the warrants. However, if and when the warrants are exercised, ABC simply issues shares to satisfy the warrant holders.

Another type of warrant is a covered warrant. Unlike traditional warrants, these are issued by financial organisations (usually investment banks). The name ‘covered’ comes from the fact that the issuers are marketing the warrants based on assets they already own or control (they have the assets covered). They are offered in the form of call warrants (giving the investor the right to buy), or put warrants (giving the investor the right to sell). In the UK, covered warrants are traded on the London Stock Exchange, with dealing services and market prices provided by the issuers who make markets in these instruments under the LSE umbrella. At the time of writing, there are over 50 brokers trading over 700 warrants. Some of the market leaders are Dresdner Kleinwort Wasserstein, Goldman Sachs, JP Morgan, Societe Generale and TradingLab.

Covered warrants can be based on a wide range of underlying instruments, including equities, equity indices, currency exchange rates and interest rates. Investors, both institutional and private, can buy call and put warrants according to their market view and appetite for risk.
Covered warrants can either be American (exercised any time before expiry) or European (exercised only on date specified) but most are simply bought and sold back to the issuer prior to expiry. Should a warrant be held to expiry, they are cash-settled automatically - the issuer returns the difference between the exercise price and the price of the underlying security, instead of delivering the underlying itself.

2.5.2 Equity Options

Equity options are similar to warrants in that the option enables the buyer to purchase or sell the individual shares at a pre-determined price on (or over a range of) a pre-agreed future date(s). Since options are available as both calls and puts, unlike a company’s warrants, they provide a vehicle to arrange a future sale of shares at a pre-determined price.

Equity options are traded on both exchanges and over-the-counter (OTC). These can have individual company shares as their underlying asset or a narrow, industry/sector-based index, or even a market’s total index.

As mentioned earlier, any type of corporate actions, such as stock splits or bonus or rights issues, that has an effect on the stock’s cash price will also result in an ‘adjustment’ to the option’s terms, usually the contract’s price. This is to insure that no one gains or loses as a direct result of the corporate action itself.

2.6 Summary of Overseas Bond and Interest Rate Contracts

The following table outlines certain bond and interest rate futures that are examinable and where they are traded:

**LEARNING OBJECTIVES**

4.2.1 Know the existence of certain overseas bond futures, interest rate futures and the overseas exchanges on which they are traded
2.7 Summary of Currency Futures and Options Contracts

**LEARNING OBJECTIVES**

4.3.1 Know the existence of certain currency derivatives and the exchanges on which they are traded

<table>
<thead>
<tr>
<th>Region</th>
<th>Name of Futures Product</th>
<th>Exchange</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>30-day Fed Funds</td>
<td>Chicago Board of Trade (CBOT)</td>
</tr>
<tr>
<td></td>
<td>US T-Bond</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 5 year notes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>US Long Bond</td>
<td></td>
</tr>
<tr>
<td></td>
<td>US 30 year Long Bond</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spread based Futures (Fed Fund – Eurodollar)</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>3-month Euribor</td>
<td>Eurex</td>
</tr>
<tr>
<td></td>
<td>EuroSchatz (1.75 – 2.25 years)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EuroBobl (4.5 – 5.5 years)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EuroBund (8.5 – 10.5 years)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EuroBuxl (24 – 35 years)</td>
<td></td>
</tr>
</tbody>
</table>

Firstly, some points about exchange-traded currency products:

- There are none listed on UK exchanges.
- Major centres for exchange-traded currency products are the CME in Chicago and the Philadelphia Stock Exchange (PHLX), which is famous for its options.
- There are no US dollar futures on the above exchanges. The underlying asset is always the non-dollar currency (euro, yen etc).
- Euronext lists euro/US dollar futures and options contracts in Amsterdam.

These exchange-traded currency products are always quoted against the dollar, eg, €1 = $0.8745 and if one currency is strengthening, the other must be weakening. If the euro is weakening, it will buy fewer dollars so the dollar is strengthening.

Currency futures are **physically deliverable**. The futures buyer takes delivery of the non-dollar currency and pays for it in dollars.

Currency options are either physically deliverable (PHLX) or options on futures (CME).
The following table outlines the currency futures and options contracts that are examinable. You should be aware of the products and the exchange on which they are traded:

(Since these are US exchanges, the underlying currency is usually the US dollar.)

<table>
<thead>
<tr>
<th>Exchange</th>
<th>Foreign Exchange Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago Mercantile Exchange (CME)</td>
<td>A range of currency futures including:</td>
</tr>
<tr>
<td></td>
<td>- Japanese Yen</td>
</tr>
<tr>
<td></td>
<td>- Euro</td>
</tr>
<tr>
<td></td>
<td>- Russian Rouble</td>
</tr>
<tr>
<td></td>
<td>- British Pound</td>
</tr>
<tr>
<td>Philadelphia Stock Exchange (PHLX)</td>
<td>A range of currency options including:</td>
</tr>
<tr>
<td></td>
<td>- Japanese Yen</td>
</tr>
<tr>
<td></td>
<td>- Euro</td>
</tr>
<tr>
<td></td>
<td>- British Pound</td>
</tr>
</tbody>
</table>

In a similar way to other exchange-traded derivatives, currency derivatives offer the investor the potential to make money by correctly anticipating movements in exchange rates. For example, if an investor thought the euro was likely to strengthen against the US dollar, he could buy euro futures, or buy calls, or sell puts on the euro (or the euro future). If he were right, he would make geared profits.

Similarly, if another investor wanted to speculate on an anticipated weakening of the euro relative to the US dollar, she could sell Euro futures, or buy puts, or sell calls on the euro (or the euro future).

Since the euro strengthening relative to the US dollar is the same as the US dollar weakening relative to the euro, these speculative trades can be summarised as follows:

**Euro strengthening/US$ weakening** = buy euro futures or buy euro calls or sell euro puts

**Euro weakening/US$ strengthening** = sell euro futures or buy euro puts or sell euro calls

Someone with an actual or anticipated long underlying position in a particular non-US dollar currency, but needing US dollars, may want to lock into a fixed rate of exchange by selling futures. This might be a **US company exporting** goods and **invoicing in £ sterling**. They want to remove the uncertainty about the number of dollars this £ sterling sum will provide, so they **sell the appropriate number of £ sterling futures**.

A **European company that imports** from the US and is **invoiced in US dollars** might want to reduce the uncertainty of how many euros will be required to provide the required US dollars. Again, they would **sell the appropriate number of futures** contracts, but this time it would be euro futures not £ sterling futures.
Options could be used instead of futures and, in the above scenarios, the alternative to selling futures would be to **buy euro put options or sell euro call options**.

In summary:

Non-US importer needs to pay in US$  
US exporter expects to receive £, euro, etc.

\{  
\text{Sell futures or buy puts}  
\text{or sell calls in the non-US currency}  
\}

Someone with an actual or anticipated short underlying position in a particular non-US dollar currency, may want to lock into a fixed rate of exchange by buying futures. For example, a **US importer** needing to **pay in £ sterling** for goods might wish to lock into a set rate of exchange by buying **£ sterling futures**.

A **UK company that exports** to the US and **invoices in US dollars** would reduce the uncertainty of how much the dollars would deliver in £ sterling terms by **buying £ sterling futures**.

In summary:

Non-US exporter expects to receive US$  
US importer needs to pay in £, euro, etc.

\{  
\text{Buy futures or buy calls}  
\text{or sell puts in the non-US currency}  
\}

Note. For exam purposes, be aware that long options would be used if there was any uncertainty in the scenario, eg, when a company is bidding for a contract that it hasn’t secured so far. This is because there is not a currency risk yet and there might never be a risk if the company does not win the contract. The maximum potential loss is the premium.

Number of contracts needed to hedge = \frac{\text{Amount of underlying currency}}{\text{Contract size}}

Note. Convert a US dollar sum using the current futures price if necessary.

---

**Example 8**

A UK importer needs to pay £1m in two months’ time. The current futures rate is £1 = $1.4565. Contract size = £62,500.

The number of contracts needed to hedge:

\begin{align*}  
1,000,000 & \div 1.4565 = £686,577. \\
\text{Number of contracts needed (sell)} & = £686,577 \div £62,500 = 11 \text{ (approx).}  
\end{align*}

---

**Exercise 6**

A US importer needs to pay €500,000 in three months’ time. The current exchange rate is $1 = €1.0356 and the relevant euro futures contract is currently trading at $1 = €1.0288, with a contract size of €125,000. If the importer were to use the euro futures contract to hedge, how many contracts are required and should he buy or sell the future?

The answer can be found in the Appendix at the end of this chapter.
2.8 Settlement Links between Exchanges

LEARNING OBJECTIVES

4.2.2 Know the main exchanges and contracts that have common settlement prices and links, which effectively allow investors to transfer open positions from one exchange to another.

4.4.2 Know the main exchanges and contracts that have common settlement prices and links, which effectively allow investors to transfer open positions from one exchange to another.

Since 1984, the Chicago Mercantile Exchange (CME) has operated with the Singapore Exchange (SGX - formerly called the Singapore International Monetary Exchange or SIMEX) a two-way futures trading link known as the ‘Mutual Offset System Agreement’, which the CME refers to as ‘MOSA’. This agreement enables traders to open a futures position on one exchange and liquidate it on the other and thereby manage their overnight risk. There have been very few examples of such an approach and this is the only international futures trading link of its kind currently operating. The CME/SGX agreement now includes four contracts: three short-term interest rate products - Eurodollars, Euroyen TIBOR, Euroyen LIBOR - and the Japanese Government Bonds contracts.
Answers to the exercise included in this chapter.

**Answers to Exercise 1**

Since he is lending £1.5m, and the contract value of the short sterling future is £500,000, he needs 3 contracts to hedge (£1.5m/0.5m = 3).

He locks in at the interest rate implicit in the short sterling futures contracts, which is 4.8% (based on 100 – 95.2).

He should buy the contracts, since he is worried about a fall in interest rates reducing his income and a fall in interest rates will lead to an increase in the contract quotation.

**Answer to Exercise 2**

The investor’s closing position is:

<table>
<thead>
<tr>
<th>EDSP</th>
<th>(€21.40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening sale</td>
<td>€22.40</td>
</tr>
<tr>
<td>Profit per share</td>
<td>€1.00</td>
</tr>
</tbody>
</table>

x 100 shares per contract x 5 contracts = €500 profit

**Answer to Exercise 3**

The investor has gained 5156 - 5050 = 106 index points on each contract

106 x 2 = 212 ticks

212 ticks x £5 = £1060 per contract

£1060 x 6 contract = £6360 gain

**Answer to Exercise 4**

The put options will be worth exercising, each gaining 5300 - 5280 = 20 index points. However, the investor’s option cost 15 index points, so the overall gain is 20 - 15 = 5 index points.

5 index points x £10 x 7 contracts = £350
Answer to Exercise 5

1. Number of contracts required:

\[
= \frac{\£3.5m}{(5250 \times \£10)} \times 1 = 66.67 \text{ or } \sim 67 \text{ contracts}
\]

Mrs Zed should sell the contracts, since she is attempting to hedge a long underlying portfolio.

If the beta of the portfolio is 1.2, then the number of contracts sold would increase to:

\[
= \frac{\£3.5m}{(5250 \times \£10)} \times 1.2 = 80 \text{ contracts}
\]

2. Number of contracts required:

\[
= \frac{\£1.5m}{5200 \times \£10} = 28.8 \sim 29 \text{ contracts}
\]

Mr Hay should buy put options to cover the risk of nil long portfolio of underlying shares falling in value.

3. Effe plc should buy calls to cover the short selling of shares in M&S plc.

The number of options contracts purchased is \(6000 \div 1000 = 6\) contracts

Answers to Exercise 6

The importer wants to reduce the uncertainty about how much the euros will cost in US dollars, so he will buy euro futures contracts.

Because each contract represents €125,000, he simply buys 4 contracts \((500,000/125,000 = 4)\). The current and futures exchange rates are irrelevant to this calculation.
PRINCIPLES OF EXCHANGE-TRADED FUTURES AND OPTIONS

1. FUTURES PRICING 83
2. PRICING OPTIONS 94
3. OPEN OUTCRY VERSUS SCREEN TRADING 107
APPENDIX 117

This syllabus area will provide approximately 15 of the 70 examination questions.
1. FUTURES PRICING

LEARNING OBJECTIVES
5.1.1 Understand the mechanisms for futures pricing and the relationship with the underlying cash prices together with the significance of contributing factors

1.1 Futures Pricing Relationships

We already know that a future is a derivative. It is derived from the underlying asset, and the price of the future will be derived from the price of the underlying asset in the cash market.

However, it is normal to find the cash price is different to the price for various deliveries in the future. Why? Well, it is tempting to think that the futures price is the market’s perception of what the price of the underlying asset will be at the time of delivery, but this is NOT the case.

The price of the future is NOT the market’s perception of what the price of the asset will be at the time of delivery.

Although prices in both markets are set by the interaction of buyers and sellers, there is a mathematical relationship that binds them together. It is important to understand the nature of this relationship. The following comments will be based on this simple illustration:

Example 1

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash price (January)</td>
<td>400</td>
</tr>
<tr>
<td>March futures price</td>
<td>417</td>
</tr>
<tr>
<td>June futures price</td>
<td>433</td>
</tr>
</tbody>
</table>

Why should anyone want to pay 417 in March for an asset that is only worth 400 today?

The price relationship between the cash asset and the same asset in the future is based on an arbitrage principle.

1.2 Cost of Carry

LEARNING OBJECTIVES
5.1.2 Know the implications of the cost of carry and what may be included in these

It is January and an investor who wants a particular asset in March has two choices:

- go long the March future and lock in the buying price for the asset at 417; or
- buy the asset today for 400 and store it until it is needed in March.
However, by buying the asset today, the investor is foregoing the interest which could be earned on the funds until March. Furthermore, there might be costs associated with storing the asset until it is needed. The result is that anyone wanting delivery of the asset in March will be willing to pay the higher price because they are earning interest on their funds and not incurring any storage costs.

Similarly, the person holding the asset will require a higher price for future delivery to compensate for the costs involved.

These are referred to as ‘costs of carry’.

The main components of costs of carry are:
• finance costs (interest) over the period;
• storage costs; and
• insurance.

As will be seen in Section 1.3.1 below, there may be benefits of carry, such as dividend yields when equity derivatives are considered.

1.3 Fair Value

Knowing what the cash price of an asset is, and knowing how much it will cost to carry the asset up to the moment of delivery, it is possible to calculate a futures price that will be fair to both the buyer and seller of the contract. This is known as the ‘fair value of the future’.

If the differential between the cash price and futures price were less than the cost of carry, the investor would be better off buying the future rather than buying the asset and holding it.

If the differential were greater than the cost of carry, an investor would be better off buying the asset and holding it.

It is only when the differential exactly reflects the costs of carry that the buyer is indifferent as to whether to buy in the cash market or the futures market.

Therefore:

\[
\text{Fair value of the future} = \text{cash price} + \text{costs of carry}
\]
1.3.1 Calculating the Fair Value

**LEARNING OBJECTIVES**

5.1.3 Be able to calculate the fair value of a future

To calculate the fair value of a particular future, simply take the cash price, calculate the interest for the period and calculate the other costs involved. The total of the cash price plus the interest plus the other costs equals the fair value.

**Example 2**

Cash price = £1,250, interest rates are 6% pa, storage costs = 1% pa.

The fair value of a future with 90 days to delivery would be:

- **Cash price**: £1,250.00
- **Finance**: £1,250 x 0.06 x (90/365) = £18.49
- **Storage**: £1,250 x 0.01 x (90/365) = £3.08
- **Fair value**: £1,271.57

Note, this is the method that should be used in the exam.

**Exercise 1**

If the cash price of a particular asset is £750, the prevailing rate of short-term interest is 3% pa and the estimated storage costs (including insurance) for the asset are 0.5% pa, what is the fair value of a futures contract with 45 days to expiry?

The answer can be found in the Appendix at the end of this chapter.

**Calculating the fair value for equity index futures**

In calculating the fair value of an equity index future, only the net finance costs need to be considered as the other costs are negligible.

**Net finance costs = interest – dividends.**

This is because, by holding the underlying, the investor forgoes the interest on the funds invested in the shares, but receives dividends from those shares.
### Example 3

The S&P 500 index is currently 1265, one-year US interest rates are 4.55% and the index’s dividend yield is 2.25% pa.

The fair value of a future with 182 days to delivery would be:

- **Cash index** = 1265.00
- Net finance costs:
  - \[1265 \times ((0.0455 - 0.0225) \times 182/360) = 14.71\]
- Future’s fair value = 1279.71

### Exercise 2

The FTSE 100 cash index is 5250, interest rates are 3.5% pa and the dividend yield on the index is 2.6% pa. What is the fair value of a FTSE 100 future with 91 days to run?

The answer can be found in the appendix at the end of this chapter.

### 1.4 Contango and Backwardation

In markets where there is a net cost of carry in holding the asset to delivery, **futures prices are higher than cash prices**, ie, the market is said to be in ‘contango’, ie, a contango market.

This is the **normal situation for equity markets** – interest rates are higher than dividend yields, therefore, there is a net cost of carry.

In markets where there is a net benefit in holding the asset to delivery, **futures prices are lower than cash prices**, the market is said to be in ‘backwardation’, ie, a backwardation market.

Backwardation is the normal situation for:

- bond markets; and
- STIR markets.

This is because long-term interest rates are higher than short-term rates.
1.5 Convergence

The cost of carry determines the differential between cash and futures prices and is the cost associated with holding the asset from now until expiry. It follows that as the point of expiry approaches, the costs of carry diminish and the differential must narrow.

At expiry, the cost of carry is zero, so the cash and futures prices must converge over the life of the future until they meet at expiry.

1.6 Basis

**LEARNING OBJECTIVES**

5.1.4 Know the definition and significance of the basis

Basis is a measure of the difference between cash and futures prices.

\[ \text{Basis} = \text{cash price} - \text{futures price} \]

This is also sometimes referred to as ‘crude basis’.

The term ‘basis’ can also be used to describe the difference between two futures prices (eg, March futures price vs June futures price).

---

**Example 4**

The cash price of a bond = £110.50. Interest rates available on 30 day deposits are 6% pa and the bond yields 5% pa.

The fair value of a 1-month future would be:

- Cash price = £110.500
- Finance costs:
  - £110.50 x (0.06 – 0.07) x (1/12) = (0.092)
- Fair value = £110.408

ie, the futures price is lower than the cash price.

**Exercise 3**

The approximate cash price of the notional long gilt is £104.30. Interest rates available on 2-month deposits are 3% pa and the bond yields 5% pa. What is the fair value of the long gilt future with 2 months to expiry?

The answer can be found in the Appendix at the end of this chapter.
In contango markets, the futures price is greater than the cash price, so the basis will be a negative number.

**Basis is negative in contango markets**

In backwardation markets, the futures price is less than the cash price, so the basis will be a positive number.

**Basis is positive in backwardation markets**

Because of convergence, in both types of market the basis must narrow to zero as the contract moves towards expiry.

In a perfect market, the basis should reflect the cost of carry and the future would always trade at its fair value. However, as markets are not perfect, the actual difference between two prices will be influenced by short-term supply and demand pressures. It is unlikely that the future will be trading exactly at its fair value at any moment in time.

Basis can change as a result of:
- changes in supply and demand;
- changes to the cost of carry, eg, interest rates, insurance costs, dividend yields;
- changes in time remaining to expiry (convergence).

As we will see, movements in basis can adversely impact hedging strategies and correctly anticipating the changes to basis can provide trading opportunities.

### 1.6.1 Changes in Basis – Terminology

**Strengthening of basis**

When basis moves in a positive direction it is said to be 'strengthening'. This is the expected situation in a contango market - as the future moves towards expiry, and the cash and futures price converge, the basis become less negative. The strengthening basis narrows the gap in prices in a contango market, as price differentials become less significant. This is shown in the following illustration:

<table>
<thead>
<tr>
<th></th>
<th>March futures price</th>
<th>June futures price</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Today</td>
<td>417</td>
<td>433</td>
<td>-16</td>
</tr>
<tr>
<td>Tomorrow</td>
<td>410</td>
<td>420</td>
<td>-10</td>
</tr>
</tbody>
</table>

In contrast, a strengthening of basis in a backwardation market results in a widening gap between the two prices. This is because basis is already a positive number and any movement in a positive direction will increase the difference between the two prices. This is shown in the following illustration:
When basis move in a negative direction, it is said to be ‘weakening’. A weakening of basis in a contango market widens the gap in prices, with the negative price differential increasing. This is shown in the following illustration:

<table>
<thead>
<tr>
<th>March futures price</th>
<th>June futures price</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Today</td>
<td>110.15</td>
<td>110.02</td>
</tr>
<tr>
<td>Tomorrow</td>
<td>111.00</td>
<td>110.75</td>
</tr>
</tbody>
</table>

When basis move in a negative direction, it is said to be ‘weakening’. A weakening of basis in a contango market widens the gap in prices, with the negative price differential increasing. This is shown in the following illustration:

<table>
<thead>
<tr>
<th>March futures price</th>
<th>June futures price</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Today</td>
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<td>433</td>
</tr>
<tr>
<td>Tomorrow</td>
<td>410</td>
<td>429</td>
</tr>
</tbody>
</table>

A weakening of basis in a backwardation market narrows the gap between prices because the positive basis moves in a negative direction to become less positive. This is shown in the following illustration:

<table>
<thead>
<tr>
<th>March futures price</th>
<th>June futures price</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Today</td>
<td>110.15</td>
<td>110.02</td>
</tr>
<tr>
<td>Tomorrow</td>
<td>111.00</td>
<td>110.92</td>
</tr>
</tbody>
</table>

In summary, due to the convergence of futures and cash prices as a contract nears maturity, the following is expected:

- In contango markets (eg, equity index and commodity futures) the basis strengthens towards expiry.
- In backwardation markets (eg, STIR and bond futures) the basis weakens towards expiry.

### 1.6.2 Changes in Basis – The Trades

Whenever the basis is expected to **strengthen** (irrespective of whether the market is in contango or backwardation), a trader should buy the spread. This involves buying the near-dated instrument and simultaneously selling the far-dated instrument, eg, buy March future and sell June future. This is shown in the following example:
Whenever the basis is expected to **WEAKEN** (irrespective of whether the market is in contango or backwardation), a trader should sell the spread. This involves selling the near-dated instrument and simultaneously buying the far-dated instrument, e.g., sell March future and buy June future. Selling the spread is illustrated in the following example:

**Example 6**

Currently the March futures price is 417 and the June futures price is 433.

A trader expects a weakening of basis over the next week. He sells the spread today.

The following week the March future is still trading at 417, whilst the June contract trading at 439. The price difference has widened, so the trader’s anticipated weakening of basis was correct.

The outcome is as follows:

<table>
<thead>
<tr>
<th>March futures</th>
<th>sold at 417</th>
</tr>
</thead>
<tbody>
<tr>
<td>a week later</td>
<td>purchased at 417</td>
</tr>
<tr>
<td></td>
<td>no gain/loss 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>June futures</th>
<th>bought at 433</th>
</tr>
</thead>
<tbody>
<tr>
<td>a week later</td>
<td>sold at 439</td>
</tr>
<tr>
<td></td>
<td>gain 6</td>
</tr>
</tbody>
</table>

Overall gain = 6 = the amount of the change in basis.
Summary of basis changes and trades

<table>
<thead>
<tr>
<th>Market</th>
<th>Gap</th>
<th>Basis</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contango</td>
<td>Narrowing</td>
<td>Strengthening</td>
<td>Buy the spread</td>
</tr>
<tr>
<td>Contango</td>
<td>Widening</td>
<td>Weakening</td>
<td>Sell the spread</td>
</tr>
<tr>
<td>Backwardation</td>
<td>Narrowing</td>
<td>Weakening</td>
<td>Sell the spread</td>
</tr>
<tr>
<td>Backwardation</td>
<td>Widening</td>
<td>Strengthening</td>
<td>Buy the spread</td>
</tr>
</tbody>
</table>

1.6.3 Basis Risk

Basis risk is defined as the risk that a futures price will move differently from that of its underlying asset.

As we have seen in the previous sections, there are a number of reasons why a futures price differs from that of its underlying asset. But there is a relationship between the two, which means that a futures price should broadly follow the price movements of its underlying asset. Additionally, the difference between the two should become less as the future approaches its expiration — this is known as convergence.

However, other factors can occasionally influence the futures price and have a lesser effect, if any, on the cash market, or vice-versa. When this happens the basis will change. However, this basis risk is significantly less than the risk associated with price changes of the underlying asset.

The only foolproof method of eliminating basis risk would be to hold a futures contract to its expiration. At expiry, the futures price and the cash price will converge.

1.7 Arbitrage Trades

LEARNING OBJECTIVES

5.1.5 Be able to apply the principle of cash/futures arbitrage

Arbitrage is attempting to profit by exploiting price differentials between identical, or similar, financial instruments that are trading on different markets, or in different forms. The examples considered above of buying or selling the spread could be described as arbitrage trades because they attempted to exploit pricing differentials between futures on the same underlying asset, with different maturities.

However, there is also the potential to arbitrage mispricings between the underlying (cash) instrument and the futures available on that instrument. Such arbitrage opportunities exist when the future is not trading at its fair value.

The following two sub-sections (1.7.1 and 1.7.2) consider firstly how to arbitrage when a future is above its fair value and, secondly, how to arbitrage when a future is trading below its fair value.
1.7.1 Cash and Carry Arbitrage

If the future is currently trading **ABOVE** its **FAIR VALUE** it means that it is expensive relative to the price of the underlying asset.

The appropriate arbitrage trade is to buy the relatively cheap underlying asset and simultaneously sell a future. This is known as a ‘cash and carry’ trade because the underlying cash asset is carried to satisfy the sale of the future. This is illustrated in the following example:

**Example 7**

<table>
<thead>
<tr>
<th>Current cash price</th>
<th>Fair value for future</th>
<th>Current futures price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1450</td>
<td>1485</td>
<td>1497</td>
</tr>
</tbody>
</table>

The trader buys the underlying for 1450. He incurs further 35 in costs of carry over the period, giving an effective buying price of 1485. However, by selling the future, the trader is guaranteed a selling price of 1497, thus locking in a profit of 12.

The trader can either hold the position to expiry and realise the profit of 12, or wait for an opportunity to close out before expiry if the basis changes earlier.

1.7.2 Reverse Cash and Carry Arbitrage

If the future is currently trading **BELOW** its **FAIR VALUE** it means that it is cheap relative to the price of the underlying asset.

The appropriate arbitrage trade to exploit this mispricing is to sell the relatively expensive underlying cash asset and to buy the relatively cheap future. This is known as a ‘reverse cash and carry’ trade. A reverse cash and carry trade is illustrated in the following example:

**Example 8**

<table>
<thead>
<tr>
<th>Current cash price</th>
<th>Fair value for future</th>
<th>Current futures price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1450</td>
<td>1485</td>
<td>1477</td>
</tr>
</tbody>
</table>

The trader sells the underlying for 1450, releases funds which can be placed on interest and saves storage costs etc, over the period. This gives an effective selling price of 1485. However, by buying the future, the trader is guaranteed a buying price of 1477, thus locking in a profit of 8.

The trader can either hold the position to expiry and realise the profit of 8, or wait for an opportunity to close out before expiry if the basis changes earlier.

1.7.3 The Arbitrage Channel

In the examples above the fact that trading incurs expenses by way of commissions and fees, as well as bid and offer spreads, has not been considered. The effect of these trading costs is to make arbitrage unprofitable if they outweigh the arbitrage profits achievable.
Therefore, the futures price can move away from its fair value without there being any arbitrage activity, as long as the movement is less than the trading costs that would be incurred. This creates what is referred to as an ‘arbitrage channel’ - the range of prices within which there will be no possibility to arbitrage due to transaction costs outweighing any potential benefits.

If, however, the futures price moves beyond the limits of the channel, arbitrage becomes profitable. The arbitrage activity forces the futures price back into the channel and ensures that the futures price does not move too far away from fair value. This explains the strong correlation between cash and futures prices.

1.8 Hedging and Basis Risk

An unhedged position is at risk from changes in the price of the underlying asset.

Futures can be used to offset this risk, with the underlying cash position being mirrored by an opposite position in the futures market.

Although the cash and futures prices are strongly correlated, there is, as we have seen, some flexibility in that relationship. Basis changes will affect the performance of the hedge.

The future might not have been trading at its fair value at the time the hedge was undertaken. This will, in time, be rectified by market pressure or convergence, and will, therefore, lead to some profits/losses on the hedge.

Basis might have changed from the time the hedge was placed to the time it was offset, thus resulting in profits/losses on the hedge.

The hedge might overperform or underperform due to changes in basis. However, the risk of significant underperformance is small because arbitrage will keep the futures price close to its fair value.
2. PRICING OPTIONS

LEARNING OBJECTIVES

5.2.1 Understand the significance of premiums, time values and intrinsic values

Unlike a futures contract, where both parties enter into an obligation to deliver the asset (for the seller) or agreed sum (for the buyer), an options contract allows one of the counterparties a choice - the holder has the right to exercise the option, but not the obligation. The writer is obliged to meet the delivery obligations if the option is exercised. Clearly, the writer requires compensation to take on the risk and the holder is willing to pay for the flexibility that the option allows. This payment takes the form of a premium.

2.1 The Premium

The premium is the price of the option. The level of the premium is determined by buyers and sellers trading in the market and is the cost of the option. Option buyers must pay the agreed premium to the option sellers.

There are a number of factors that determine the level of the premium. Changes in these factors will result in a change in the options premium.

The two most obvious factors are the strike (or exercise) price and the time to run until the option expires. These are illustrated in the following example:

Example 9

ABC Plc shares are currently trading at 550, and the following call options are available:

<table>
<thead>
<tr>
<th>Strike Price</th>
<th>Premium for March expiry</th>
<th>Premium for April expiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 call</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>525 call</td>
<td>49</td>
<td>61</td>
</tr>
<tr>
<td>550 call</td>
<td>37</td>
<td>46</td>
</tr>
<tr>
<td>575 call</td>
<td>25</td>
<td>39</td>
</tr>
<tr>
<td>600 call</td>
<td>19</td>
<td>28</td>
</tr>
</tbody>
</table>

The various strikes and expiries have different premiums reflecting the risks involved in holding/selling those options. The longer-dated expiries are more expensive than the near months, and the lower strike price options have higher premiums.

The premium is made up of two broad elements: intrinsic value and time value:

\[
\text{Premium (PM)} = \text{Intrinsic value (IV)} + \text{Time value (TV)}
\]
2.1.1 **Intrinsic Value (IV)**

The intrinsic value of an option is the difference between the strike price and the underlying asset’s price. Call options have intrinsic value when the strike is less than the underlying asset price. Put options possess intrinsic value if the strike is greater than the underlying’s cash price. Intrinsic value can never be negative.

There has to be some intrinsic value for an option to be worth exercising. An option with zero intrinsic value is not worth exercising at expiry. Intrinsic value can also be thought of as the ‘minimum’ value that an option can have. An option either has or does not have intrinsic value.

From the above example, for ABC the 500 calls have an intrinsic value of 50p - they must be worth at least 50p because they enable 550p shares to be purchased at 500p.

In the above example, both the 500 and 525 strikes have intrinsic value. If the price remained at 550p at expiry, holders of both those options would exercise them because they allow the holders to buy the asset at a cheaper price than the current market price. All options that have intrinsic value at expiry will be exercised. As the premium is not refundable the amount paid for the option is not a factor in determining whether to exercise. The holder will realise any intrinsic value which will then be used to offset the cost of the premium. If the intrinsic value is greater than the premium paid, the holder will make a net profit and the writer will make a net loss.

An option with intrinsic value is described as being 'in-the-money'. An option with no intrinsic value is described as being ‘out-of-the-money’. An option with an exercise price that equals, or is close to, the underlying asset price is described as being ‘at-the-money’. Sometimes options that are significantly in-the-money are described as ‘deep’ in-the-money options. Similarly, options that are significantly out-of-the-money are described as ‘far’ out-of-the-money’ options.
2.1.2 Time Value (TV)

In the ABC plc example, the 550, 575 and 600 strikes have no intrinsic value, yet a premium still has to be paid. The 500 and 525 strikes have intrinsic value, but the premium exceeds the intrinsic value.

The time value is the simply the excess above the option’s intrinsic value, ie, the difference between the premium and intrinsic value:

$$TV = PM - IV$$

Why should an option buyer pay more than its intrinsic value? The answer is simply that the price of the underlying can move during the lifetime of the option. There is always a possibility that the price can move beyond any given levels by the time of expiry, resulting in potential profits, or losses, for traders. The time value reflects the possibility, or probability, that the price can move beyond any given strike, thus making it worth exercising, and is the price paid for that uncertainty.
The following example illustrates the intrinsic and time value of ABC plc options:

Example 10

ABC Plc current share price is 550p. The price of March options, and their intrinsic and time values, are as follows:

<table>
<thead>
<tr>
<th>Strike</th>
<th>Call PM</th>
<th>Call IV</th>
<th>Call TV</th>
<th>Put PM</th>
<th>Put IV</th>
<th>Put TV</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>70</td>
<td>50</td>
<td>20</td>
<td>18</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>525</td>
<td>49</td>
<td>25</td>
<td>24</td>
<td>23</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>550</td>
<td>37</td>
<td>0</td>
<td>37</td>
<td>35</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>575</td>
<td>25</td>
<td>0</td>
<td>25</td>
<td>47</td>
<td>25</td>
<td>22</td>
</tr>
<tr>
<td>600</td>
<td>19</td>
<td>0</td>
<td>19</td>
<td>67</td>
<td>50</td>
<td>17</td>
</tr>
</tbody>
</table>

The call IV is the share price minus the strike, and the balance is the time value (TV).
The put IV is the strike minus the share price, and the balance is the TV.

Exercise 5

If a call option has a strike price of 234p, the current price of the underlying share is 256p and the option premium is 40p, calculate the intrinsic value and, thus, the time value of the option.

The answers can be found in the Appendix, at the end of this chapter.

2.1.3 Determinants of an Option’s Premium

**LEARNING OBJECTIVES**

5.2.2 Understand the significance of the determining factors in options premiums

The two elements that make up the option premium are intrinsic and time values. The intrinsic value can be determined quite simply: the difference between the underlying and the strike for in-the-money (ITM) options, or zero for out-of-the-money (OTM) options. The price of the underlying asset is a major influence because it determines the amount of intrinsic value.

The time value can be calculated as that part of the option’s premium that is not intrinsic value.

So, the time value reflects the uncertainty (probability) of an option being exercised.

But who or what determines how much time value there should be at any moment?

There are three major factors which determine the amount of time value - all of them are to do with uncertainty. The greater the uncertainty, the greater the time value.
1. Time to expiry

A longer-dated option will have more time value than a near-dated one with the same strike. The price of the underlying can move over a greater range in one year than in one week. This means that there is more uncertainty associated with an option with one year to expiry, so the time value will be greater. Looked at another way, the holder has more time for the option to work in his favour (and would be prepared to pay more), whilst the writer is at risk for a longer time and would need to be paid more for that risk.

If an option with one year to expiry must have more time value than one with one week to expiry, it stands to reason that the time value in an option gradually ‘leaks’ away as expiry approaches (traders usually talk about the erosion of time value, or ‘time decay’). As expiry approaches, there is generally less uncertainty about whether a particular option will be worth exercising.

On expiry, there is no uncertainty left. At that stage, either the option will be exercised, or it will not.

If it is OTM at expiry, IV=0 and TV=0, so the option will not be exercised.

If it is ITM, the holder will exercise to realise the intrinsic value, there is no possibility of making any more, so TV=0.

The rate at which the time value erodes over the life of the option is not linear (see graph below). The erosion speeds up as expiry approaches.

![Time Value vs. Time to Expiry Graph]

Erosion of time value works against the holder. If an investor buys an option today, and other factors (such as the underlying price and volatility) remaining constant, it will be worth less next week. If the investor closed next week, he will crystallise a loss.

Erosion must, therefore, work in favour of the writer. Provided that other factors remain constant, an option writer could sell an option today and close-out next week at a lower price, crystallising a profit.

2. The distance between the strike and the underlying

Remember that the time value reflects the uncertainty about whether an option is likely to be exercised on expiry.
In-the-money options (especially deep in-the-money options) have a high probability of exercise. There is less uncertainty about the outcome, so there is less time value.

Out-of-the-money options (especially far out-of-the-money options) have a high probability of being abandoned. There is less uncertainty about the outcome, so there is less time value.

At-the-money options must, therefore, have the highest amount of time value because that is the strike where most of the uncertainty exists.

3. Volatility

The more volatile the price of an asset, the greater the uncertainty, so the higher the time value and, hence, the premium. If the price of an asset is prone to large movements, holders have a higher chance of making a profit and writers are at greater risk.

Volatility, therefore, has a major impact on the option premium because of its effect on the time value and the price of an option.

However, there are three types of volatility to be considered:

1. Historic volatility. This represents how volatile the asset has been in the past and can be measured accurately because we know what the price movements have been. It is only of limited value in pricing an option because there is no guarantee that the same volatility will prevail in the future.

2. Future volatility. In pricing an option, or deciding whether an option is worth buying or selling, it would be incredibly useful to know what the volatility of the asset was going to be. Unfortunately, nobody can predict future volatility perfectly.

3. Implied volatility. As it is impossible to predict future volatility, traders must effectively take a view on it. This is implicit when options are traded. If volatility is a component of an options premium, by buying and selling options the market forms a collective view about what is likely to happen in the future.

The actual figure for implied volatility is derived from options pricing models. Perhaps the best known of these is the ‘Black-Scholes model’, named after its authors Fischer Black and Myron Scholes, two American economists who created the algorithm in 1973. Inputs such as volatility, strike price, underlying price, time to expiry and cost of carry are needed by pricing models in order to compute the premium. If the current option premium is known, the volatility figure can be adjusted (the others being fixed at any moment in time) until the premium calculated by the model is the same as the current price in the market. In other words, by working backwards through the model, it is possible to calculate the volatility implied by the premium.

Different option pricing models are better suited to differing requirements. For example, the Black-Scholes model can only be used to price European exercise options. Another, known as the ‘binomial pricing model’, is more appropriate for pricing American-style options. Adjustments to models will also need to be made to take into account the differences between options on futures and options based upon actual underlying assets, and to take into account dividends when addressing equity-based assets.
2.1.4 Other Factors determining the Option Premium

For some types of options, the prices of calls and puts are affected by interest rates and dividend yields.

An example of an option on a physical would be an option on an individual company’s shares. If the interest rate rises, the buyer of a call, who effectively keeps his money in the bank, earns more interest. The call writer, who has his money in the shares, is disadvantaged. It is only fair that writers should charge more if rates rise.

From this it is a simple step to see the impact of dividends. If dividends rise relative to interest rates then call writers can afford to charge slightly lower premiums.

For the writers of puts, who hold cash as cover, higher interest rates mean they can charge slightly lower premiums.

**Impact on option prices as the determinants change**

Now that we have seen the factors that affect the option premium, we can summarise the impact of a change in those factors on call and put premiums.

The following table is a summary of how call and put prices change as the factors that affect the premium option vary:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Call premiums</th>
<th>Put premiums</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of underlying rises</td>
<td>Rise</td>
<td>Fall</td>
</tr>
<tr>
<td>Time to expiry rises</td>
<td>Rise</td>
<td>Rise</td>
</tr>
<tr>
<td>Volatility rises</td>
<td>Rise</td>
<td>Rise</td>
</tr>
<tr>
<td>Exercise price rises</td>
<td>Fall</td>
<td>Rise</td>
</tr>
<tr>
<td>Interest rate rises</td>
<td>Rise</td>
<td>Fall</td>
</tr>
<tr>
<td>Options on physicals</td>
<td>Generally unchanged</td>
<td>Generally unchanged</td>
</tr>
<tr>
<td>Options on futures</td>
<td>Generally unchanged</td>
<td>Generally unchanged</td>
</tr>
</tbody>
</table>

Obviously, the opposite reaction applies to decreases!

Note: If interest rates rise, the cost of carry rises, impacting the futures price as well as the incentive to hold cash.
2.2 The Put/Call Parity Theorem

LEARNING OBJECTIVES

5.2.3 Be able to apply the Put/Call Parity Theorem
(some aspects of this learning objective may be tested by the use of simple calculations)

Whilst there is no absolute fair value for an option’s premium, there is a connection between the call and put premiums for the same strike on the same underlying asset. Call and put premiums must be fair in relation to each other (for any given price of the underlying), otherwise arbitrage opportunities present themselves.

The put-call parity theorem(s) define(s) the relationship between call and put prices and the price of the underlying asset. The following put-call parity formula applies to all options at expiry and to options on futures at all times:

\[ C - P = S - K \]

Where:

\( C = \) Call premium
\( P = \) Put premium
\( S = \) Underlying price (Spot or cash price/futures price if the option is on a future)
\( K = \) Strike price

As long as three of the variables are known, the value of the missing variable can be calculated by simply rearranging the formula.

Example 11

If the futures price = 100.95, the strike = 100 and the call option on the future’s premium is 1.07, the price of the put option on the future can be calculated:

\[ C - P = S - K \]
\[ 1.07 - P = 100.95 - 100 \]
\[ 1.07 - P = 0.95 \]
\[ P = 1.07 - 0.95 \]
\[ P = 0.12 \]

Exercise 6

If the futures price = 101.5, and the premium for a call with a strike of 110 is 12, what is the premium for a put with the same strike?

The answer can be found in the Appendix at the end of this chapter.
For options on futures the underlying asset is the future itself (the right to buy/sell a future on the asset). Costs of carry do not need to be taken into account because the futures price already includes them. However, the formula for put-call parity needs to be adjusted to take account of the costs of carry for options on the underlying asset that have not yet reached expiry.

The formula becomes:

\[
C - P = S - \frac{K}{(1 + rt)}
\]

Where:

- \(C\), \(P\), \(S\) and \(K\) are the same as above.
- \(r\) = annual risk-free interest rate.
- \(t\) = time to expiry (in years).

This is the formula used for individual equity options and equity index options.

**Example 12**

ABC Plc share price = 600. The put premium for the 500 strike is 7. The option expires in three months and risk-free interest rates are currently 6% pa.

The call premium for the 500 strike should be:

\[
C - P = S - \frac{K}{(1 + rt)}
\]

where \(r = 0.06\) and \(t = 0.25\) years

\[
C - 7 = 600 - \frac{500}{[1 + (0.06 \times 0.25)]}
\]

\[
C - 7 = 600 - \frac{500}{1.015}
\]

\[
C - 7 = 600 - 492.61
\]

\[
C = 107.39
\]

\[
C = 107.39 + 7
\]

\[
C = 114.39
\]

Note that at expiry \(t = 0\), so the formula becomes \(C - P = S - K\).
The above formulae are more accurate for European-style options than for American-style options. This is because American-style options have the added complication that they can be exercised early.

If the call and put premiums are not consistent with put-call parity, they are mis-priced and arbitrage is possible.

The key arbitrage trades are (assuming that the options are options on futures):
1. If the call is relatively cheap, then buy the call, sell the put and sell the future. The combination of buying the call and selling the put creates a synthetic long futures position. This is closed-out by selling the future to lock in an arbitrage profit. This trade is termed a 'reversal'.
2. If the put is relatively cheap, then buy the put, sell the call and buy the future. The combination of buying the put and selling the call creates a synthetic short futures position. This is closed-out by buying the future to lock in an arbitrage profit. This trade is termed a 'conversion'.

2.3 Delta (\(\Delta\))

**LEARNING OBJECTIVES**

5.2.4 Be able to calculate the sensitivity of the option premium to changes in price by applying delta values to cumulative positions

One of the factors which can change the premium during the lifetime of an option is movement in the price of the underlying. However, the premium doesn’t always move by the same amount as the underlying asset.

The delta of an option is a measure of the sensitivity of the option’s price to changes in the price of the underlying asset. Simplistically, it can be calculated by measuring the change in an option premium brought about by a small change in the price of the underlying. This would be done using option pricing models such as Black-Scholes.

Simplistically, \(\Delta = \frac{\text{change in option premium}}{\text{change in price of underlying}}\)

The delta will lie somewhere between 0 and 1. For example, if the change in price of the underlying was 20p, and perhaps the option increased by 12p, this would give a delta of \(\frac{12}{20} = 0.6\).

A delta of 0 means that the premium is totally insensitive to small changes in the price of the asset. This will be the case for options that are far out-of-the-money.
A delta of 1 means that the premium will change by exactly the same monetary amount as the underlying. This will be the case for options that are deep in-the-money.

**The sign of the delta enables us to distinguish between calls and puts.**

**Call deltas are positive** - because the premium will rise when the price of the underlying rises.

**Put deltas are negative** - because the premium will fall when the price of the underlying rises.

**Example 13**

ABC Plc share price = 575.
The 625 call has a delta of 0.30 and a premium of 26.
The 525 put has a delta of -0.30 and a premium of 24.
If the share price rises to 585, using delta we can approximate the new call and put premiums:
The share price has risen by 10.
The delta of the call is 0.30, so the change in premium will be $10 \times 0.3 = 3$ (ie, the call premium will rise from 26 to 29).
The delta of the put is -0.30, so the change in premium will be $10 \times -0.30 = -3$ (ie, the put premium will fall from 24 to 21).

As seen, the delta for a deep in-the-money call option would be +1, and for a deep in-the-money put would be -1.

The delta for a far out-of-the-money call or put would be zero. Generally, an at-the-money option will have a delta of approximately 0.5, +0.5 far a call and -0.5 for a put.

Furthermore, the underlying physical asset and long futures will always have a delta of +1 and short futures will have a delta of -1.

<table>
<thead>
<tr>
<th><strong>Summary of deltas</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instrument</strong></td>
</tr>
<tr>
<td>Physical asset or future or a deep ITM call</td>
</tr>
<tr>
<td>ATM call</td>
</tr>
<tr>
<td>Far OTM call or a far OTM put</td>
</tr>
<tr>
<td>ATM put</td>
</tr>
<tr>
<td>Deep ITM put</td>
</tr>
</tbody>
</table>

**2.3.1 Delta Value of Cumulative Positions**

Deltas can also be used to measure the sensitivity of a portfolio containing futures/underlying, calls and puts. The delta calculated for a portfolio of positions is known as the ‘cumulative delta’.
In order to measure the cumulative delta of a combined portfolio, the deltas of the individual positions within it need to be added together. The cumulative delta then gives the overall sensitivity and directional bias of a portfolio. The directional bias is obtained by taking account of long and short positions (+ for long and – for short). This is best illustrated by looking at an example:

**Example 14**

Investor A is short an ATM put.
The net delta position is \((-1) \times (-0.5) = +0.5\)

This is arrived at by taking the number of positions (1) and assigning a negative to it because it is a short position. This -1 is then multiplied by the delta of an at-the-money put of -0.5.

The result is that if the price of the underlying rises by 10, Investor A's position improves by 5. The price of the put would have decreased, thus showing a profit on the trade. Obviously, a decrease in the underlying price would show a loss.

**Example 15**

Investor B is long 5 ITM calls with a delta of 0.7.
Investor B’s net delta is \((+5) \times (+0.7) = +3.5\)

If the price of the underlying rises by 1, Investor B’s position improves by 3.5. The price of each of the calls would have gone up by 0.7 and he has 5 of them.

**Example 16**

Investor C has the following portfolio on the same underlying:

<table>
<thead>
<tr>
<th>Position</th>
<th>Delta</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long 10 futures</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Short 3 calls</td>
<td>+0.30</td>
<td>OTM call</td>
</tr>
<tr>
<td>Long 4 puts</td>
<td>−0.65</td>
<td>ITM put</td>
</tr>
<tr>
<td>Short 5 puts</td>
<td>−0.15</td>
<td>OTM put</td>
</tr>
<tr>
<td>Long 8 calls</td>
<td>0</td>
<td>Far OTM call</td>
</tr>
</tbody>
</table>

The cumulative delta is:

\[
\begin{align*}
(+10) \times (+1.00) &= +10.00 \\
(-3) \times (+0.30) &= -0.90 \\
(+4) \times (-0.65) &= -2.60 \\
(-5) \times (-0.15) &= +0.75 \\
(+8) \times (0) &= 0.00 \\
&= +7.25
\end{align*}
\]

A very bullish position - currently equivalent to being long over seven futures.
Cumulative deltas can be useful to gauge what is required to hedge a portfolio. A portfolio that has a cumulative delta of 0 is insensitive to price movements in the underlying - it is a hedged position, often referred to as ‘delta neutral’ or ‘delta hedged’.

Taking example 16 above, the cumulative delta was +7.25. In order to delta hedge, positions with a cumulative delta of -7.25 need to be added, eg, sell seven futures and buy a put with a delta of 0.25.

It is also useful to note that such delta hedging only hedges against price risk; other risks associated with time decay, volatility and basis still remain. Delta is also a dynamic measure so, as time passes, or the price of the underlying asset changes, the delta will change.

### Exercise 8

You have the following position in the same underlying asset:
- Short 4 futures
- Short 3 at-the-money calls
- Long 6 deep-in-the-money puts

What is your cumulative delta?

The answer can be found in the Appendix at the end of this chapter.

### 2.3.2 Gamma

**LEARNING OBJECTIVES**

5.2.5 Understand the concept of gamma

Gamma is the measure of how delta changes (the rate of change of delta) with respect to movements in the price of the underlying. It is small when the option is either deep in-the-money, or far out-of-the-money. It is at its greatest when the option is at-the-money, especially when the option is close to expiry.

Traders will monitor the impact of gamma on the premiums of options. Short-dated ATM options are more volatile than longer-dated ones, and these differences may present an opportunity for trading profits.

Asset managers also use gamma in their dynamic hedging strategies. A portfolio can be taken to delta neutral. The delta would have to be monitored and perhaps re-balanced because of the impact of gamma on the portfolio delta.
2.3.3 Premium Payment

For the majority of options contracts, the buyer of the option is requested to pay the premium immediately. The seller of the option will receive the premium into his broker’s account on the morning of the next business day.

At the point of trading, the seller become liable for any margin required by the clearing house. This is collected when the market value of the underlying instrument moves against the seller (known as ‘marking-to-market’). The margin collection is made by the broker on behalf of the clearing house. For example, if the mark-to-market shows the option to be further in-the-money, the seller will need to deliver margin to his broker and onto the clearing house to represent the worsening of his position.

However, the margining of options positions is made more complex because some option premiums are payable ‘futures style’. Such premiums are not payable immediately, but are paid during the life of the contract through margining. Certain financial options on Euronext.liffe, such as bond and interest rate options, are futures style.

The following table summarises the margin requirements for options positions:

<table>
<thead>
<tr>
<th>Position</th>
<th>Initial margin</th>
<th>Variation margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity Index and Single Stock Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Positions</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Short Positions</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Bond and STIR Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Positions</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Short Positions</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3. OPEN OUTCRY VERSUS SCREEN TRADING

In an open outcry market, the exchange floor is split into designated sections, traditionally known as ‘pits’, where individual futures or options products are traded.

Orders are initially received by a floor booth belonging to the broker and are transmitted to the trader in the pit. Traders stand in their pits and trading takes place face-to-face. To maintain price transparency, orders are shouted out (backed up by hand signals) so that all participants have an equal opportunity to trade.
In a **screen-based market**, orders are placed directly onto an electronic order book via traders’ computer terminals. This obviously eliminates the need to have a trading floor. Orders will take their place in the relevant buy/sell queue (determined by price and time of placement) where they will await a matching transaction, or they will match against orders that are currently in the system. Depending on whether they are market or conditional orders, they may be executed immediately or remain stored in the queue. The order will move up or down the queue as a result of trading and the placing of other orders.

European exchanges are now generally screen-based, whereas open outcry floors still exist in the US; all the major American exchanges have adopted electronic trading in parallel with open outcry.

### 3.1 Trade Execution and Nature of Orders

#### LEARNING OBJECTIVES

- **5.4.1** Know the principles of order flow
- **5.4.2** Know the definition, significance and differences between principal and agency orders (i.e., of dual capacity vs agency orders)

#### 3.1.1 Principles of Order Flow

In a traditional open outcry system customer orders specify:

- the asset;
- whether it is a buy or sell order;
- the size of order (number of contracts or lots);
- expiry month; and
- price conditions (if any).

The order is passed by telephone, fax or by electronic means to the edge of the trading floor where a booth clerk passes or signals it to the trader in the pit. Many pit traders execute orders for clients as well as for their own institution.

The details of any trade executed are then passed back by the trader to the clerk who confirms back to his/her office and enters details of the trade onto a matching system; this allows trades to be matched with the floor counterparty so that any discrepancies can be resolved before the trades are registered at the clearing house.

In screen-traded systems (like Euronext.liffe’s LIFFE Connect® system) order flow is more straightforward. Orders are input and then executed and reported by the system. There is no need to match trade details afterwards with a counterparty as the trades are already ‘matched’ when the order book links together a buyer and a seller.

#### 3.1.2 Principal and Agency Functions

Exchange members can execute a trade in one of two capacities, either as principal or as agent.
Acting as principal means that the member is carrying out the trade on his own behalf and will be subject to profits and losses on those trades.

Acting as agent means that the firm is carrying out the trade on behalf of clients, i.e., acting as broker. So an ‘agency order’ is one arranged by a brokerage on behalf of its client. This may give the client the advantage of anonymity in the arranged transaction. The trade will be registered in a client account (see notes on Trade Registration in Section 3.4) and the client will be responsible to the member for profits/losses resulting from it.

The ability of the member to act as either principal or as agent in any transaction is known as ‘dual capacity’.

3.1.3 Opening Trades

Opening trades create a position in the market and so incur rights or obligations. They will be subject to profits/losses arising from subsequent price movements.

They can be opening purchases or sales.

3.1.4 Closing Trades

Closing trades are trades that offset an existing long/short position (established through an opening purchase/sale) in the market. They extinguish any existing rights or obligations. A closing transaction is the point at which profits/losses on the contract are crystallised.

They can be closing sales or purchases.

3.1.5 Volume and Open Interest

Both of these are measures of a derivatives contract’s liquidity.

Volume is usually reported for each product and its expiry month; it shows the cumulative number of contracts traded so far each day.

Open interest shows the total number of contracts for any delivery month that remain open. Open positions are contracts that will either be closed-out before expiry or taken to delivery. As most contracts will be closed-out before expiry, it is an important indicator of the contract’s liquidity.

Open interest is the sum of all open long positions OR the sum of all open short positions, NOT the sum of both.

3.1.6 Cross Trades

As noted above, a member of an exchange is said to have dual capacity if he is able to trade as a principal and arrange trades as an agent. This dual capacity will enable the member to enter into ‘cross trades’, sometimes referred to as ‘matching orders’. A cross trade is a situation where the member:

• has a buyer and a seller for the contract at a given price; or
• is willing to deal with a client as principal.

The member can effectively conduct the transaction without taking the trade into the market. However, for the purposes of price transparency and to allow other traders the opportunity to trade at the given price, the order needs to be executed within the market.

There are strict rules that need to be adhered to prior to the exchange accepting a cross order, for example, in an open outcry market cross trades must be verified and signed off by exchange officials (pit observers) when the order is executed. An exchange's rules will state whether cross trades are permitted and what reporting conditions apply.

3.1.7 Audit Trail

An audit trail is a record of a transaction. To assist in the resolution of disputes and to promote confidence in an exchange it is important to be able to trace a trade from start to finish and vice versa.

3.2 Order Types

**LEARNING OBJECTIVES**

5.4.4 Know the range of types of orders, their uses and effects

While particular exchange systems have specific names for the types of orders they accept, the following types of order are typical of those placed in derivatives markets.

They can be used on their own or combined with others as appropriate.

• **Market Order** - This is an order to buy/sell immediately. It does not stipulate a price and will be executed at the best price currently available in the market. A buy order will 'hit' the ask price, a sell order will 'hit' the bid. A market order is guaranteed to be filled.

• **Limit Order** - Such an order stipulates a required price level. If the trade can be executed at a better price than stated, the client will be ‘filled’ at the improved price. The broker is not allowed to take the difference. Execution is not guaranteed as the market might not reach the required price.

• **Spread Order** - The simultaneous purchase and sale of futures or options is executed for a specified price difference.

• **Scale Order** - A ‘stepped’ order when a gradual entry/exit from a position is needed.

• **Market If Touched (MIT)** - A combination of a limit order and a market order. Initially, the trade specifies a limit. If the market trades at or through the price, the order becomes a market order and will be executed at the best prevailing price.

• **Opening Order** - An order, with or without a stipulated price, which is to be executed during the official opening period of the market, usually the first two minutes of trading. If the order can't be filled during that period, it is cancelled.

• **Closing Order** - As above, but executed towards the end of the day.
• **Limit or Market on Close (MOC)** - Will be executed at the stipulated price during the day, or else it will be executed at the best available price towards the end of the day, usually within the last five or ten minutes of trading. It is guaranteed to be filled.

• **Stop (Loss) Order** - This is designed to limit trading losses. A stop is primarily used to close-out a position if the price moves against the trader. The stop is triggered when the market trades at the stipulated price. However, there is no guarantee that the order will be filled at the stop price. In volatile markets it might not be possible to obtain that price, so it can be filled at any price once it is triggered.

• **Stop Limit Order** - As above, but this order stipulates two prices within which the stop order operates. If the second limit is breached the stopping stops!

• **Guaranteed Stop** - A facility offered by some brokers which guarantees the stop price to a client (perhaps the firm is willing to take the position at that price). The broker will probably charge more for this service.

• **Good ‘til Cancelled (GTC)** - This really is an instruction accompanying an order and defines the period of validity for the order. A GTC order is firm until the client specifies otherwise. In the real world, most orders are good for the day (GFD) and will be cancelled if the order remains unfilled at the close of trading.

• **Fill or Kill (FOK)** - This means execute the whole quantity of the order if market conditions permit, otherwise cancel the whole order if the former cannot be achieved. They are often referred to as ‘immediate’ or ‘cancel’ orders.

When brokers enter client orders they will occasionally make mistakes. Some exchanges allow members to correct genuine mistakes by requiring the brokerage firm to submit a correction declaration. Depending on the exchange’s policy and rules, the erroneous trade may possibly be reversed. The exchange will check to ensure that the client is not disadvantaged.

### 3.3 Price and Position Limits

**LEARNING OBJECTIVES**

5.4.3 Know the purpose of price limits and position limits and the effects of their application

#### 3.3.1 Price Limits

These are ‘circuit breakers’ imposed by the exchange that place limits to absolute price movements on the contract on any day. If the limit is breached (limit up/limit down), trading in the contract halts for a few minutes. The idea being that, at a time when markets are subject to extreme price movements, a trading halt gives participants time to calm down and take a more reasoned view about trading conditions – however, it doesn’t always work!

On UK exchanges there are no standing price limits on any derivatives contract other than the Japanese Government Bond futures traded on Euronext.liffe.
Electronic systems (such as Liffe Connect®) also operate price limits to make sure that orders entered onto the system are within an allowed spread around the prevailing market price. If orders are entered outside this price spread they are rejected. This should lessen the possibility of errors on entry.

### 3.3.2 Position Limits

It is always possible for someone to try and ‘corner’ the market in any asset by building up large derivatives positions. This would give them the power to manipulate short-term price movements to their advantage. Position limits attempt to prevent this from happening.

However, **in the UK there are no standing position limits for any contract**, although exchanges have the power to impose them if they think that markets are being manipulated and confidence in the exchange is being threatened.

Similarly, for credit risk reasons, a clearing house or broker may impose position limits on a clearing member firm or client respectively, such that only a position of a certain size may be carried.

### 3.4 Trade Registration

**LEARNING OBJECTIVES**

5.5.1 Know the processes involved in trade registration: trade input and trade matching

Once a deal has taken place, the position needs to be allocated to the relevant account. The trade may have been executed for the firm itself (and may, therefore, be allocated to the firm’s principal account), or on behalf of a client (and may, therefore, be allocated to a client account).

The details of the trade will be reported into the administration system that is used by the exchange, such as the Trade Registration System (TRS) for Euronext.liffe. This system will ensure that the trade inputs are matched; in other words, that both a purchase and a sale exist on the same terms. This process is particularly important when the exchange is uses open outcry, where there is scope for more human error than an electronic order matching system.

### 3.4.1 Client Accounts

**LEARNING OBJECTIVES**

5.5.3 Understand the use of different types of accounts

**Assignment** is the process of obliging option sellers to perform their obligations, for example:

A seller of an equity call would, potentially, be obliged to sell the shares at the strike price.
A seller of a bond call would, potentially, become the short to a bond future.

As mentioned above, trades may be executed by the firm for itself or on behalf of a client. As a result of this, the trades will be assigned to one of three types of account:

1. **House**. For all proprietary trades of the clearing member.

2. **Segregated**. For trades that the member firm is registering on behalf of a ‘segregated’ client. In the event of the member firm’s default, these positions will be protected against having to meet the defaulting firm’s liability.

3. **Non-segregated**. Client trades that are not segregated and, therefore, are not protected in the event of the firm’s default.

### 3.4.2 Pre-Registration/Allocations/Give-Ups

**LEARNING OBJECTIVES**

5.5.2 Understand give-ups/allocations

**Pre-Registration** involves a member firm indicating that a deal they are doing should be allocated or ‘given-up’ to a second member. This is also described as an ‘allocation’.

**Give-ups** are the sending of a trade to another member of the exchange. The member to whom the trade is given-up is said to be performing a ‘give-in’.

Both parties to an allocated transaction risk the other not fulfilling their obligations.

A give-up trade is allocated to the give-in on Euronext.liffe; this is done by the TRS.

Give-up trades are mainly performed in order to separate the execution and the clearing function. Hence, a customer might wish to trade (execute) through one exchange member but state that the trade should be given up to the customer’s usual clearing broker. This keeps one clearing relationship between the customer and the clearing broker. Give-ups are sometimes also undertaken because of shortages of trading staff at a give-in firm, or to preserve anonymity where a give-up firm is helping another member build up a position.

**Example 17**

For example, member firm ABC executes, confirms and matches a trade which it pre-registers, notifying the system that the trade should be **allocated** to another member firm (DEF). ABC gives-up the trade to DEF. In turn, DEF will claim the trade, which will be registered to DEF as a house, segregated or non-segregated transaction.
3.5 Trade Reporting

In order to regulate the activities of their member firms satisfactorily, derivatives exchanges need to know what trades have been executed by their members. To this end, they may require members to trade report the transactions they have been involved in. The exchanges specify the time limits within which these trade reports must be submitted, and the member firms could be subject to disciplinary action if they fail to adhere to these limits.

For electronic markets (such as Euronext.liffe), trade reporting is largely performed automatically by the electronic system.

3.5.1 Price Transparency

In order for investors to have confidence in the exchange, they must know that prices are determined fairly. For an exchange, investor confidence is vital because its income is primarily derived from fees charged on the contracts traded.

Price transparency is a central part of investor confidence and refers to the availability of up-to-date trading information for anyone who wishes to receive it. This transparency is generally provided by the exchange feeding the prices to members and to ‘quote vendors’ such as Reuters and Bloomberg.

The electronic nature of the trading system provided by Euronext.liffe means that trade reporting is largely automatic. It is only block and basis trades that need to be reported into the exchange.

On Euronext.liffe, block trades must be reported to the exchange within three minutes of verbal agreement being reached and basis trades within 30 minutes of the time the trade was organised.

3.5.2 Constituents of Exchange Price Feeds

The exchange disseminates the trade reporting information through a price feed to its members. Real-time price and trade information via the feed is made available to quote vendors (eg, Reuters and Bloomberg) so that investors at large can see the information on their price screens.
The price screens will generally include the following information:

**Buying and selling prices**

The best buying price (bid—often shown by the letter ‘B’) and offering price (selling price – often shown by the letter ‘A’ = ask) will constitute the bid/offer spread in the market.

The screens are designed to report all data which traders and investors wish to know. This will include volume traded and open interest (as at the close of the previous business day), plus price information showing the opening price, the closing price (again, as at the close of the previous business day), the price of the last trade, the day’s high and low prices, all shown by delivery month.

This data is made available via both real-time price feeds and on a delayed basis.

**Delivery month codes**

Each futures or options expiry month has its unique identifier.

<table>
<thead>
<tr>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>G</td>
<td>H</td>
<td>J</td>
<td>K</td>
<td>L</td>
<td>M</td>
<td>N</td>
<td>P</td>
<td>Q</td>
<td>R</td>
<td>S</td>
</tr>
</tbody>
</table>

For example, Z 4245B 4246A = current bid/ask for December future.

**3.6 Monitoring Volume and Open Interest**

**LEARNING OBJECTIVES**

5.3.3 Understand the importance of monitoring volume and open interest information and settlement

It is important for any exchange to publish accurately its open interest so that all market observers and investors can make judgements in respect of their positions and trading strategies. To this end, markets such as Euronext.liffe and Eurex set down procedural rules as to how members of the market should report open interest on a daily basis back to the exchange(s). In the case of Euronext.liffe this is effected by the use of the TRS through which all members report their holdings in respect of their ongoing client positions. As seen, these details are provided to interested parties via information vendors.

This is separate from the open interest that may be recorded in omnibus accounts at the clearing houses. It falls to every client to be aware of their position(s) where they are holding long or short contracts, and to instruct their clearing brokers carrying their positions where contracts are to be closed, matching purchases against sales. Sometimes systems will exist operationally to effect these close-outs automatically. If a client failed to manage the open interest on their account properly it may lead to unwanted delivery situations.
If the client’s position became excessive, there is a danger of the client breaching his credit limit with the broker when prices move against him. However, as will be covered in more detail in the next chapter, the clearing system provides a mutual guarantee structure.
APPENDIX

Answers to exercises included in this chapter.

Answers to Exercise 1
The fair value of a future with 45 days to delivery would be:

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash price</td>
<td>£750.00</td>
</tr>
<tr>
<td>Finance</td>
<td>£750 x 0.03 x (45/365) = 2.77</td>
</tr>
<tr>
<td>Storage</td>
<td>£750 x 0.005 x (45/365) = 0.46</td>
</tr>
<tr>
<td>Fair value</td>
<td>£753.23</td>
</tr>
</tbody>
</table>

Answer to Exercise 2
The fair value of the FTSE 100 future with 91 days to delivery would be:

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash index</td>
<td>5,250.00</td>
</tr>
<tr>
<td>Net finance costs</td>
<td>5,250 x (0.035 – 0.026) x 91/365 = 11.78</td>
</tr>
<tr>
<td>Fair value</td>
<td>5,261.78</td>
</tr>
</tbody>
</table>

Answer to Exercise 3
Cash price = £104.30

Finance costs
£104.30 x (0.03 – 0.05) x (2/12) = (0.35)

Fair value = £103.95

Answer to Exercise 4

<table>
<thead>
<tr>
<th>Status of a put option</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-the-money</td>
<td>Market price &lt; exercise price</td>
</tr>
<tr>
<td>At-the-money</td>
<td>Market price = exercise price</td>
</tr>
<tr>
<td>Out-of-the-money</td>
<td>Market price &gt; exercise price</td>
</tr>
<tr>
<td>Breakeven point</td>
<td>Market price = exercise price - premium</td>
</tr>
</tbody>
</table>
Answer to Exercise 5

The option allows the investor to buy a share at 234p that is currently trading at 256p. This is equivalent to saving 22p, and this is the intrinsic value.

Since premium = intrinsic value + time value

Given the premium of 40p and the intrinsic value of 22p from above:

40p = 22p + time value

Rearranging this equation gives:

Time value = 40p - 22p = 18p

Answers to Exercise 6

Using C – P = S – K

12 – P = 101.5 – 110

12 – P = – 8.5

P = 12 + 8.5

P = 20.5

Answers to Exercise 7

The put premium can be found by solving the following equation:

\[
C - P = \frac{S - K}{(1 + rt)}
\]

where \( r = 0.03 \) and \( t = 2/12 \) of a year

\[
25 - P = \frac{410 - 400}{1 + (0.03 \times 0.167)}
\]

\[
25 - P = \frac{410 - 400}{1.005}
\]

\[
25 - P = 410 - 398.01
\]

\[
25 - P = 11.99
\]

\[
25 - 11.99 = P
\]

P = 13.01
### Answers to Exercise 8

<table>
<thead>
<tr>
<th>Position</th>
<th>Delta</th>
<th>Multiplier</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short 4 futures</td>
<td>-4</td>
<td>1</td>
<td>-4</td>
</tr>
<tr>
<td>Short 3 ATM calls</td>
<td>-3</td>
<td>0.5</td>
<td>-1.5</td>
</tr>
<tr>
<td>Long 6 deep ITM puts</td>
<td>+6</td>
<td>-1</td>
<td>-6</td>
</tr>
<tr>
<td>Cumulative delta</td>
<td></td>
<td></td>
<td>-11.5</td>
</tr>
</tbody>
</table>
This syllabus area will provide approximately 5 of the 70 examination questions
1.1 Introduction

Clearing is the process by which derivatives trades are confirmed and registered. Registration is with a ‘clearing house’ which becomes legal counterparty to every transaction. The legal process, whereby the clearing house becomes the counterparty to all trades, is called novation. This involves substituting the clearing house as the buyer to every seller and the seller to every buyer. Hence every original exchange contract becomes two new contracts; the original contract no longer exists. This central counterparty structure removes almost all counterparty risk (credit risk) from all clearing members operating within the market. The only counterparty risk faced by clearing members is with the clearing house itself, not with each other.

In addition, the clearing house will monitor all open positions and will facilitate the settlement process by acting as the intermediary with respect to close-out and delivery of futures contracts and exercise and assignment of option contracts.

One aspect of the clearing process is a mutual offset system. This is an agreement between two exchanges that allows trades executed on one exchange to be booked and cleared through the other. Such an agreement exists between the CME and the Singapore Exchange (SGX) for a few of the contracts that are traded on both. Two of these contracts are the Eurodollar and the Japanese Government Bond (JGB) contracts.

In a principal-to-principal system, such as that operated by LCH.Clearnet, the clearing house guarantees the performance of trades done by its members on the exchanges that it serves.

The guarantee does not extend to members’ clients or non-clearing exchange member firms. As a result, it will implicate the broker as long as the broker is an LCH.Clearnet member.
1.2 The Structure of the Clearing System

LEARNING OBJECTIVES

6.2.2 Understand the role played by the LCH.Clearnet in the clearing process
6.2.3 Understand the relationship between clearing members and non-clearing members

The three tiers that make up the clearing system at the exchange level are the clearing house, the clearing member and the non-clearing exchange members. The clearing members themselves can be General Clearing Members or Individual Clearing Members, which means respectively that they either clear for themselves, other exchange members and direct clients OR for just themselves and direct clients.

The clearing house is typically owned by its members or by the exchange whose contracts it clears, or both. There are different models. For example, in the case of the Options Clearing Corporation (OCC) in the US, the clearing corporation is jointly owned by several exchanges. On the other hand, the Chicago Mercantile Exchange’s clearing house is a division of the exchange itself. LCH.Clearnet is owned by exchanges and clearing members.

The three tiers:

```
+--------------------------+
|   Clearing House         |
+--------------------------+
|   Clearing Member        |
+--------------------------+
|   Non-Clearing Member    |
|   Individual Clearing Member |
|   General Clearing Member |
```

To illustrate the three tiers and the clearing process it is useful to look at a typical trade and the individual steps involved. The example that follows highlights the systems and procedures that are used when the trade initiates on Euronext.liffe, for which LCH.Clearnet acts as the clearing house.
1.2.1 What Now?

LCH.Clearnet guarantees the performance of the contract to its immediate counterparty, the clearing member, KMM Ltd in the above example. This is known as a 'principal-to-principal' guarantee.

LCH.Clearnet will call on KMM Ltd for any subsequent payments (margin) on the contract as necessary. KMM Ltd, as a clearing member, will pay any margin due through the Protected Payments System - an automatic debit from the member’s bank account. KMM Ltd will collect any payments from ABC Ltd, its customer. ABC Ltd will in turn call on any payments from its customer, Mr Ample. Each party has a principal-to-principal relationship with the other.

When Mr Ample decides to close the position the same process takes place. Note that ABC Ltd will not have to go back to the original counterparty because the original contract no longer exists. As the contract is standardised, the offsetting trade simply cancels out the trade previously registered with the clearing house, thus cancelling any delivery obligations.

Note that the clearing house does not give any guarantees to Mr Ample, the client. Mr Ample and his broker (ABC Ltd) have a risk on each other defaulting, as does ABC Ltd and the clearing member (KMM Ltd). So, although the system substantially reduces the risk of default, it does not eliminate it along the whole chain.

Example 1

Step 1. The trade
Mr X. Ample is a client of ABC Ltd, a member firm of Euronext.liffe and places a market order. ABC Ltd will act as broker, executing the trade on the Euronext.liffe exchange. ABC Ltd is not a member of LCH.Clearnet Ltd.

Any trade executed needs to be reported to, and registered with the clearing house (LCH.Clearnet). The trade will need to be registered via a clearing member and ABC Ltd has an agreement with a general clearing member, KMM Ltd, a firm which is a member of both the exchange and LCH.Clearnet.

Step 2. Confirmation and matching
ABC Ltd will pass details of the trade to KMM Ltd (its clearing member) who will input the details into the confirmation and matching system (known as TRS, used by Euronext.liffe) where it will wait until the counterparty to the ABC Ltd trade enters the equal and opposite details into the system.

Step 3. Registration
Once matched, KMM Ltd registers the trade with LCH.Clearnet (via the TRS), giving details of the type of account the trade is assigned to. The account will either be in a segregated, 'client’ account, or within the non-segregated ‘house’ account.

Step 4. Novation
At the point of registering the trade with LCH.Clearnet the contract is novated resulting in LCH.Clearnet becoming counterparty to two new transactions - one with KMM Ltd and the other with ABC Ltd’s original counterparty. The original contract between ABC Ltd and its counterparty no longer exists.

In effect, ABC Ltd (a non-clearing firm) has committed KMM Ltd (its clearing member) to a transaction with LCH.Clearnet (the clearing house).
1.3 LCH.Clearnet

1.3.1 Ownership and Status

LCH.Clearnet is a private limited company, formed by the merger in December 2003 of the London Clearing House Ltd of London and Clearnet SA which was part of the Euronext group and was the clearing house and central counterparty for the Euronext exchanges. Today, LCH.Clearnet is owned 45.1% by exchanges, 45.1% by users, with the balance being held by Euroclear. Euronext is the largest individual shareholder, with a 41.5% stake, but its voting rights are limited to 24.9%.

There are two autonomous operating companies within the group:

- LCH.Clearnet Ltd in London; and
- LCH.Clearnet SA in Paris.

The derivatives exchanges that LCH.Clearnet Ltd clears in London are Euronext.liffe, the ICE Futures and the LME. The user shareholders referred to above are the clearing members of those exchanges. Non-clearing members, although members of their relevant exchanges, are not members of LCH.Clearnet and do not share in its ownership. In Europe, LCH.Clearnet SA serves the Euronext exchanges which operate in France, Belgium, Holland and Portugal. Note that this does not include Euronext.liffe which is cleared by the London entity. Both companies also operate central counterparty services for a wide range of additional equity, repo, bond, OTC and energy businesses.

LCH.Clearnet is regulated by the FSA in the UK and has the status of a Recognised Clearing House (RCH) under the Financial Services and Markets Act 2000 (FSMA 2000). It is due to this recognition that LCH.Clearnet is exempt from the need to be authorised to carry on investment business under the Act.

In Europe, the regulatory framework is rather more complex as LCH.Clearnet SA falls under the regulatory regimes of four countries.

In addition to the status as an RCH in London, LCH.Clearnet has also been granted an equivalent status of Designated Clearing Organisation (DCO) in the US.

1.3.2 Net Clearer

As will be seen in Chapter 9 on 'Margin', LCH.Clearnet needs to call for/pay funds to its clearing members daily as a result of profits and losses on open positions. Instead of treating payments separately, LCH.Clearnet will net off the obligations across all products and all exchanges in respect of each of its clearing members’ accounts and will pay/call for one payment per currency per day as necessary.
1.3.3 Guarantee

As noted earlier, LCH.Clearnet operates a ‘principal-to-principal’ guarantee based on a mutual guarantee structure. The supporting financial resources pertaining to LCH.Clearnet in London are provided as follows:

- **Initial margins** from clearing members in the form of cash (in various currencies) and acceptable securities and other collateral.

- In the event of a member default the LCH.Clearnet would first utilise the margin monies and collateral placed by the defaulting member. Note that, so far in its history, LCH.Clearnet has always resolved defaults without recourse to any further means of support beyond this level. This includes the Barings case in 1995.

- The major tranche of financial support which is next in line is the **Member Default Fund** to which every clearing member contributes in cash (interest bearing) according to the volume of its clearing activities. This is reviewed and adjusted every three months. At the time of writing, the fund stood at £582m. The fund is fully fungible across the business streams of LCH.Clearnet. Hence, for example, a member default occurring in swaps clearing is supported by funds provided by those firms involved in futures or equity clearing.

- The next level of support is provided by an **insurance policy** from a triple A rated American insurer in the sum of £200m.

- Finally, the **share capital and reserves** of LCH.Clearnet itself.

The Member Default Fund is a key part of the mutual guarantee system that LCH.Clearnet has established to support its underlying guarantee. Similar funds are used by other major exchanges.

In the event of a clearing member defaulting on its obligations, the following sources are drawn upon to cover the losses arising on the default:

- firstly, the default member’s margin held by LCH.Clearnet is used; then
- the default fund contributions of that member are used; then
- the default fund contributions of other clearing member firms are used as a result of this, the system is known as a ‘mutual guarantee system’. An independent guarantee system would not have a collective default fund; then
- the insurance policy is called upon; then
- the retained profits and capital of LCH.Clearnet are used.

The LCH.Clearnet treasury function is the department within LCH.Clearnet that manages the funds belonging to members to generate a return. For example, cash collateral deposited as margin and default fund monies. Any interest earned on this money is paid to the members. The members are under no obligation to pay the interest along to the ultimate client.
This syllabus area will provide approximately 7 of the 70 examination questions
1. MARGIN

1.1 Introduction

LEARNING OBJECTIVES

7.1.1 Understand the various margin types and their purposes
7.1.2 Understand how a firm deals with margin payments for its own positions and for clients’ positions through its books
7.1.3 Understand the difference between the clearing house’s margin and that of the broker and the collection/payment process

In guaranteeing contracts, the clearing house is taking on a substantial risk, especially on those contracts which have a contingent liability, such as futures contracts and writing options. A contingent liability is one where a loss might arise, but it is not possible to be certain of its amount – the outcome is contingent upon the price of the underlying asset.

In order for any clearing house to protect itself there are a number of steps that it might take:

• It only permits firms to become clearing members who meet (and continue to meet) its membership and financial criteria. This is the first line of defence, the quality of its membership.
• It only deals directly with clearing members, who have the most onerous financial resources requirements.
• It relies on its own financial resources and perhaps operates inter alia a default fund, has lines of credit with a consortium of major banks and has insurance policies.
• The next line of defence is its margining system, where margin is best defined as the cash (or equivalent) deposited with the clearing house to cover the risk of the clearing member defaulting on its position.

The underlying reason for requiring margin payments is to support the guarantee provided by the clearing house, in other words to reduce or eliminate any counterparty credit risk. This is the underlying purpose of an efficient margin system.

Margin is collected in two ways: initial margin is largely collected when a position is first established, and then variation margin may be collected as that position worsens.

Margin is demanded by the clearing house separately for the house accounts maintained by the clearing member (which will include any non-segregated client positions) and the segregated client accounts. As an example, LCH.Clearnet will demand margin from each type of account separately, on the basis of the net positions in that account. In contrast to the method adopted by LCH.Clearnet in the UK, the clearing houses in the US demand margin on gross positions.

Placing client positions within the ‘house’ account as non-segregated clients may provide a cash flow benefit to the clearing firm, because any credit positions will effectively offset any debit positions. These benefits would be lost if the client’s account was segregated.
However, the client is obviously facing an additional risk if they are non-segregated. If the firm were to default they would potentially lose out.

These margin demands are made of the clearing member, and for LCH.Clearnet any cash payments are drawn directly from a bank account held by that member. As seen in the last chapter, this process is known as the ‘Protected Payments System’ (PPS), and the accounts are referred to as ‘PPS accounts’. Note that no cash call would be made for initial margin if the clearing member was covering initial margin requirements by an acceptable form and value of collateral.

For the clients of the clearing member, the financial rules set by the Financial Services Authority require the margin demanded by the clearing member to be at least as much as that being demanded by the clearing house, in order to avoid the need to retain more financial resources.

1.2 Types of Margin

There are basically two types of margin: initial and variation margin.

1.2.1 Initial Margin

Initial margin is a good faith deposit (perhaps in the form of collateral rather than cash), lodged with the clearing house against potential liabilities on an open position. It is returned when the position is closed out.

Initial margin is calculated by the clearing house in respect of clearing members’ positions using whatever system it has adopted (see the notes on SPAN margining below). The clearing member similarly calculates margin with respect to its clients and may demand a higher rate of margin (known as ‘broker margin’) from its client.

Once a client’s trade has been executed, the clearing member or broker that holds the client’s account will put the trade in the client’s segregated or non-segregated account (depending on its relationship with the client), and at the same time collect the initial margin that is required. Note that if the new trade was the purchase of an option, no initial margin is collected; instead the premium payment will be collected from the client’s account. The reason for this is that buying an option is not a contingent liability transaction. The maximum loss an option buyer will have is the upfront premium payment.
Initial margin seeks to protect the clearing house from the worst case loss a position could potentially incur in one day. The actual initial margin rate per contract will be set by looking at the recent price volatility of the contract and will be determined following consultation with the exchange.

**Example 1**

For example, by continually monitoring market prices, LCH.Clearnet calculates that the most the price of the FTSE futures contract could move in one day is 300 points. Given the tick size and tick value, this could mean a potential loss of £3,000 per contract on the day on long/short open positions. So the initial margin rate will be set at £3,000 per contract for both the buyer and seller of a future. If the volatility changes up or down, the initial margin requirement may be changed.

Initial margin is re-computed every business day and effectively called first thing in the morning before markets open. If there is a sudden jump in the volatility, and the clearing house is no longer comfortable with the amount of initial margin held, indeed if the initial margin amount is exhausted, it can call for an extra *intra-day margin* which is taken immediately from the clearing members via their PPS accounts. In 2004, LCH.Clearnet started working on a new system called ‘IDRiS’ (Intra-Day Risk System) for this very purpose; the system is currently being used for swaps, repos and equities and is planned to be used for futures and options by early 2008.

Initial margin can be provided in *cash* or covered by acceptable *non-cash collateral*. Clearing houses have different rules on the forms of acceptable collateral they will accept. As one might expect, the lists of collateral published by LCH.Clearnet, OCC and the CME are rather longer than those of smaller clearing houses.

The system used to calculate initial margins for futures and options positions is known as ‘SPAN’ (see notes in Section 1.3 below) or its UK variant used by LCH.Clearnet, known as ‘London SPAN’. Other clearing houses may use methods other than this, some risk-based and some self-developed. Another well known method is the ‘Theoretical Intermarket Margining System’ (TIMS), which was invented and used by the Options Clearing Corporation. Both SPAN and TIMS are portfolio systems which examine the risk of futures and options positions in the same portfolio and work out the worst case scenario in order to reflect fairly the risk of the clearing house.

**Spreads** involve more than one position across different delivery months in the same contract (a trader perhaps being long a June FTSE 100 future and short a September FTSE 100 future). The initial margin will be substantially lower than normal because the two positions largely offset each other and the price movements of each month, although not perfectly, do tend to correlate in their movement. These are known as *intra-commodity spreads*. Spreads also exist between different instruments which always exhibit correlation in their price movements. These are called *inter-commodity spreads* apply to such contracts as ICE Futures Gas Oil and ICE Futures Brent Crude Oil.
As a contract nears its expiry date, its volatility can increase. If physical delivery is required in final settlement of the contract then only those position holders who wish, or may wish, to take delivery should maintain their open contracts in the market. Others should close-out or roll their positions forward to later delivery months. The clearing house tries to minimise the speculative and delivery pressures by increasing the initial margin (this is known as a ‘spot month margin’) as delivery for that product draws near. This occurs in order to ensure that those position holders contemplating taking the contract to delivery have either the underlying asset to deliver or have allocated adequate funds to effect settlement, and also to force any less well-capitalised speculators out of the market, thereby reducing short-term speculative pressures.

1.2.2 Variation Margin

Exchanges establish settlement prices every business day in order to provide the price yardsticks for calculation of ‘mark to market’ variation margin and valuation of positions at the end of the day. This procedure is normally conducted at the end of the trading period so the daily settlement price is also referred to as the ‘closing price’. However, some markets do not use the closing price, particularly those which have a global pricing influence (such as the LME) or markets which are in operation for most of the 24-hour day.

Example 2 below explains the standard criteria used by Euronext.liffe on its futures contracts to arrive at daily settlement prices for each delivery month.

Example 2

A time is specified at which the daily settlement price is calculated (eg, the close of trading for that day) and the two minutes up to this time is known as the ‘settlement range’. The first 90 seconds of the settlement range allows the market supervision department to monitor spread levels. Generally, the daily settlement price is then simply the weighted average traded price during the final 30 seconds of the settlement range. However, market supervision have the flexibility to adjust the daily settlement price if the calculated price is not deemed to be a fair reflection of the market price.

At the close of each trading day all positions are ‘marked to market’, based on the daily settlement price. The profit/loss on the day is measured and must be paid to/received from the clearing house as variation margin by the following day by the clearing members. The same procedure applies between clearing members and their customers by exactly the same process in turn. In this way, profits and losses accruing to positions are accounted for every day.

Variation margin must be paid in cash (cleared funds), and is calculated as:

\[
\text{Ticks moved on the day} \times \text{tick value} \times \text{number of contracts}
\]
As noted earlier, each clearing member has at least one bank account to which LCH.Clearnet has access via a direct debit system so that variation margin payments can be transferred. These are the Protected Payments System (PPS) accounts.

1.2.3 Maintenance Margin

This is an arrangement between member and client and is not operated by the clearing house. Usually a member firm will expect a client to deposit more than the initial margin. This provides a safety cushion for the member and allows for the payment of some variation margin without referring back to the client every day. Once the credit breaches a preset limit (trigger/maintenance level), the member will issue a margin call (trigger margin), expecting the client to replenish the account to the original amount. This practice is common in the United States.

1.3 Methods of Determining a Margin

Exchanges have developed several different programs to calculate the initial and variation or daily margin requirements for all new and existing futures and options positions. The two most common are SPAN and TIMS.

The level of variation/daily margin required for an existing position is determined by the change in the price of the underlying asset. For futures, there is a direct relationship, therefore a 3% rise in the price of gold in the cash market will have a similar effect on the margin required for those short gold futures, since the future’s price will rise at least that amount. For options, the relationship between price changes in the underlying and its effect on an option’s value is more complex, given the characteristics of an option. As explained in Chapter 7, Section 2.3, an option’s delta is used to measure the sensitivity of an option’s price to changes in the price of the underlying asset. Since an ‘at-the-money’ option has a delta of 0.5, a 3% rise in the price of its underlying asset will result in an approximate 1.5% rise in the value of the option (remember that this is only one of the factors that will influence the option’s price, any changes to its volatility and time decay will also be taken into account).

Exercise 1

A trader goes short 5 FTSE 100 futures at 5,240 and, at the end of day, the daily settlement price is 5,270. What is the variation margin payable?

The answer can be found in the Appendix at the end of this chapter.
SPAN is a **scenario-based risk program** used for calculating daily initial margins. It was originally developed by the CME, which then permitted LCH.Clearnet to adapt its specifications to produce London SPAN. It has also been licensed by the CME for use by many other clearing houses. Essentially, it looks at the impact on a position of futures and options contracts if the price and volatility of the underlying asset changes by set amounts. Its parameters include the initial margin rate (known as the ‘scanning range’) and the percentage volatility movement.

SPAN is based on the estimation of the liquidation value of a position or portfolio using several scenarios representing changes in market conditions. There is a set of scenarios for each contract, which is updated on a daily basis, to reflect current market conditions.

SPAN scenarios include the following factors:
- possible changes of the underlying asset’s price;
- changes in the underlying asset’s price volatility;
- the impact of time on an option’s value.

Although it draws heavily upon complex options pricing theory, SPAN itself is based upon an extremely simple set of arithmetic equations, and it is this simplicity that is perhaps the key element of the program’s success. SPAN considers a total of 16 risk scenarios, when estimating the maximum loss that might be incurred from one position from one trading day to another. This is the basis for the clearing house’s initial and variation margin requirements.

It separates the total position of the clearing member into **individual portfolios**, eg, all gilt futures and options in one portfolio, and FTSE 100 futures and options in another.

For each portfolio, LCH.Clearnet will set its maximum scanning range; for the FTSE 100, say a 300 point price movement, up and down, as well as a change in the volatility, say, 30% rise or fall. It then applies 16 scenarios with price and volatility moving up and down by varying degrees and measures the impact on the position, eg, price up 1/3 of range and volatility up 30%. A charge for inter-month spreads is added as delivery months within one instrument do not exhibit perfect correlation between each other. A credit is given for inter-commodity spreads (where permitted by the clearing house), recognising the correlation of price movements between different contracts because gains in one instrument will often offset losses in another. SPAN also recognises the additional risk of spot delivery months and adds a charge for this. Finally, it chooses the largest resulting negative number. This then becomes the initial margin requirement.

In a futures contract there are only price movements to consider, so the initial margin tends to remain the same unless the scanning range is changed.

Options positions (and combined futures and options positions) will be affected by changes in volatility as this is the most important element in pricing options, so the initial margin needed to maintain a position is likely to change daily. For options positions, London SPAN uses deltas to calculate the equivalent number of futures to quantify any potential offset.

London SPAN produces an overall initial margin requirement for the member, covering all of the contracts registered in the member’s name at LCH.Clearnet. If a member has registered positions in both house and client accounts, it must simultaneously meet a separate requirement for each account.
TIMS, which stands for **Theoretical Intermarket Margining System** has been approved for use by the OCC and is also used by several other exchanges. TIMS uses a portfolio-based margining methodology and is particularly well suited for measuring the risk of mixed portfolios (those containing physical, futures and options).

TIMS uses an option pricing model to identify the risks of options on a specific underlying asset which have different strike prices and maturities, and provides for offsets between positions in different, but highly correlated, underlying assets.

TIMS bases its total margin calculation for each position by calculating two margin components: the premium margin and the risk margin. The sum of these is the total margin. The premium margin is the market value of a particular position at the close of trading. It represents the daily change or price movement. The risk margin uses an option pricing formula to measure the potential change in the position’s value assuming the assessed maximum probable intra-day price movement (using forecasts of implied volatility). TIMS is a more complex methodology than SPAN, but one that is considered to be well suited for use in these mixed portfolios given its use of the option pricing model, stress testing, implied volatility and correlation modelling.

Both SPAN and TIMS were designed to measure the market risk associated with derivatives.

Because margin requirements are based on the net positions held by the member firm, and there may be a variety of positions held at a given time, the calculation of the total margin amount due/to be received is based on the **net liquidation values (NLVs)** of the constituent parts of the portfolio. This allows the for the profits showing on a portion of a member firm’s positions to offset the losses of other positions in its portfolio, resulting in one net payment.

### 1.4 LCH.Clearnet Acceptable Collateral

**LEARNING OBJECTIVES**

- **7.1.3** Understand the difference between the clearing house’s margin and that of the broker and the collection/payment process
- **7.3.1** Know the definition, purpose and uses of collateral and the criteria for acceptable collateral by LCH.Clearnet (cash vs non-cash)

Initial margin can be funded using collateral rather than cash. The following is the full list of acceptable assets for initial margin from LCH.Clearnet clearing members:

- **Cash** in eight approved currencies (£ sterling, euros, US dollars, Swiss francs, Swedish krona, Danish krone, Norwegian kroner and Japanese yen).
- **Bank guarantees** from an approved bank in the UK.
- **Certificates of Deposit** (denominated in £ sterling and US dollars).
- **Government Debt** (bills, bonds and notes) from the following 14 countries:
  - The UK.
  - Germany.
  - Italy.
  - The Netherlands.
  - Sweden.
Austria.
The US.
France.
Spain.
Belgium.
Canada.
Australia.
Finland.
Denmark.

However, it is important to note that:

• Undated bonds are not acceptable.
• The bonds must be denominated in the currency of the issuing country.
• Swiss and Japanese bonds are not acceptable.
• Collateral is also marked to market daily and is subject to a published ‘haircut’, which means that the full market value is not credited.
• The securities that are used as collateral are lodged with depositories and custodians that are acceptable to LCH.Clearnet, such as Euroclear and CREST.

1.5 Credit Lines

LEARNING OBJECTIVES
7.3.2 Know the definition and significance of credit lines

Although it is uncommon, some exchanges allow their members to extend credit to their clients to cover margin requirements. Deals requested in the excess of a specified credit line will be rejected by the exchange member firm. These so-called ‘credit lines’ will be subject to the regulatory rules specifying the circumstances in which lending money to clients is acceptable, for example, the FSA has rules on customer borrowing.

Under FSA rules, credit may be extended for up to five days without a formal written loan agreement.

Credit lines, which are used by customers to finance their derivatives trading, are not allowed by Euronext.liffe for their financial products.
APPENDIX

Answer to the chapter exercise.

Answers to Exercise 1

Sold at 5,240

Less: current cost of purchase (5,270)

Loss in index points per contract (30)

Variation margin payable = 30 index points x £10 per index point x 5 contracts = £1,500.
DELIVERY AND SETTLEMENT

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2. DELIVERY AND SETTLEMENT - OPTIONS 147
APPENDIX 150

This syllabus area will provide approximately 5 of the 70 examination questions
1.1 Introduction

Even though most futures positions are closed-out before expiry, the conceptual basis of these contracts is that delivery can take place. Hence mechanisms must be in place to ensure that this can happen. The clearing house will manage and define rules and procedures, in conjunction with the exchange, to govern the delivery process.

As seen in Chapter 8 ‘Principles of Clearing’, the clearing house becomes the legal counterparty (via the process known as ‘novation’) after the trades have been confirmed and registered. The clearing house guarantees the performance of the trades carried out by its members and substantially reduces counterparty risk.

As buyer and seller to each contract, when a futures contract proceeds to delivery the clearing house will assign contracts for delivery and may enable the delivery of documents to represent the underlying assets (such as ‘warrants’ used in the metals market operated by the London Metal Exchange).

1.2 Closing Contracts

Holders of futures contracts have three choices:
1. to close-out before expiry; or
2. to roll the position forward by closing-out and, simultaneously, taking a new position in a new quoted month; or
3. proceeding to delivery.

Closing the contracts before delivery will avoid the need to make or take delivery and enable the holder to realise any profit or loss arising on the position.

In order to relinquish any obligations in the market, a close-out instruction must be given by the client. This instruction determines which long position (or part position) to close-out against which short position (or part position).
For clients holding various positions in a particular contract (i.e., both long and short positions held ‘gross’), there are various common methods for performing close-outs where positions have been held gross:

- **First-in, first-out (FIFO).** Close-out the oldest long position against the oldest short position.
- **Last-in, first-out (LIFO).** Close-out the most recent trade (long or short) against the oldest position (long or short).
- **Maximum profit.** Close-out an equal number of long and short positions to realise the maximum amount of profit.
- **Maximum loss.** Close-out an equal number of long and short positions to realise the maximum loss.

Positions can be designated to be left open, for instance, if they are part of a specific strategy.

There are other close-out methods which are used and it is also possible to provide manual instructions to close-out specific positions. A position which has been closed out and, effectively, no longer exists is described as being ‘flat’.

If a position is closed out incorrectly or in error then it is possible to ‘bust the settlement’. This is the term used for reversing the closing action and re-opening a position.

### 1.3 Physical Delivery

**LEARNING OBJECTIVES**

- **8.1.2** Understand the differences between cash settlement and physically delivered contracts and the final payment process.
- **8.1.3** Understand the importance and implications of the delivery of open contracts at expiry and the significance of the short position.

As seen in the previous section, the rationale for closing out a contract is to avoid the need to take or make delivery. For those contracts that have not been closed out and remain open at expiry, the exchange rules define what assets, in terms of quality and quantity, may be delivered in final settlement of exchange contracts. For example, the LME defines in its rules the brands, origins and warehouses that are acceptable as good delivery against each of its metals contracts and the ICE Futures similarly defines delivery points and deliverable grades for its deliverable Gas Oil contract.

In these contracts the underlying asset changes hands. The exchange stipulates the last trading day for the contract at the end of which the closing price is established. In the case of Euronext.liffe this is known as the ‘Exchange Delivery Settlement Price’ (EDSP).

The delivery process then begins for all open positions.

Futures sellers give notice declaring their intention to deliver the asset to the clearing house. This is known as a ‘tender notice’ - they are ‘tendering’ for delivery. It then assigns those assets to futures buyers, usually on a random basis. If there is any flexibility allowed in the contract, the futures seller has the choice of what, where and when to deliver – this is referred to as ‘seller’s choice’.
The timetable for the tender process varies between contracts. Sometimes there is only one notice day and tenders are all processed together (an example is the German government bond future on Eurex). On other contracts there may be a longer period starting with a ‘first notice day’ and ending with a ‘last notice day’ (such as the long gilt, cocoa and coffee futures on Euronext.liffe). The underlying asset is then delivered on the ‘delivery day’.

These are the first two steps of four main stages that are part of Euronext.liffe’s delivery procedure:
1. The seller or holder of the short futures advises LCH.Clearnet/Euronext.liffe of their intention to deliver the underlying asset.
2. LCH.Clearnet. Than matches sellers to buyers on a random basis.

The next two steps in the delivery process are discussed in the following sections of this chapter; they are:
3. LCH.Clearnet calculates the invoice amount and notifies the seller and buyer.
4. The seller delivers the underlying asset as instructed to the clearing house and receives the invoice amount. The buyer makes the invoice payment to the clearing house and receives delivery of the underlying asset.

1.3.1 Invoice Amount

For physically-delivered contracts the futures buyers will receive an invoice for the asset and have to pay the amount stated in the invoice. The formula is:

**EDSP x Scale Factor x Number of Contracts**

The scale factor converts the price quote to reflect the total value of the assets being delivered, eg, the EDSP for Brent crude is $64.70 per barrel. Contract size is 1000 barrels. Because the price is quoted in barrels, and each contract is for 1000 barrels, the scale factor is 1000.

The invoice amount for 5 contracts would be:

\$64.70 \times 1000 \times 5 = $323,500

The EDSP is unlikely to be the price originally agreed. Suppose the buyer went long at $63.00. By paying $64.70, he is paying more than the agreed price. But, remember that the buyer will already have received variation margin through the lifetime of the contract and that profit will be in his account. So, in net terms, the actual price paid is the agreed price of $63.00 per barrel.

As seen in Chapter 4 ‘Financial Futures and Options’, the invoice amount for a bond futures contract is slightly more involved. It is given by the following equation:

\[(EDSP \times Price\ Factor \times Scale\ Factor \times Number\ of\ Contracts) + Accrued\ Interest\]

There are two additional elements in this equation. The price factor is used to convert the EDSP based on the notional bond to the equivalent EDSP for the bond actually being delivered. The accrued interest reflects the fact that the EDSP is quoted clean (ignoring the accrued interest implicit within the bond at the point of delivery).
1.3.2 Cash Settlement – Contracts for Differences

With cash-settled contracts there is no exchange of the underlying asset. There is an exchange of funds representing profits and losses on the contract.

The key advantage of cash settlement over physical delivery is that cash settlement avoids the need for the asset to be delivered, and the consequent need for precise specification of quantity, quality and location. Cash settlement also allows contracts to be based on non-deliverable underlying assets, such as the FTSE 100 and S&P 500 equity indices.

As variation margin payments have already been made, the only element required to settle the trade is the payment of the last day’s variation margin against the EDSP (being the final price for the contract month); this satisfies the delivery obligations.

1.4 Exchange Delivery Settlement Price (EDSP)

As seen, the Exchange Delivery Settlement Price (EDSP) is the Euronext.liffe term for a future’s closing price.

The EDSP (or equivalent on other exchanges) is very significant as it is the sole price at which all outstanding futures (bought and sold) will be closed. In setting the EDSP, the exchange must use an openly declared mechanism which will prevent any price manipulation. The resulting price must be fair, and truly representative of spot prices.

Note that many contracts are cash-settled and, by definition, physical delivery does not apply (examples are STIR and stock index futures and options). The EDSP process is still of fundamental importance as the EDSP effectively becomes the final price at which variation margin changes hands. Some exchanges have contracts which offer the option of cash settlement or settlement by physical delivery (eg, ICE Futures Brent Crude Oil).

The EDSP could be subject to manipulation and needs to be a fair reflection of the underlying asset at expiry. As a result, the exchange will endeavour to avoid manipulation by following the procedures, outlined in Chapter 9 ‘Margin’, for establishing the daily settlement prices.

Exercise 1

What would be the invoice amount for the following delivery of Euronext.liffe’s Long Gilt future?

Five contracts when the EDSP for the contract is £98.50, the price factor of the bond being delivered is 1.12142 and the bond has accrued interest of £4.54 per £100 nominal.

The answer can be found in the Appendix at the end of this chapter.
Euronext.liffe uses a variety of techniques across its various contracts. The flagship contract, the Euribor short-term interest rate future, depends upon an EDSP price that is supplied by the European Banking Federation (ie, the price view of some 40+ banks). Whatever technique is used to determine the EDSP by an exchange it must be fair and reflect as accurately as possible the price status in the underlying market. It must also be free from manipulation. Exchanges keep such matters under close supervision, together with the regulators. For example, the procedure for establishing the EDSP for the FTSE 100 futures and options contracts on Euronext.liffe was changed for the November 2004 expiry. Previously a price-averaging system, based on actual trades over the last 20 minutes of trading on the morning of the last trading day, had been used. This was replaced by a system which derives the EDSP from an intraday auction.

The new system ensures that, at expiry, potentially substantial trading activity in the underlying shares is channelled into a mechanism where there is opportunity for aggregate supply and demand to be matched efficiently. Every share in the FTSE is included within parallel auctions, all of which last for no more than 15 minutes. By doing this, the exchange knows that the EDSP is being based upon the very latest information from the market as to where each share price (and, hence, the overall index itself) lies. Similar approaches are used by derivatives markets in Germany and the United States.

Euronext.liffe uses a completely different technique for its long gilt futures contract. The EDSP of this contract is the market price of the contract at 11.00am on the second business day prior to settlement, unless notice is given on the last notice day, when it is the price prevailing on the last trading day. The invoice amount with respect to the deliverable gilt is calculated by a price factor system, with an adjustment for any coupon interest accruing as at the settlement day.

2. DELIVERY AND SETTLEMENT – OPTIONS

LEARNING OBJECTIVES

8.2.1 Understand the significance and implications of the exercise of options, the assignment of obligations, abandonment and expiry

2.1 Exercise of Physically Deliverable Options

The exercise of an option can only occur at expiry if the option is European-style, or over a set period up to expiry if the option is American-style. However, remember that even American-style options are unlikely to be exercised until the expiry date approaches, because the holder will prefer to sell the option and realise the time value within the premium.

Furthermore, an option holder will only exercise an option if it is ‘in-the-money’ (ITM), with the exercise itself either realising a profit or reducing the loss on the open trade.

If the option holder decides to exercise a profitable ITM option, he notifies his broker. The broker will then fill in an exercise notice that is delivered to the clearing house (by the deadline) via the clearing member. Notice how with options, unlike futures where the seller commences the delivery cycle, it is the buyer (holder or owner) who exercises their right and starts the process.
On receipt of the exercise notice, the clearing house will select (assign), at random, an option writer (seller or short) and send them an assignment notice. The assignment notice is the formal notification that the terms of the contract must be fulfilled. The transaction then becomes a cash market transaction and is subject to the normal trading costs, such as commissions.

**Example 1**

On exercise of an Euronext.liffe individual equity call option contract on the shares of a UK company, both the holder and the writer will receive contract notes, and the holder will have to pay commission on the value of the shares, as well as Stamp Duty Reserve Tax (SDRT) and Panel on Takeovers and Mergers (PTM) levy. The trade will settle through the UK equity cash market settlement mechanism (CREST) on the normal equity settlement timetable of T+3.

2.2 Exercise of Cash-Settled Options – Contracts for Differences

The process is effectively to transfer the intrinsic value of the option from the writer to the holder.

**Example 2**

If an investor exercises one FTSE 5000 call when the EDSP is 5150, since the contract size is £10 per point he will receive:

\[(5150 - 5000) \times 10 = £1,500\]

Remember, for options which have futures-style premium payment (as with Euronext.liffe), variation margin will have accounted for most of this and only the final day’s variation margin will change hands.

2.3 Exercise of Options on Futures

If these are exercised, the process is as above, except that the holder and writer will be assigned a long/short futures position at the strike price. As a result of the option being exercised, the open interest in the underlying futures contract will increase by the number of exercised options.

2.4 Abandonment and Cabinet Trades

If the holder decides not to exercise, the option lapses and the writer’s obligation ceases.

Holders tend to wait until the last possible moment before abandoning the option. They would abandon options that are out-of-the-money, or slightly in-the-money but not worth exercising when transaction costs are taken into account.

Sometimes traders prefer to close-out the position for a nominal amount – a ‘cabinet trade’ – in order to crystallise a loss for tax or accounting purposes.

For example, if an investor wants to set losses against current or future capital gains, documentation is required.
2.5 Automatic Exercise

LCH.Clearnet operates an automatic exercise facility (for Euronext.liffe and ICE Futures) whereby it will \textbf{automatically exercise any option that is sufficiently in-the-money at expiry}. This reduces the paperwork and also means that participants need not worry about forgetting to exercise.

There are exercise fees to be paid so, if an investor does not want the option exercised, a suppression notice must be filed with the clearing house.

2.6 Early Exercise of Options

It is possible to exercise American-style options before their expiry. The decision to exercise early is the responsibility of the holder and not the clearing house. The clearing house will assign the contracts to writers at random.

Normally, it is not rational to exercise an option before its expiry. Exercising realises the intrinsic value of the option and not its time value. It makes more sense to sell the option to capture the time value as well. However, for some types of options (eg, equity-based) there are times when it will be feasible to exercise early. This requires three criteria:

1. \textbf{American-style}. European-style options cannot be exercised before expiry.
2. \textbf{Deep-in-the-money}. The option must have intrinsic value.
3. \textbf{Close to expiry/short-dated}. There must be very little time value left.

With equity options there are sometimes good reasons to exercise early because the owner can then take up dividend rights pertaining to a stock, or is able to obtain voting rights.
Answer to the chapter exercise.

**Answers to Exercise 1**

The invoice amount is given by the equation:

\[(\text{EDSP} \times \text{Price Factor} \times \text{Scale Factor} \times \text{number of contracts}) + \text{Accrued interest}\]

Where:

<table>
<thead>
<tr>
<th>EDSP</th>
<th>£98.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price factor</td>
<td>1.12142</td>
</tr>
<tr>
<td>Scale factor</td>
<td>1000</td>
</tr>
<tr>
<td>Number of contracts</td>
<td>5</td>
</tr>
<tr>
<td>Accrued interest</td>
<td>£4.54 x 1,000 x 5 = £22,700</td>
</tr>
</tbody>
</table>

(the Long Gilt contract has a notional value of £100,000 nominal and with the EDSP based on £100 nominal it must be scaled up by 1,000)

Invoice amount = \((98.5 \times 1.12142 \times 1,000 \times 5) + 22,700 = £574,999\)
TRADING, HEDGING AND INVESTMENT STRATEGIES

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This syllabus area will provide approximately 11 of the 70 examination questions
We have already looked at individual futures and options trades and their uses as speculative, hedging and arbitrage instruments.

Remember that **hedging** involves reducing the risk of adverse price movements on an underlying position, **arbitrage** activities take advantage of mis-pricings and **speculators** are placing bets on the direction of the price of the underlying.

2. **FUTURES SPREADS**

A futures spread trade involves simultaneously buying and selling futures contracts.

Note that in all types of futures or options spreads, or even combination trades, it is always possible to 'leg in' to the strategy by undertaking one half of the trade now and completing the second leg later. Clearly, until the second leg is completed, the trader will be exposed to price risk.

2.1 **Intra-Market Spreads**

These are trades based on the simultaneous buying and selling of futures with different expiry dates, but on the same underlying asset. For example, selling the June long gilt contract and buying the September long gilt contract.

The **motivation** for entering into these intra-market spreads can take a number of forms:

- Anticipating changes in basis. It could be that the basis is expected to strengthen or weaken.
- Reducing risk. Intra-market spreads are less risky than taking an outright position (basis risk is smaller than price risk, but profits will be smaller too).
- Arbitrage. Where the same underlying product is traded in two different markets and there are price differences. For example, buying SGX Nikkei 225 futures (traded in Singapore) and selling OSE Nikkei 225 futures (traded in Osaka).
- To ‘roll over’ an existing hedge so that it continues further into the future.
2.2 Inter-Market Spreads

These trades are based on simultaneously buying and selling futures on different underlying (but, probably, correlated) assets.

For example, buying September short sterling contracts and selling September long gilt contracts.

The motivation for these trades is often that the price relationship between two correlated products has temporarily broken down or has moved outside its normal range. The trade anticipates a re-establishment of a more normal relationship.

They are very popular in interest rate markets where traders take a view on the relationship between long-term and short-term interest rates (the yield curve). The example quoted above is a trade that anticipates a steepening of the yield curve.

These trades are also used as a means of changing asset allocations within a portfolio. A fund manager may be long equities and be looking to reduce the exposure by selling some shares and using the funds to buy bonds. By using the futures market (selling FTSE futures and buying long gilt futures) it is possible to produce the same effect without the need to trade the actual securities. It is usually much faster and less expensive. The manager can continue to benefit from dividend income until the securities are sold as needed, while, at the same time, unwinding the futures positions until he has the required physical portfolio.

Note. In differentiating between intra- and inter-market spreads, it is the underlying asset that is important and not the physical location of the futures product.

- Intra = underlying assets are the same.
- Inter = underlying assets are different.

Example 1

An international equity fund manager holds the view that the UK shares will outperform US shares over the next few months.

To take advantage of this view he/she will sell S&P 500 futures contracts and, at the same time, buy the FTSE 100 futures for the same maturity and for the same amount.

By using this inter-market spread the fund manager has re-allocated the fund’s investments from US to UK equities to take advantage of the view that the UK market will outperform the US market.
Remember that unhedged positions are at risk from changes in the price of the underlying asset. The unhedged position may be a long underlying position or it may be a short underlying position.

Hedgers offset the risk in the underlying asset by taking an opposite position in the futures market. So, someone long the underlying would sell the equivalent number of futures contracts to hedge the risk (a short hedge). However, although the cash and futures prices are strongly correlated, there is, as we have seen, some flexibility in that relationship. Basis changes will affect the performance of the hedge. This is termed the ‘basis risk’ of the hedge.

If the long gilt futures contract is used to hedge a portfolio of underlying gilts, risk is limited to the basis risk (assuming that the appropriate number of contracts are entered into). Remember that the long gilt futures contract has a basket of deliverable gilts, one of which is cheaper to deliver than the others (the Cheapest To Deliver or CTD). The CTD bond is the deliverable gilt with the highest implied repo rate. The futures contract price will be very closely correlated to this CTD bond, and the number of contracts used to hedge is calculated on the basis of holding the CTD bonds in the portfolio, not any other bonds.

The implied repo rate is a measure of the funding cost implied in futures prices, which reflect the difference between a bond’s cash price and the price of a futures contract.

For a lot of products the number of contracts needed to hedge is simply a matter of dividing the portfolio size/value by the contract size/value.

However, with bonds the price factor of the CTD bond needs to be taken into account. The formula is:

\[
\text{Number of contracts} = \frac{\text{Price factor} \times \text{Nominal value of CTD portfolio}}{\text{Nominal value of the contract}}
\]
Note that if you did not have a portfolio of CTD bonds, the above formula would need to be adjusted. Hedging non-CTD bonds is outside the exam syllabus.

**Example 2**

You have a portfolio of CTD bonds with a nominal value of £10,000,000 and a market value of £11,500,000. The price factor is 1.1214645. The contract size of the Long Gilt future is £100,000, nominal.

Number of contracts needed to hedge =

\[
\frac{1.1214645 \times £10,000,000}{£100,000} = 112.14 \\
= 112 \text{ approximately.}
\]

Note that if you did not have a portfolio of CTD bonds, the above formula would need to be adjusted. Hedging non-CTD bonds is outside the exam syllabus.

**Exercise 1**

An investor has sold short CTD gilts with a nominal value of £15m and a market value of £15.4m. The price factor is 1.12486. She wishes to hedge the position using long gilt futures. How many contracts are required and should the investor buy or sell the long gilt futures contracts?

The answers can be found in the Appendix at the end of this chapter.

**3.1 Basis, Basis Trading and Basis Risk**

**LEARNING OBJECTIVES**

9.4.3 Understand basis, basis trading and basis risk

Basis and basis trading have been covered in Chapter 7, Section 1.6. Remember that basis is the difference between the cash and futures prices. Basis risk is the risk that the change in futures prices will be different to changes in the cash price. Basis trading is implementing strategies to profit from anticipated basis changes.
The four basic options positions (long call, short call, long put and short put) can be used as hedging instruments against an underlying position.

Remember from Chapter 7, Section 2.4 that the efficiency of hedging using options is dependant upon the delta of the options position mirroring the delta of the underlying position, in other words, creating a delta neutral portfolio overall.

**Example 3**

A fund manager has a portfolio of top UK equities, currently valued at £10,634,000. He hedges the portfolio by selling 200 FTSE index futures at 5,317. The FTSE 100 currently stands at 5,280. A day later the FTSE 100 has fallen by 20 index points and the future has fallen by 16 points to 5301. The outcome for the fund manager is as follows:

<table>
<thead>
<tr>
<th>Day</th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day 1</strong></td>
<td><strong>Day 2</strong></td>
</tr>
<tr>
<td>Equity portfolio</td>
<td>10,634,000</td>
</tr>
<tr>
<td>£10,634,000 x (5,280 - 20) = 5,280</td>
<td></td>
</tr>
<tr>
<td>Futures profit</td>
<td>32,000</td>
</tr>
<tr>
<td>200 x (5317 - 5301) x £10</td>
<td>10,634,000</td>
</tr>
<tr>
<td>Difference = loss due to change in basis = £8,281</td>
<td></td>
</tr>
</tbody>
</table>
Broadly, the deltas are as follows:

<table>
<thead>
<tr>
<th>Position</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long underlying</td>
<td>+1</td>
</tr>
<tr>
<td>Short underlying</td>
<td>-1</td>
</tr>
<tr>
<td>Long future</td>
<td>+1</td>
</tr>
<tr>
<td>Short future</td>
<td>-1</td>
</tr>
<tr>
<td>Long call (deep in-the-money)</td>
<td>+1</td>
</tr>
<tr>
<td>Long call (at-the-money)</td>
<td>+0.5</td>
</tr>
<tr>
<td>Short call (deep in-the-money)</td>
<td>-1</td>
</tr>
<tr>
<td>Short call (at-the-money)</td>
<td>-0.5</td>
</tr>
<tr>
<td>Long put (deep in-the-money)</td>
<td>-1</td>
</tr>
<tr>
<td>Long put (at-the-money)</td>
<td>-0.5</td>
</tr>
<tr>
<td>Short put (deep in-the-money)</td>
<td>+1</td>
</tr>
<tr>
<td>Short put (at-the-money)</td>
<td>+0.5</td>
</tr>
</tbody>
</table>

So a long underlying position (delta +1) could be hedged by a short, deep in-the-money call (delta -1) to create a delta neutral portfolio (overall delta = +1 -1 = 0). Alternatively, it could be hedged by 2 short at-the-money calls (-0.5 x 2 = -1), or a deep in-the-money long put (-1), or even 2 at-the-money long puts (-0.5 x 2 = -1).

4.1 Hedging a long underlying position using options

This is illustrated by an example:

1. Buy a put option

**Example 4**

Investor A owns a portfolio of FTSE shares with a current value of £525,000. The FTSE index stands at 5250.

He is exposed to a fall in the value of the shares. To hedge the risk he needs an options position that will make a profit if the index falls, for example, a long put position.

If his worries are borne out and the index falls, the loss on the portfolio will be offset by the profit on the put option. Remember that the premium paid on the put will never be refunded, so the hedge has a cost (unlike a futures hedge).

However, if the index were to rise, the long underlying position can still show an overall profit once the cost of the put premium has been recouped.

**How many contracts are needed to hedge?**

The contract size of a FTSE option on Euronext.liffe is the index level x £10 per point.

With the put option exercise price at, say, 5250, each contract hedges £52,500 of shares (5250 x £10 per point).

So the number of contracts needed = £525,000 ÷ £52,500 = 10 contracts.

2. Sell a call option – See notes on covered calls in Section 5 below.
4.2 Hedging a Short underlying Position using Options

The following illustrates how a short position might be hedged:

1. **Buy a call option**

   **Example 5**

   Investor B needs to buy 500oz of gold for June; gold is currently trading at $542.50 per oz in the cash market.

   The investor is exposed to an increase in gold's price. One way to hedge the risk would be to buy a gold futures call option for June, a position that will make a profit if the price of gold rises. To be fully hedged, investor B will have to buy 5 calls, since each option has a value of 100oz per contract.

   If the price of gold rises, the extra cost of buying it in the cash market will be offset by the profits on the call option. But remember that the premium paid to buy the call will not be refunded, therefore this method of hedging has an initial cost (unlike a futures hedge).

   But if the price of gold falls, investor B will be able to buy gold at a lower price and reduce his/her costs, after recouping the premium paid for the call.

2. **Sell a put option** – See notes on covered short puts in Section 5 below.

   It is useful to note the following:

   • Unlike a futures hedge, an options hedge will under-perform because of the premium paid.
   • In contrast to a futures hedge, an options hedge provides flexibility. It allows overall profits to be made if the price of the underlying moves in the investor’s favour instead of against him because the loss on the option is limited to the premium paid.

5. **COVERED OPTIONS POSITIONS**

   **LEARNING OBJECTIVES**

   9.5.2 Understand the uses and advantages of covered calls and covered puts

5.1 **Covered Short Call**

A covered short call is sometimes referred to as a **buy/write strategy**. It is constructed by combining a long underlying position with a short call position.

The following example illustrates the potential outcome of a covered short call strategy.
In summary, the motivation is to enhance returns in a stagnant market and, at the same time, to partially hedge a long underlying position.

Exercise 2

Mr Z holds 1,000 shares in XYZ, with a current price of 215p. He writes a single call option (on 1,000 shares) with an exercise price of 220p and for a premium of 9p. What is the outcome for Mr Z if the price of XYZ shares at expiry is:

a) 194p
b) 208p
c) 230p

The answers can be found in the Appendix at the end of this chapter.

Note that selling call options without owning the asset is known as creating a ‘naked’ short call position or ‘naked writing’. It is very dangerous as there is a possibility of a potentially unlimited loss.

5.2 Covered short put

A covered short put position is constructed by selling a put but, at the same time, holding sufficient funds to buy the asset if necessary or already having a short position, such as being short the futures contract then writing/selling a put on the futures contract.
In summary, the motivation is to enhance the return on funds in a stagnant market and to partially hedge a short underlying position.

Selling put options without having the funds to pay for the asset is known as creating a ‘naked’ short put position. These positions are dangerous as they expose the investor to a potentially very substantial loss.

**Example 7**

ABC plc share price is 407p. An investor leaves the funds (£4,070) on deposit and sells the 400 put for 20p per share.

**Analysis of outcome at expiry**

If the share price is unchanged at expiry, the option is abandoned by the long and the investor keeps the premium. This increases the return on his funds by the premium retained.

If the share price rises, although the investor is enhancing the return on his funds by the premium received, he has forgone the opportunity to make a profit on the shares he could have purchased. There is an opportunity cost for the investor.

If the share price falls below 400, the option will be exercised against the investor. He will have to buy the shares at 400p. The investor has effectively reduced the cost price of the shares to 400p, less the amount of the premium. That is 380p (400 – 20).

The point of maximum profit is at 400. The investor will make 20 on the premium, plus the interest on the funds, and be able to buy the shares at 400 rather than 407.

In summary, the motivation is to enhance the return on funds in a stagnant market and to partially hedge a short underlying position.

**Exercise 3**

Mrs P enters into a covered short put position on the shares in QRS plc. She writes a 700p put option for a premium of 12p at the time QRS plc shares are trading at 718p. What is the outcome for Mrs P if the price of QRS shares at expiry is:

a) 690p  
b) 718p  
c) 750p

The answers can be found in the Appendix at the end of this chapter.
An options spread involves the simultaneous purchase and sale of options in the same class, i.e., calls or puts on the same underlying asset.

There are three different types of options spreads that are constructed as follows:

1. **Vertical** spread. Buying and selling calls (or puts) with **different strikes**, but the **same expiry**.
   
   - eg. buy April 200 call and sell April 220 call or
   - buy September 500 put and sell September 550 put.

2. **Horizontal (calendar)** spread. Buying and selling options with the **same strike**, but **different expiry** months.
   
   - eg. buy April 200 call and sell May 200 call or
   - sell September 500 put and buy December 500 put.

3. **Diagonal (diagonal calendar)** spread. Buying and selling options with **different strikes** and **different expiry** months.

### 6.1 Vertical Spreads

Vertical spreads can be split into two basic types: **bull spreads** and **bear spreads**.

In a **bull spread** the investor **buys the lower** strike and **sells the higher** strike.

For example, buying the 500 call and selling the 600 call (a ‘bull call spread’). Alternatively, buying the 500 put and selling the 600 put (a ‘bull put spread’).

The opposite is true for a **bear spread**, where the investor **sells the lower** strike and **buys the higher** strike.

For example, selling the 500 call and buying the 600 call (a ‘bear call spread’). Alternatively, using put options by selling the 500 put and buying the 600 put (a ‘bear put spread’).
All vertical spreads attempt to profit from a directional movement in the underlying. However, unlike an outright purchase of a call or put, spreads are moderately bullish/bearish strategies.

**Example 8**

For example, the current price of ABC Plc = 550 and the options available with the quoted premium (PM) at a range of exercise prices are as follows:

<table>
<thead>
<tr>
<th>Call PM</th>
<th>Strike</th>
<th>Put PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>500</td>
<td>18</td>
</tr>
<tr>
<td>49</td>
<td>525</td>
<td>23</td>
</tr>
<tr>
<td>37</td>
<td>550</td>
<td>35</td>
</tr>
<tr>
<td>25</td>
<td>575</td>
<td>47</td>
</tr>
<tr>
<td>19</td>
<td>600</td>
<td>67</td>
</tr>
</tbody>
</table>

**Rationale**

Suppose an investor is bullish on ABC shares. He could buy the 550 call and pay a premium of 37. However, he is moderately bullish and does not think the shares will rise beyond 590 by expiry.

So he sells the 600 call at the same time. He receives a premium of 19, which reduces his net outlay to 18. This is known as a ‘bull call spread’.

**Analysis**

If the price remains at 550 or below, both options will expire OTM and be abandoned. The loss would be limited to the net outlay of 18.

If the price rises to between 550 and 600, he would exercise the 550 call and collect the intrinsic value (the 600 call would be abandoned). To make a net profit on the trade, the intrinsic value of the 550 call needs to be greater than 18, his initial net outlay. The breakeven point is 568.

If the price rises beyond 600, both calls are ITM and would be exercised. In effect, the investor would exercise the 550 call and would be obliged to deliver the ABC shares at 600. The profit would be capped at 32 (600 - 550 - 18). Looked at another way, once ABC shares are above 600, all the extra profit made from the 550 call is taken away by the short 600 call.

All vertical spreads work in a similar way. A bear spread is essentially the other side of a bull spread.

**Exercise 4**

Mr Z buys a 500 put in ABC plc shares for 18p and sells a 550 put at 35p. What is the outcome at expiry if the price of ABC plc shares is:

a) 490p  
b) 530p  
c) 575p

The answers can be found in the Appendix at the end of this chapter.
6.1.1 Summary of Spreads

**Bull call**

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Moderately bullish.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Buy lower strike, sell higher strike.</td>
</tr>
<tr>
<td>Net premium</td>
<td>Paid out.</td>
</tr>
<tr>
<td>Maximum risk</td>
<td>Net premium paid.</td>
</tr>
<tr>
<td>Maximum reward</td>
<td>Difference in strikes less net premium paid.</td>
</tr>
<tr>
<td>Breakeven point</td>
<td>Lower strike + net premium paid.</td>
</tr>
</tbody>
</table>

**Bear call**

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Moderately bearish.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Sell lower strike, buy higher strike.</td>
</tr>
<tr>
<td>Net premium</td>
<td>Received.</td>
</tr>
<tr>
<td>Maximum risk</td>
<td>Difference in strikes less net premium received.</td>
</tr>
<tr>
<td>Maximum reward</td>
<td>Net premium received.</td>
</tr>
<tr>
<td>Breakeven point</td>
<td>Lower strike + net premium received.</td>
</tr>
</tbody>
</table>
**Bull put**

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Moderately bullish.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Buy lower strike, sell higher strike.</td>
</tr>
<tr>
<td>Net premium</td>
<td>Received.</td>
</tr>
<tr>
<td>Maximum risk</td>
<td>Difference in strikes less net premium received.</td>
</tr>
<tr>
<td>Maximum reward</td>
<td>Net premium received.</td>
</tr>
<tr>
<td>Breakeven point</td>
<td>Higher strike less net premium received.</td>
</tr>
</tbody>
</table>

The shape of the bull put graph will be identical to the bull call graph.

**Bear put**

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Moderately bearish.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Sell lower strike, buy higher strike.</td>
</tr>
<tr>
<td>Net premium</td>
<td>Paid out.</td>
</tr>
<tr>
<td>Maximum risk</td>
<td>Net premium paid.</td>
</tr>
<tr>
<td>Maximum reward</td>
<td>Difference in strikes less net premium paid.</td>
</tr>
<tr>
<td>Breakeven point</td>
<td>Higher strike less net premium paid.</td>
</tr>
</tbody>
</table>

The shape of a bear put graph will be identical to the bear call graph.

**Exercise 5**

Mr Z buys a 500 put in ABC plc shares for 18p and sells a 550 put at 35p. What is the breakeven point and what is the maximum profit on this trade?

The answers can be found in the Appendix at the end of this chapter.
6.2 Horizontal and Diagonal Spreads

**Horizontal spreads** are also known as calendar spreads. They are motivated by expected moves in volatility.

There are two basic types of horizontal spreads, the first is based on the view that volatility will fall, involves selling a shorter maturity and buying a longer maturity option on the same asset with the same strike price. This type of spread takes advantage of the fact that short-dated options will lose their time value faster, and therefore react quicker to a fall in volatility, than the longer dated option.

The second type of horizontal or calendar spread is based on the view that volatility, particularly short-term volatility will rise. It involves buying a shorter maturing option and selling a longer maturity option, again on the same underlying asset with the same strike price. This strategy is used most often ahead of key announcements, such as companies’ earnings reports or central bank meetings, to take advantage of any dramatic short-term moves that may occur from the news.

**Diagonal spreads** are directional depending on market view. They would be constructed with call options if the investor’s view was bullish or put options if bearish by selling shorter dated options and buying longer dated and further out-of-the-money options. Diagonals are difficult to compute as, once again, they use different dated expiries.

Both these strategy types take advantage of the different rates of time decay for options with different expiries. Essentially, the trades are designed to take advantages of changes in volatility.

There will be no calculation questions in the exam on horizontal and diagonal spreads.

---

7. **OPTIONS COMBINATIONS**

**LEARNING OBJECTIVES**

9.3.2 Know the characteristics and effects of long and short straddles and strangles

9.3.3 Be able to calculate maximum profits/losses in simple examples of the above strategies

A combination strategy involves the simultaneous purchase/sale of calls and puts. Although synthetic positions also involve the use of calls and puts, they will be treated separately.

The two major strategies are **straddles** and **strangles**. They attempt to profit from a change in the volatility of the underlying asset. Long positions anticipate an increase in volatility and short positions anticipate a decrease.
Both strategies will be illustrated using the following example:

**Example 9**

The current price of DEF shares is 550p and the following options are available:

<table>
<thead>
<tr>
<th>Call PM</th>
<th>Strike</th>
<th>Put PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>500</td>
<td>18</td>
</tr>
<tr>
<td>49</td>
<td>525</td>
<td>23</td>
</tr>
<tr>
<td>37</td>
<td>550</td>
<td>35</td>
</tr>
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<td>47</td>
</tr>
<tr>
<td>19</td>
<td>600</td>
<td>67</td>
</tr>
</tbody>
</table>

**7.1 Long Straddle**

**Rationale**

Suppose an investor was unsure about the direction of movement in the price of DEF shares. Perhaps a major announcement was due. Good news would push the share price higher, bad news would push it lower. By buying a 550 call for 37 he would profit if the price rose and by buying a put for 35 he would profit if the share price fell. By doing both, a long straddle position is created for a net premium outlay of 72 (37 + 35).

**Analysis**

If the news was good, and the share price rose to say 660 by expiry, the investor would exercise the call (110 intrinsic value) and abandon the put. He has paid 72 for the strategy, giving a net profit of 38. For the strategy to make a net profit, the price has to rise above 622 (550 + 72).

If the news was bad and the share price fell to 500, the investor would exercise the put (50 intrinsic value) and abandon the call. The price move has not been large enough to offset the premium paid. The price would have to fall below 478 (550 – 72) before the strategy showed a net profit.

There is a profit potential on this trade in either direction, as long as the price movement is large enough (high volatility) to overcome the cost of both premiums. The strategy has two breakeven points, an upside and a downside breakeven.
7.2 Short Straddle

Rationale
Taking the opposite view, an investor who is unsure as to directional movement, but is convinced
that the price will not move too far away from the current price, would be looking to sell both call
and put, i.e., taking a short straddle position. This is simply the other side of the long straddle, for
example, an investor selling a 550 call for 37 and selling a 550 put for 35.

Analysis
The investor would have received a net premium of 72 (call = 37, put = 35).

If the share price rose, the investor would have the call exercised against him/her and lose the
intrinsic value. As long as this was less than 72, the investor would still be making a net profit. A
movement above 622 would produce a net loss.

Exercise 6
What is the breakeven range for the buyer of a put and a call on XYZ plc shares, where the
500p call has been purchased for 18p and the 500p put has been purchased for 7p?
The answer can be found in the Appendix at the end of this chapter.

7.2 Short Straddle

Motivation
Expectation of increase in volatility.

Construction
Buy a call and a put with the same strike and expiry.

Maximum risk
Total sum of premiums paid.

Maximum reward
Unlimited.

Breakeven point
Downside: Strike less total premium paid.
Upside: Strike plus total premium paid.
If the share price fell, the investor would have the put exercised against him/her and lose the intrinsic value. As long as this was less than 72, the investor would still be making a net profit. A movement to below 478 would produce a net loss.

The point of maximum profit would be at 550. Here, both options would be abandoned and the seller of the straddle would keep the total premium.

You can see that there is a profit potential on this trade in either direction, as long as the price movement is not large enough (low volatility) to outweigh the net premium received.

### 7.3 Long Strangle

A strangle is a variation of a straddle undertaken for the same purposes, ie, expectation of changes in volatility.

For example, buying a 500 put for 18 and buying a 600 call for 19.

Differences between a long strangle and a long straddle are as follows:

- A strangle involves the purchase of a call and a put with the same expiry but different strikes (normally constructed with the put strike lower than the call strike).
- The premium outlay on a strangle will usually be lower than on a straddle.
- The strategy needs more volatility to succeed.
- The maximum loss on a long position will be crystallised over a range (between the two strikes) where neither option would be worth exercising.
7.4 Short Strangle

A short strangle is the other side of a long strangle strategy. For example, it would be created by selling a 500 put for 18 and selling a 600 call for 19.

Exercise 7

What is the breakeven range for the buyer of both a 400 put at 17p and a 450 call for 8p?

The answer can be found in the Appendix at the end of this chapter.
Differences between a short strangle and a short straddle are as follows:

- A short strangle involves the sale of a call and a put with the same expiry but different strikes (normally constructed with the put strike lower than the call strike).
- The total premium received on a strangle will usually be lower than on a straddle.
- The strategy can withstand more volatility before losses are incurred.
- The maximum profit on a short position will be crystallised over a range (between the two strikes) where neither option would be worth exercising against the seller.

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Expectation of a large decrease in change of volatility.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Sell a call and a put with the different strikes but same expiry.</td>
</tr>
<tr>
<td>Maximum risk</td>
<td>Unlimited.</td>
</tr>
</tbody>
</table>
| Maximum reward      | Total premium received.  
                        (Premiums received less difference between the strikes if call strike is lower than the put.) |
| Breakeven point     | Downside: Lower strike minus premiums.  
                        Upside: Higher strike plus premiums.  
                        (Put strike lower than the call.)  
                        (If the call strike is lower than the put, these will be reversed.) |
By combining futures and options it is possible to create positions synthetically. There are six synthetics that you should be familiar with:

1. **Synthetic long future** = buy a call and sell a put with the same strike and expiry.
2. **Synthetic short future** = sell a call and buy a put with the same strike and expiry.
3. **Synthetic long call** = buy a future and buy a put. (Note this is the same as having a hedged long position.)
4. **Synthetic short call** = sell a future and sell a put. (Effectively a covered short put position.)
5. **Synthetic long put** = buy a call and sell a future. (Note this is the same as a hedged short position.)
6. **Synthetic short put** = sell a call and buy a future. (Effectively a covered short call position.)

The reason for using synthetics might be to create positions that may not be available on the underlying asset. For example, if no futures were available the investor can create a futures position synthetically, as long as options are available.

However, the main reason for the use of synthetics is arbitrage. The put-call parity formula encountered earlier defined the relationship between call and put premiums and the price of the underlying asset. If call and put premiums are out of line with each other it is possible to lock in riskless profits. This is illustrated in the following examples, both creating synthetic futures:

**Example 10**

The Long Gilt future is currently trading at 114.14. The premium of the 114.00 call is 0.45 and the premium of the 114.00 put is 0.39.

What should you do?

**Buy the call and sell the put** for a net premium outlay of 0.06. This gives you a long futures position (synthetically) at 114.06.

But the actual future is trading at 114.14, so **sell the future** to ‘lock-in’ the difference of 0.08.

The whole trade is known as a ‘reversal’. 
Most investors are unlikely to become involved directly in derivatives markets, but there are numerous instruments that they do invest in which indirectly involve the use of futures and options.

There are two main routes for most customers wanting to invest in derivatives, accounts and pools/funds.

1. **Accounts**. A discretionary account operates where the client entrusts money to a regulated firm which then undertakes to manage the funds according to the client’s objectives, perhaps subject to restrictions on the types of instruments that can be used by the manager. Such funds are normally used by wealthy individuals.

   The key advantage of such accounts is that the client benefits from professional management and oversight. The client also benefits from profits, but is also liable for losses on the portfolio which can be more than the funds invested.

2. **Pools/Funds**. These are Collective Investment Schemes (CISs) managed by regulated fund management companies on behalf of investors whose money is pooled together and invested. These collective schemes can include derivatives.

   An investment pool is specific to the US and relates to small highly regulated funds.

   The maximum loss to the investor is restricted to the amount they invest. Their main advantage is that, by pooling the funds, risk is diversified. The number of investors in a pooled fund is usually small, normally 20-30, and management fees are relatively high.

---

**Example 11**

The Long Gilt future is currently trading at 114.14. The premium of the 114.00 call is 0.51 and the premium of the 114.00 put is 0.31.

What should you do?

**Sell the call and buy the put** for a net premium receipt of 0.20. This gives you a short futures position (synthetically) at 114.20.

But the actual future is trading at 114.14, so **buy the future** to ‘lock-in’ the difference of 0.06.

The whole trade is known as a ‘conversion’.

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**9. INDIRECT INVESTMENT**

**LEARNING OBJECTIVES**

9.1.2 Understand the uses, requirements and advantages of accounts and pools/funds as investment methods
9.1 Investment Style of Derivatives-Based Funds

LEARNING OBJECTIVES
9.1.3 Understand the characteristics of speculative, guaranteed and synthetic investment styles

Investment objectives of derivatives-based funds vary, but can be categorised by three main types:

1. **Speculative.** Highly geared funds investing in derivatives to try and produce high returns, at high risk. As seen above, clients cannot lose more than the funds invested.

2. **Guaranteed.** Funds that lock-in the investor for a minimum period and provide exposure to a market but ‘guarantee’ that, at worst, the investor will get their money back (or a preset amount, eg, 95%).

   Typically, most of the funds will be invested in zero coupon bonds, or cash, with the balance being used to buy options, eg, FTSE put options for an index bear fund.

   These are low-risk because investors’ capital is safe. However, the lock-in periods can be quite long (one to seven years). If after five years an investor only received their money back, the cost is the lost returns he could have received elsewhere, for example bank interest. This is known as ‘opportunity cost’.

3. **Synthetics.** Funds designed to replicate the performance of an index. They use the techniques described earlier in this chapter to achieve their objectives.

   Typically, the funds are invested on risk-free deposit and the relevant numbers of futures contracts (representing the value of the funds) are purchased.

   Note, even though futures are being used, there is no gearing in these funds.

9.2 Derivatives-Based Funds

LEARNING OBJECTIVES
9.1.1 Know the characteristics, advantages and types of investment vehicle - off-shore and on-shore investments including Futures and Options Funds (FOFs) and Geared Futures and Options Funds (GFOFs)

As seen, Collective Investment Schemes (CISs) are a means of investing money alongside others, benefiting from professional fund management. The prime vehicle is the unit trust, which pools funds placed by the investors.

There are two types of unit trusts: **authorised** and **unauthorised**. The authorisation comes from the FSA. The significance of authorisation is that it dictates the marketability of the fund to private customers. Authorised unit trusts (AUTs) can be freely advertised and marketed; unauthorised unit trusts cannot.

There are two types of derivatives funds that are categorised as authorised funds: **Futures and Options Funds (FOFs)** and **Geared Futures and Options Funds (GFOFs)**.
Both funds specifically use futures and options as integral investments within the fund. They are, however, subject to restrictions.

The following are the major features of FOFs and GFOFs:

<table>
<thead>
<tr>
<th>FOFs</th>
<th>GFOFs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max 10%</strong> of fund can be used to buy approved derivatives (gearing is, therefore, limited).</td>
<td><strong>Max 20%</strong> of current fund value can be used for initial margins or premiums, being the initial outlay to gain exposure to the derivative.</td>
</tr>
<tr>
<td>All outstanding derivatives transactions must be <strong>covered</strong> by holdings in the underlying assets.</td>
<td><strong>No cover</strong> required.</td>
</tr>
<tr>
<td>Can have <strong>short-term borrowings</strong> like other AUTs.</td>
<td><strong>Cannot borrow</strong> (because it is already geared).</td>
</tr>
<tr>
<td><strong>Freely marketable</strong>, including cold calls.</td>
<td>Although authorised, these fund do have marketing restrictions</td>
</tr>
</tbody>
</table>

Note that, in either fund, the liability of the investor is restricted to their investment.

FOFs are effectively ungeared, whereas there is some gearing in a GFOF which is, therefore, a riskier fund in which to invest.

**9.3 Offshore Funds**

Investors can invest in CISs established within the UK (onshore funds) or outside the UK (offshore funds). Offshore funds may provide the UK investor with greater choice and may be tax efficient, however the regulatory protections may be less substantial and the charges may be higher than in an equivalent UK fund.
Answer to the chapter exercise.

**Answers to Exercise 1**

Number of contracts required = 

\[
\text{Price factor} \times \frac{\text{Nominal value of CTD portfolio}}{\text{Nominal value of the contract}}
\]

Number of contracts needed to hedge = 

\[
1.12486 \times \frac{\£15,000,000}{\£100,000} = 168.729
\]

= 169 contracts approx.

Because the investor has short sold the gilts, she should buy 169 long gilt futures.

**Answer to Exercise 2**

a) There is a loss on the shares of 21p (215 - 194), however the option is not exercised, so Mr Z keeps the premium of 9p, resulting in an overall loss of 21 – 9 = 12p per share.

b) There is a loss on the shares of 7p (215 - 208), however the option is not exercised, so Mr Z keeps the premium of 9p, resulting in an overall profit of 9 – 7 = 2p per share.

c) The gain on the shares would have been 15p (230 - 215), but the option is exercised, so Mr Z needs to deliver his shares at 220p, a gain of only 5p (220 – 215). However, he also keeps the premium of 9p, resulting in an overall profit of 9 + 5 = 14p per share.

**Answer to Exercise 3**

a) The option is exercised and Mrs P has to pay 700p under the terms of the option. However, the premium is retained meaning the effective price of the shares is just 688p (700 – 12). Therefore the profit is 2.

b) The option is not exercised and Mrs P keeps the 12p premium.

c) The option is not exercised and Mrs P keeps the 12p premium.
Answer to Exercise 4

a) The 550 put will be exercised, so Mr Z will buy the ABC shares at 550p each and he will be able to sell them for 500 under the terms of the put option he holds. The loss will be 50p, but Mr Z has received a net premium of 17p (35p − 18p), so in overall terms he has lost 33p (50 − 37p).

b) The 550 put will be exercised, so Mr Z will buy the ABC shares at 550p each and he will be able to sell them for 530 on the market. The loss will be 20p, but Mr Z has received a net premium of 17p (35p − 18p), so in overall terms he has lost 3p (20p − 17p).

c) Neither option will be exercised, so Mr Z will keep the net premium of 17p (35p − 18p).

Answer to Exercise 5

This is a bull put spread.

The breakeven will be when the share price reaches 533p. At this price the holder of the 550 put will exercise, so Mr Z will lose 17p (buying shares for 550 that are only worth 533). However, there is also the net premium receipt of 17p to consider (35p − 18p), so overall Mr Z will breakeven.

The maximum profit will occur at 550p or above. At 550p, Mr Z will keep the premium of 35, having spent a premium of 18p on the bought put with the lower exercise – a net profit of 17p.

Answer to Exercise 6

This is a long straddle, and the breakeven range is the strike plus and minus the two premiums, here 7 + 18 = 25p. So, in this instance the shares would need to fall below 475p (500 − 25) or rise to above 525p (500 + 25) to bring about a profit for the investor.

Answer to Exercise 7

The underlying share has to rise above 450 plus the two premiums or fall below 400 minus the two premiums. So the breakeven range is from 375 to 475.
Abandon
The decision of the holder of an option not to exercise his rights, due to the fact that the option is either out-of-the-money (OTM) or the transaction costs are greater than its Intrinsic Value.

Accrued Interest
The calculation of entitlement to interest on a bond, usually done on a daily basis. This needs to be reflected in the Invoice Amount in a bond future.

Against Actuals (AA)
See Exchange For Physicals.

Allocation
Assigning a completed derivatives trade to its originator, including registration into the correct account.

American-Style
An exercise style of an option. An option that can be exercised on any business day up to expiry on the last trading day.

Arbitrage
Trading simultaneously in one asset in two different markets to profit from short-term price differentials.

Assign
Refers to options - following exercise by the option holder, the exercise is matched with a short position. Assignment is initiated when the exchange clearing house notifies the writer by an ‘assignment notice’.

At-The-Money (ATM)
An option with an exercise price that is the same as, or very near to, the current underlying asset price.

Backwardation
When cash prices are higher than futures prices. Unusual for equity futures because of positive Cost of Carry. Normal for bond futures because bond yields are normally higher than money market yields (there is a negative cost of carry).

Basis
The difference between the present cash price and the nearby futures price of an asset. Calculation is cash minus futures. Basis will be negative in a Contango market, and positive in a Backwardation market.
**Bear**
An investor who believes the market in general, or a particular investment, will fall.

**Bear Spread**
A moderately bearish strategy. Uses call or put options for the same month but at different strikes (ie, Vertical Spreads) eg, buy 350 June calls, sell 300 June calls.

**Bond**
A security issued by an organisation such as a government or corporation. Bonds pay regular interest and repay their principal or face value at maturity. One of the most common underlying assets for derivative contracts.

**Bull**
An investor who believes the market in general, or a particular investment, will rise.

**Bull Spread**
An options trade for the moderately bullish investor. Uses call or put options for the same month but at different strikes (ie, Vertical Spreads), eg, buy a 300 June call, sell a 350 June call. Could also be done with put options.

**Bund**
German government bond.

**Buy-Write**
An investment strategy involving buying a security and, simultaneously, selling calls against it.

**Cap**
An option, which puts a ceiling to the interest rate at which a client borrows. A common term would be quarterly over three years. If the reference rate (eg, LIBOR) is above the cap the writer pays compensation. Allows the borrower to manage interest rate risk. Also used in Foreign Exchange.

**Cash Settlement**
Method of settlement where the underlying asset is not exchanged, just the cash difference between the contracted price and the official settlement price. Often known as a Contract for Difference, STIRs, and Equity Indices futures are settled by cash payment rather than Physical Delivery.

**Collar**
The purchase of a Cap, financed by the sale of a Floor.

**Combination**
Strategy involving a variety of individual positions, such as puts and calls (eg, Straddle, Strangle).
**Contango**
A market where futures prices are higher than the cash price because of a positive Cost of Carry. Opposite of Backwardation.

**Contingent Liability**
A potential liability for loss, over and above the amount invested, the amount of which cannot be established at the outset of a derivatives contract. For example, the seller of a future does not know how high the price could move against him - he is in a contingent liability situation.

**Contract for Differences (CFD)**
A contract involving the exchange of difference between the pre-agreed price and the closing price of the underlying instrument (such as an index or a share price). A contract involving Cash Settlement.

**Cost of Carry**
The cost of holding an asset over time. Comprises borrowing costs and, for physical commodities, storage/insurance costs. For equities, the cost of carry will be reduced by dividends earned from the shares.

**Covered Call**
A short call option position that is covered because the writer also owns the underlying asset.

**DAX**
Deutsche Aktien Index - an index of 30 German equities. The principal German equity index.

**Delivery**
The settlement of a contract (such as a future) by delivery of the asset by the seller to the exchange clearing house. The long position holder takes delivery from the clearing house against payment.

**Delta (Δ)**
The measure of change in an option’s premium or futures price given a change in the underlying asset. In options, delta can be thought of as the probability that the option will be in-the-money at expiry. The delta of futures will generally be about 1 or 100%. A £3 change in the cash price should cause the future to move by about £3 (3/3 = 1).

**Derivative**
Instruments whose price is derived from another asset. Examples include futures, options, FX forwards and swaps.

**Equity Indices**
Indices of blue-chip (ie, large) companies in various national or regional markets. Examples include S&P 500, FTSE 100, Eurostoxx. Major indices are used as the basis for derivatives contracts.

**European-Style**
An exercise style of an option. An option, which can only be exercised by the holder at expiry.
Exchange Delivery Settlement Price (EDSP)
The price at which maturing futures are settled (a Euronext.liffe term).

Exchange For Physicals (EFP)
The exchange of a future’s position for a physical position. Also known as Against Actuals.

Exercise
The decision by a holder of an option to take up their rights. In a call option, exercise involves buying the asset; in a put option exercise involves selling the asset.

Exercise (or Strike) Price
Refers to options - the price at which assets can be bought (call) or sold (put). In exchange-traded options, the exchange determines the intervals between strike prices.

Fair Value
The theoretical price of a future, ie, cash price plus cost of carry.

Floor
An OTC option which guarantees a minimum return. If the reference rate (eg, LIBOR) falls below the floor level, the buyer of the floor receives compensation. See also Collar.

Foreign Exchange (FX)
The name given to the general aspects of currency trading.

Forward
An OTC derivative on, for example, Foreign Exchange. Forwards prices are based on the spot price and the interest rate differential of the two currencies, in the same way as exchange-traded FX futures.

Forward Rate Agreement (FRA)
An agreement where the client can fix the rate of interest that will be applied to a notional loan or deposit, drawn or placed for an agreed period in the future. Traded Over-The-Counter.

Future
An exchange-traded contract that is a firm agreement to make/take delivery of a standard quantity of a specified asset on a fixed future date at a price agreed today.

Gamma
Measures the speed of change of Delta on a derivative for a given change in price of the underlying asset. Gamma is at its maximum for at-the-money options.
**Gearing**
An important feature of derivatives. Because only a small percentage of an asset’s value is required when a contract is entered into (Initial Margin or Premium) a small change in the underlying asset’s value can lead to large percentage gains or losses relative to the initial investment. Also known as ‘leverage’.

**Hedge**
A strategy to protect or minimise a potential loss to an existing position or known commitment resulting in adverse price movements. For example, those owning assets can hedge by buying put options, protecting against a fall in value of that asset.

**Initial Margin**
A good faith deposit (in the form of collateral or cash) lodged with the broker or clearing house against potential liabilities on an open position. It is returned when the position is closed out.

**In-The-Money (ITM)**
An option with Intrinsic Value, eg, a call whose Strike is below the underlying asset price.

**Intrinsic Value (IV)**
Indicates how much an option is in-the-money (ITM). One of the two components that make up an option’s value.

The intrinsic value represents the absolute minimum premium for an option. For example, a £1 call option would be worth at least 25p if the underlying asset’s price was £1.25. Options which are in-the-money have intrinsic value. Intrinsically, a £2 put would be worth at least 50p if the underlying asset was trading at £1.50.

**Invoice Amount**
The amount a futures buyer pays to the exchange clearing house at Delivery, for the underlying physical asset.

**Last Notice Day**
The last day for issuing of notices of intent to deliver against a futures contract.

**Last Trading Day**
The last day for trading futures with the current delivery month. All contracts outstanding/open at the end of the last trading day must be settled by delivery.

**London Inter-Bank Offered Rate (LIBOR)**
The average rate at which banks will lend sterling, dollars, euros, yen etc to each other for periods of one month, three months etc. Established by a daily survey by the BBA (British Bankers’ Association) who also ask for bid rates enabling LIBID (London Inter-Bank Bid Rate) to be calculated, which is how much banks would pay to borrow funds.
**Long**
The buyer of an asset is 'long' the asset. Futures buyers are 'long' the futures. Options buyers or holders are 'long' the options.

**Margin**
Collateral paid to the clearing house by the counterparties to a derivatives transaction to guarantee their positions against loss. *Initial Margin* is a security deposit that must be handed to the exchange clearing house by a broker (and to the broker by their client) for futures or short options. See also *Variation Margin*.

**Mark To Market**
The process of adjusting the value of investments to reflect their current market price. See also *Variation Margin*.

**Novation**
The legal process where the exchange’s clearing house becomes the counterparty to both the buyer and seller of futures contracts, substituting the original contract.

**Open Interest**
The number of contracts that have not been closed-out by being offset.

**Open Outcry**
Trading system where participants meet face-to-face and cry out their prices and sizes to the others on the floor. Used in many US exchanges.

**Option**
A contract that gives the buyer the right, but not the obligation, to sell or buy a particular asset at a particular price, on or before a specified date. Options are set at an agreed price (exercise or strike price) and the exercise style would normally be *American-Style* or *European-Style*. The class of option either gives holders the right to buy (call) or the right to sell (put).

**Out-Of-The-Money (OTM)**
A term used to describe an option whose strike price is less advantageous/profitable than the asset’s current market price. For example a £1 call if the asset is trading at 85p. An OTM option has no *intrinsic value*, but a *Premium* may well be payable, but it would comprise only *Time Value*.

**Over-The-Counter (OTC)**
Transactions between banks and their counterparties not on a recognised exchange.

**Physical Delivery**
Where the settlement of a futures contract is by delivery of the physical underlying asset. Certain futures (eg. gilt futures, copper etc) will run through to physical delivery for final settlement. Other futures (eg. stock index futures and *Short-Term Interest Rates*) are cash settled.
**Premium**
The money paid by option buyers to option sellers. The price paid for the option.

**Put**
A type of option that gives its buyer the right, but not the obligation to sell the underlying asset at an agreed price within a specific time for a set premium. Put sellers may be obliged to buy the specified asset at the strike price if the put’s holder chooses to **Exercise**.

**Put-Call Parity**
The theoretical relationship between put premiums and call premiums for the same strike and expiry. The relationship (for European options) is:

\[ \text{Call premium} - \text{put premium} = \text{underlying asset’s price} - \text{strike price (discounted to the present value)} \]

**Screen Trading**
Trading system where participants trade with each other by submitting prices and sizes onto a computer system from remote terminals.

**Series**
Options of the same class (ie, calls or puts) with the same strike, date and underlying (eg, calls - 950, June, HSBC).

**Short**
1. To need an asset.
2. Another term for selling futures or selling/writing puts.
3. To hold a net sold position.

**Short-Term Interest Rate (STIR) Derivatives**
Common **Contracts For Difference** derivative contract, based on the interest on a notional sum of money for three months. For example, Euronext.liffe June short sterling contracts are based on the interest on a notional cash deposit of £500,000 for the three months from June (ie, July, August and September). Priced as 100 minus the predicted rate, thereby replicating the inverse pricing behaviour of bonds and bond futures.

**Spot**
A term used to describe the current price of an asset. Also known as ‘underlying’ or ‘cash’. Also used in foreign exchange where spot rates are the exchange rates for deals, which settle right away (usually T+1).
**Spread**
1. In futures - buying and selling different months of the same asset (intra-market spread) with a view about changes in Basis.
2. In futures - buying and selling futures in different assets (inter-market spread). For example, a fund manager could increase his effective weighting of US stocks by buying S&P 500 futures and simultaneously selling FTSE 100 futures.
3. In options - see Vertical Spreads.
4. The difference between the bid and offer price.

**Standard Portfolio Analysis of Risk (SPAN)**
SPAN is a scenario-based risk programme, designed by the Chicago Mercantile Exchange, used for calculating daily initial margins across a portfolio. Essentially, it looks at the impact on a position if the price and volatility of the underlying changes by set amounts.

**Straddle**
A combination of a put and a call option at the same Strike. Buyers profit from volatility in the underlying asset.

**Strangle**
A combination of a put and a call option at different strikes. Buyers profit from volatility in the underlying asset.

**Strike**
See Exercise.

**Swap**
A contract to exchange a series of payments with a counterparty, eg, fixed for floating interest rates, currency A for currency B, income from asset C for income from asset D etc.

**Swaption**
An option to enter into a Swap.

**Synthetic**
Manufactured position, eg, a synthetic future can be created by buying a call and selling a put option on the future.

**Theoretical Intermarket Margining System (TIMS)**
TIMS an method used by the OCC and other exchanges to determine the margin requirements for mixed portfolios of derivatives, particular options.

**Tick**
The smallest permitted variation between prices quoted to buy and sell on derivatives exchanges. For example, the tick for gold is 10 cents so prices of $390.00, $390.10, $390.20 can be quoted, but not $390.13.
**Tick Value**
The profit or loss that arises when prices move by one tick.

**Time Value**
An option’s value that represents its time to expiry and the volatility of the underlying asset’s cash price. It is the option’s premium, less any *Intrinsic Value*. Time value will be higher the longer the option has to maturity. Sometimes known as ‘extrinsic value’.

**Variation Margin**
Margin is transferred from the account of the loser to the winner as prices move on a daily basis and positions are *Marked to Market*. The total accumulated variation margin equates to the profit or loss when a position is closed out.

**Vertical Spreads**
Calls (or puts) for the same month but at different strikes. For example, buy a 300 June call, sell a 350 June call. See also *Bull Spread* and *Bear Spread*.

**Volatility**
The measure of the probability of an asset's price moving. Usually calculated as annualised standard deviation. Volatility has an important impact on the pricing of options.

**Warrant**
1. A securitised option. An example is a security, which can be converted into shares in a company.
2. A document of title to goods, for example, warrants are used to satisfy the physical delivery of metals on the LME.
### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>Δ</td>
<td>Delta</td>
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<tr>
<td>AA</td>
<td>Against Actuals</td>
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<tr>
<td>ATM</td>
<td>At-The-Money</td>
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<tr>
<td>BBA</td>
<td>British Bankers' Association</td>
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<td>CBOE</td>
<td>Chicago Board Options Exchange</td>
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<td>CBOT</td>
<td>Chicago Board of Trade</td>
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<td>CDS</td>
<td>Credit Default Swap</td>
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<td>CFD</td>
<td>Contract For Differences</td>
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<tr>
<td>CFTC</td>
<td>Commodity Futures Trading Commission (US derivatives regulator)</td>
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<td>CIS</td>
<td>Collective Investment Scheme</td>
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<td>CME</td>
<td>Chicago Mercantile Exchange</td>
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<td>CMO</td>
<td>Contingent Multiple Orders</td>
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<td>CP</td>
<td>Committed Principal</td>
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<td>COB</td>
<td>Conduct Of Business</td>
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<tr>
<td>COMEX</td>
<td>A division of the New York Mercantile Exchange</td>
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<td>CTD</td>
<td>Cheapest To Deliver</td>
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<td>DAX</td>
<td>Deutsche Aktien Index (German equity market index)</td>
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<td>DCO</td>
<td>Designated Clearing Organisation (US)</td>
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<td>DMO</td>
<td>Debt Management Office (UK)</td>
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<tr>
<td>EDSP</td>
<td>Exchange Delivery Settlement Price</td>
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<td>EFP</td>
<td>Exchange For Physicals</td>
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<td>FOF</td>
<td>Futures and Options Fund</td>
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<td>FRA</td>
<td>Forward Rate Agreement</td>
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<td>FSA</td>
<td>Financial Services Authority (UK regulator)</td>
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<td>FX</td>
<td>Foreign Exchange</td>
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<td>GCM</td>
<td>General Clearing Member</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GFOF</td>
<td>Geared Futures and Options Fund</td>
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<td>GIS</td>
<td>Good In Session</td>
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<td>GRY</td>
<td>Gross Redemption Yield</td>
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<td>GTC</td>
<td>Good ‘Til Cancelled</td>
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<td>GTD</td>
<td>Good ‘Til Day</td>
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<tr>
<td>ICE</td>
<td>Intercontinental Exchange</td>
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<td>ICM</td>
<td>Individual Clearing Member</td>
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<tr>
<td>IDRiS</td>
<td>Intra-Day Risk System (LCH.Clearnet)</td>
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<tr>
<td>IPE</td>
<td>International Petroleum Exchange of London Limited</td>
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</tbody>
</table>
IPO  Initial Public Offering
IRP  Interest Rate Parity
IRS  Interest Rate Swap
ISDA International Swaps and Derivatives Association Inc
ITM  In-The-Money
IV   Intrinsic Value
JGB  Japanese Government Bond
LIBID London Inter-Bank Bid Rate
LIBOR London Inter-Bank Offered Rate
LME  London Metal Exchange
LSE  London Stock Exchange
MDS  Market Data System
MIT  Market if Touched
MOC  Market On Close
MOO  Market On Open
NFA  National Futures Association (US)
NLV  Net Liquidation Value
NYBOT New York Board Of Trade
NYMEX New York Mercantile Exchange
OCC  Options Clearing Corporation
OPEC Organisation of Petroleum Exporting Countries
OTC  Over-The-Counter
OTM  Out-of-The-Money
PHLX Philadelphia Stock Exchange
PM   Premium
POM  Public Order Member
PPP  Purchasing Power Parity
PPS  Protected Payments System (LCH.Clearnet)
PSNCR Public Sector Net Cash Requirement
RCH  Recognised Clearing House (UK)
RIE  Recognised Investment Exchange (UK)
SDRT Stamp Duty Reserve Tax (UK)
SEAQ Stock Exchange Automated Quotation System
SEC  Securities and Exchange Commission (US securities regulator)
SETS Stock Exchange Electronic Trading Service
SPAN Standard Portfolio Analysis of Risk
STIR Short-Term Interest Rate
<table>
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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>TAPO</td>
<td>Traded Average Price Option (LME)</td>
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<td>TIMS</td>
<td>Theoretical Intermarket Margining System</td>
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<td>TRS</td>
<td>Trade Registration System (Euronext.liffe)</td>
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<td>TV</td>
<td>Time Value</td>
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<td>USF</td>
<td>Universal Stock Futures</td>
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**SYLLABUS LEARNING MAP**

SECURITIES & INVESTMENT INSTITUTE LEVEL 3 CERTIFICATES IN INVESTMENTS

UNIT 3 – CERTIFICATE IN FINANCIAL DERIVATIVES MODULE

SYLLABUS 7.0 / WORKBOOK EDITION 3 COMPARISON

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<td>• flexibility</td>
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<td>• counterparty risk</td>
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<td>• credit default swaps</td>
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<td>• effect on yield and price of down grading</td>
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<td>Section 8.5</td>
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<td>• advantages and disadvantages of forwards v’s futures</td>
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<td>Element 2.6</td>
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<td>2.6.1</td>
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<td>• clients’ money</td>
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<td>• clients’ accounts</td>
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<td>• margining practices</td>
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<td>2.6.2</td>
<td>* know the role of the Securities and Exchange Commission (SEC) in the regulation of derivatives</td>
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<td>• what is the SEC</td>
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<td>• regulated investments</td>
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<td>• regulated exchanges</td>
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<td>2.6.3</td>
<td>* know the role of the Commodity Futures Trading Commission (CFTC) and the National Futures Association (NFA)</td>
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<td>• what is the CFTC</td>
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<td>• what is the NFA</td>
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<td>• regulation of other entities</td>
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<td>• dispute resolution</td>
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<td>2.6.4</td>
<td>* know the prohibitions of CFTC Part 30 (Foreign Futures and Segregation of Customer Funds) CASS 4.3.107 - 110</td>
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<td>Section 6.3</td>
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<td>2.7.1</td>
<td>* know the requirement under IAS 39 to disclose the ‘fair value’ of all derivative positions held</td>
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<td>* know the basic characteristics of UK Treasury Bills</td>
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<td>• term</td>
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<td></td>
<td>• how and when issued</td>
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<td></td>
<td>• issued at a discount</td>
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<td></td>
<td>• promissory note</td>
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<td>• redeemed at par</td>
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<td>3.1.2</td>
<td>* know the uses and requirements of inter-bank deposits</td>
</tr>
<tr>
<td></td>
<td>• what are inter-bank deposits</td>
</tr>
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<td></td>
<td>• why do they exist</td>
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<td>• determination of inter-bank offer rates in the UK</td>
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<td>• known as Fed Funds rate in the US</td>
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<td>• LIBOR, LIDIB and LIMEAN</td>
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<td>• EURIBOR</td>
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<td>4.1.1</td>
<td>* know the membership structure of Euronext.liffe and its participants (public/non-public order members, clearing and non-clearing) and their principal rights</td>
</tr>
<tr>
<td></td>
<td>• executing trades for third parties</td>
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<td>• executing trades for their own account</td>
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<td></td>
<td>• executing trades for other members</td>
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<td>• capacity as broker</td>
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<td>4.1.2 know the essential details of the trading mechanism – LIFFE CONNECT.</td>
<td>Section 1.3</td>
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<td>• capacity as dealer</td>
<td></td>
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<tr>
<td>• what is LIFFE CONNECT</td>
<td></td>
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<tr>
<td>• who uses it</td>
<td></td>
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<tr>
<td>• international markets that are part of LIFFE CONNECT</td>
<td></td>
</tr>
<tr>
<td>• London</td>
<td></td>
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<tr>
<td>• Paris</td>
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<td>• Brussels</td>
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<td>• Amsterdam</td>
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<td>• Lisbon</td>
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<tr>
<td>• trading sessions</td>
<td></td>
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<tr>
<td>• whether quote or order driven</td>
<td></td>
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<td>• how the trading host matches orders</td>
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<td>• the order types accepted by the markets</td>
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<td>• the trading strategies that are recognised</td>
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<td>• block trades</td>
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<td>• basis trades</td>
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<td>• record keeping</td>
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<td>4.1.3 know the matching and clearing arrangements requirements</td>
<td>Section 1.3</td>
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<td>• TRS</td>
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<td>• order process</td>
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<td>• CPS</td>
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<td>4.1.4 know the scope of contracts traded on Euronext.liffe</td>
<td>Section 1.4</td>
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<tr>
<td>• Long gilt – future and option</td>
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<td>• JGB – future</td>
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<tr>
<td>• Short sterling future</td>
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<td>• 3mth EURIBOR future</td>
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<td>• FTSE-100 future and option</td>
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<td>• Eurofirst 80 index future</td>
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<td>• Eurofirst 100 index future</td>
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<td>• Eurofirst 80 index option</td>
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<tr>
<td>• Eurofirst 100 index option</td>
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<tr>
<td>4.1.5 know the FTSE 100 Index Future; 3 month sterling (short sterling) interest rate future and Long Gilt Future and their associated option contracts</td>
<td>Sections 1.5, 1.7, 1.8</td>
</tr>
<tr>
<td>• what are equity products</td>
<td></td>
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<tr>
<td>• contract specification</td>
<td></td>
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<td>• how products are quoted</td>
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<td>• the relationship of tick size to the contract size</td>
<td></td>
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<td>• whether cash settled or physically delivered</td>
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<td>• contract expiry cycles</td>
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<td>• premium calculations (may be tested by the use of simple calculations)</td>
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<td>• timetable</td>
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<td>• settlement day</td>
<td></td>
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<td>• last trading time and day</td>
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<tr>
<td>4.1.6 be able to calculate the profit/loss on delivery of equity index futures and options</td>
<td>Section 2.3</td>
</tr>
<tr>
<td>4.1.7 understand the use of equity derivatives for speculation and hedging</td>
<td>Section 2.4</td>
</tr>
<tr>
<td>• speculation: long calls, short puts (bullish)</td>
<td></td>
</tr>
<tr>
<td>• speculation: short call, long puts (bearish)</td>
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<tr>
<td>• hedging: covered calls and protective puts</td>
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<tr>
<td>• be able to recognise diagrammatic representation of each strategy</td>
<td></td>
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<tr>
<td>• maximum upside and downside for each strategy</td>
<td></td>
</tr>
<tr>
<td>• understand the concept of option delta</td>
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<td>4.1.8 <em>be able to calculate</em> the hedge ratios for a portfolio using futures, options and stock index options</td>
<td>Section 2.4.3</td>
</tr>
<tr>
<td>• understand the concept of portfolio beta</td>
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<td>• understand the concept of delta</td>
<td></td>
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<td>4.1.9 <em>understand</em> equity warrants and equity options and know their differences</td>
<td>Section 2.5</td>
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<tr>
<td>• what is an equity warrant</td>
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<tr>
<td>• what is an equity option</td>
<td></td>
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<td>• benefits to an investor or speculator</td>
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<td>• time to expiry</td>
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<td>• reasons to issue</td>
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<td>• who issues them</td>
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<td>• where traded</td>
<td></td>
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<td>• strike prices</td>
<td></td>
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<td>• effect of exercise</td>
<td></td>
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<td>• settlement</td>
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<tr>
<td>• gearing against the underlying</td>
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<td>4.1.10 <em>understand</em> the effect of corporate actions on equity options:</td>
<td>Section 2.5</td>
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<tr>
<td>• rights issues</td>
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<td>• bonus issues</td>
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<td>• stock splits</td>
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</tbody>
</table>

**Element 4.2 Overseas Contracts – Interest Rate Futures**

On completion, the candidate should:

4.2.1 *know* the existence of the following overseas bond futures, interest rate futures and the overseas exchanges on which they are traded: Section 2.6

- 30 day Fed Funds, US T Bond, 2 & 5 year notes, US long bond CBOT
- US 30 year long bond CBOT
- Spread based futures (Fed Fund – Eurodollar) CBOT
- Eurodollar CME
- Euro Bund, Bobl, Euribor, Schatz EUREX

4.2.2 *know* the main exchanges and contracts that have common settlement prices and links, which effectively allow investors to transfer open positions from one exchange to another: Section 2.8

- CME
- SIMEX
- CBOT

**Element 4.3 Overseas Contracts – Currencies**

On completion, the candidate should:

4.3.1 *know* the existence of the following currency derivatives and the exchanges on which they are traded: Section 2.7

- Yen, Euro & Ruble Futures CME
- Euro & Yen Options PHLX

**Element 4.4 Overseas Contracts – Stock Indices**

On completion, the candidate should:

4.4.1 *know* the existence of the following stock index futures and options and the exchanges on which they are traded: Section 2.2

- S&P 100 Option CBOE
- S&P 500 Option CBOE
- S&P 500 Future CME
<table>
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<tr>
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<td>• Nikkei 225 Future CME/SGX</td>
<td></td>
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<tr>
<td>• Nikkei Future Osaka/SGX</td>
<td></td>
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<tr>
<td>• DAX Future EUREX</td>
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<tr>
<td>• CAC Future Euronext Paris</td>
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</tbody>
</table>

4.4.2 *know* the main exchanges and contracts that have common settlement prices and links, which effectively allow investors to transfer open positions from one exchange to another

| Section 2.8 |

**Element 4.5 Stock Futures and Options**

On completion, the candidate should:

4.5.1 *know* the major exchanges trading single stock futures and options – Euronext.liffe, MEFF, EDX London and OneChicago

| Section 2.1.1 |

4.5.2 *know* of the Commodity Futures Modernisation Act 2000 and the principles governing trading of single stock futures in the US

| Section 2.1.1 |

4.5.3 *know* the exchange and settlement characteristics of Universal Stock Futures on Euronext.liffe

| Section 2.1.2 |

4.5.4 *be able to calculate* the profit/loss on delivery of Universal Stock Futures on Euronext.liffe

| Section 2.1.3 |

**SECTION 5 PRINCIPLES OF EXCHANGE TRADED FUTURES AND OPTIONS**

**Element 5.1 Futures Pricing**

On completion, the candidate should:

5.1.1 *understand* the mechanisms for futures pricing and the relationship with the underlying cash prices together with the significance of contributing factors

| Section 1 |

5.1.2 *know* the implications of the cost of carry and what may be included in these

| Section 1.2 |

5.1.3 *be able to calculate* the fair value of a future

| Section 1.3.1 |

5.1.4 *know* the definition and significance of basis

| Section 1.6 |

• what does basis mean

• behaviour of basis at expiry
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<th>Syllabus Unit/Element</th>
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<td>• significance of changes in basis</td>
<td></td>
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<td>• basis risk</td>
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<tr>
<td>5.1.5 be able to apply the principle of cash/futures arbitrage</td>
<td>Section 1.7</td>
</tr>
<tr>
<td>• what is arbitrage</td>
<td></td>
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<tr>
<td>• what should be included in arbitrage calculations</td>
<td></td>
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<td>• cash and carry arbitrage</td>
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<td>• when arbitrage opportunities exist</td>
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<tr>
<td>• arbitrage possibilities (may be tested by the use of simple calculations)</td>
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<tr>
<td><strong>Element 5.2 Options Pricing</strong></td>
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<tr>
<td>On completion, the candidate should:</td>
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</tr>
<tr>
<td>5.2.1 understand the significance of premium, time value and intrinsic value</td>
<td>Section 2</td>
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<tr>
<td>• what is option premium</td>
<td></td>
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<tr>
<td>• what is time value</td>
<td></td>
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<tr>
<td>• what is intrinsic value</td>
<td></td>
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<tr>
<td>• what affects time and intrinsic values</td>
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<tr>
<td>(some aspects of this learning objective may be tested by the use of simple calculations)</td>
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<tr>
<td>• in-the-money, out-of-the-money and at-the-money</td>
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<td>5.2.2 understand the significance of the determining factors in calculating option premiums</td>
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<td>• volatility</td>
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<td>• interest rates</td>
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<td>• strike or exercise price</td>
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<td>• time to expiry</td>
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<td>• the underlying asset price</td>
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<td>• dividends</td>
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<td>5.2.3 be able to apply the Put/Call Parity Theorem</td>
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<tr>
<td>• what is the Put/Call Parity Theorem</td>
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<td>• identifying arbitrage opportunities</td>
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<td>• risk free interest rate</td>
<td></td>
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<tr>
<td>(some aspects of this learning objective may be tested by the use of simple calculations)</td>
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<tr>
<td>5.2.4 be able to calculate the sensitivity of the option premium to changes in price by applying delta values to cumulative positions</td>
<td>Section 2.3</td>
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<td>• what is delta</td>
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<td>• uses of delta</td>
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<td>• delta hedging</td>
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<td>5.2.5 understand the concept of gamma</td>
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<td>• what is gamma</td>
<td></td>
</tr>
<tr>
<td>• uses of gamma</td>
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<td>5.2.6 know the requirements of, and process for, premium payment</td>
<td>Section 2.3.3</td>
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<td>• when paid, immediately or marking to market</td>
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<td>• the roles of the clearing house and broker</td>
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<td>• what the seller receives</td>
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<td><strong>Element 5.3 Market Transparency, Trade Reporting and Monitoring</strong></td>
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<td>On completion, the candidate should:</td>
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<td>5.3.1 know the purpose and requirements of trade reporting in screen-traded markets</td>
<td>Section 3.5.1</td>
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<tr>
<td>• timetable for reporting</td>
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<td>• who has responsibility for reporting</td>
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<td>• to whom are trades reported</td>
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<td>Source of information</td>
<td>5.3.2 know the advantages, main sources and reasons for Exchange Price Feeds</td>
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<td>Price transparency</td>
<td>Section 3.5.2</td>
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<td>Current bids and offers</td>
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<td>Trade prices</td>
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<td>High/low prices</td>
<td>Section 3.5.2</td>
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<td>Last night closing price</td>
<td>Section 3.5.2</td>
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<td>Traded volume</td>
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<td>Open Interest</td>
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<td>Know the importance of monitoring volume and open interest information and settlement</td>
<td>5.3.3 understand</td>
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<td>What is open interest (also see 10.1.3)</td>
<td>Section 3.6</td>
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<tr>
<td>Purpose of monitoring open interest</td>
<td>Section 3.6</td>
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<td>Where a client's position becomes excessive – breach of credit limit</td>
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<td>Guarantee in the event of settlement failure</td>
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<td>Effect of client's failure to monitor open interests properly</td>
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<td>Order/Instruction Flow and Order Type</td>
<td>5.4 know the principles of order flow</td>
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<td>How clients, brokers and exchange members are linked</td>
<td>Section 3.1</td>
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<td>Electronic and open outcry markets</td>
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<td>Audit trail</td>
<td>Section 3.1</td>
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<tr>
<td>Know the definition, significance and differences between principal and agency orders (i.e. of dual capacity v's agency orders)</td>
<td>5.4.2 know</td>
</tr>
<tr>
<td>What is dual capacity</td>
<td>Section 3.1</td>
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<tr>
<td>Dealing as a principal</td>
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<td>What are agency orders</td>
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<td>Cross trading</td>
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<td>Advantages to the client</td>
<td>Section 3.1</td>
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<td>Know the purpose of price limits and position limits and the effects of their application</td>
<td>5.4.3 know</td>
</tr>
<tr>
<td>What are price limits</td>
<td>Section 3.3</td>
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<td>What are position limits</td>
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<td>Who imposes limits</td>
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<td>Purpose of price and position limits</td>
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<tr>
<td>Action in the event of breach</td>
<td>Section 3.3</td>
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<tr>
<td>Know the range of types of orders, their uses and effects:</td>
<td>5.4.4 know</td>
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<tr>
<td>Concept of immediate and resting orders</td>
<td>Section 3.2</td>
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<td>Correction of mistakes and errors</td>
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<td>Types of order:</td>
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<td>Market order</td>
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<td>Limit order</td>
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<td>Market if touched order</td>
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<td>Opening and closing orders</td>
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<td>Good ’til cancelled</td>
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<td>Immediate or cancel / fill or kill order</td>
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<td>Stop order</td>
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<td>Stop limit order</td>
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<td><strong>Element 5.5</strong> Trade Registration</td>
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<td>On completion, the candidate should:</td>
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<tr>
<td>5.5.1 <em>know</em> the processes involved in trade registration, trade input and trade matching</td>
<td>Section 3.4</td>
</tr>
<tr>
<td>• differing requirements of electronic and open outcry markets</td>
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<tr>
<td>• use of Euronext.liffe’s Trade Registration System</td>
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<tr>
<td>5.5.2 <em>understand</em> give-ups/allocations</td>
<td>Section 3.4.2</td>
</tr>
<tr>
<td>• what are give-ups</td>
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<tr>
<td>• what are allocations</td>
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<tr>
<td>• purpose and importance of give-ups and allocations</td>
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<tr>
<td>• reasons to allocate a trade to an account</td>
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<tr>
<td>• use of give-up agreements</td>
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<tr>
<td>• use of Euronext.liffe’s Trade Registration System</td>
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<tr>
<td>• risk implications</td>
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<tr>
<td>5.5.3 <em>understand</em> the use of different types of accounts</td>
<td>Section 3.4.1</td>
</tr>
<tr>
<td>• use of house accounts</td>
<td></td>
</tr>
<tr>
<td>• customer accounts – segregated and non-segregated</td>
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</tr>
</tbody>
</table>

**SECTION 6 PRINCIPLES OF CLEARING**

| Element 6.1 Definition and Purpose of Clearing | |
| On completion, the candidate should: | |
| 6.1.1 *understand* the processes and purpose of clearing and the function of novation | Section 1.1 |
| • what is clearing | |
| • mutual offset system | |
| • what is novation | |
| • counterparty risk | |
| • principal to principal | |
| • broker’s position | |
| 6.1.2 *understand* the risks usually associated with the clearing process and the implications of default | Section 1.1 |

<p>| Element 6.2 LCH.Clearnet Limited (LCH) | |
| On completion, the candidate should: | |
| 6.2.1 <em>know</em> the LCH backing arrangements in place in the event of a member default and the role of the LCH Treasury function | Section 1.3.3 |
| • novation | |
| • guarantees performance of the contract | |
| • default fund | |
| • insurance cover | |
| • members’ contributions | |
| • principal to buyer and seller | |
| • control of funds to clearing members’ accounts | |
| • requirement for members to use a bank approved by LCH Treasury | |
| 6.2.2 <em>understand</em> the role played by the LCH in the clearing process | Section 1.2 |
| • what is the clearing process | |
| • LCH relationship with members in settlement | |
| • use of the Protected Payments System | |
| • automatic debit to members’ accounts | |
| 6.2.3 <em>understand</em> the relationship between clearing members and non-clearing members | Section 1.2 |
| • what is a non-clearing member | |
| • use of general clearing members to clear trades | |
| • use of clearing member to clear non-member trades | |</p>
<table>
<thead>
<tr>
<th>Syllabus Unit/Element</th>
<th>Chapter/Section</th>
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<tbody>
<tr>
<td>6.2.4</td>
<td>know the principles of mutual and independent guarantees</td>
</tr>
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<td></td>
<td>• what are mutual guarantees</td>
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<td></td>
<td>• what are independent guarantees</td>
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<tr>
<td></td>
<td>• purpose of the guarantees</td>
</tr>
<tr>
<td></td>
<td>• funding of the default fund at the clearing house</td>
</tr>
</tbody>
</table>

**SECTION 7 MARGIN**

**Element 7.1 Margin**

On completion, the candidate should:

7.1.1 *understand* the various types of margin and their purposes: Section 1.1

- initial
- variation
- types of transactions on which these are required
- counterparty risk
- counterparty for margin calls
- maintenance margining system

7.1.2 *understand* how a firm deals with margin payments for its own positions and for its clients’ positions through its books: Section 1.1

- use of house accounts
- use of client segregated accounts
- use of client non-segregated / pooled accounts
- advantages and risks

7.1.3 *understand* the difference between the clearing house’s margin and that of the broker and the collection/payment process: Sections 1.1, 1.4

- amounts paid by clearing member and its clients
- acceptable collateral
- flow of margin

**Element 7.2 The Principles of Margin**

On completion, the candidate should:

7.2.1 *understand* the differences between initial and variation margin and the significance of marking to market and withdrawal of variation margin profits: Section 1.2

- what is marking to market
- trigger levels
- offsetting long and short positions
- when paid

7.2.2 *know* the means by which exchanges establish settlement prices: Section 1.2.2

- what are settlement prices
- closing ranges / prices

7.2.3 *understand* the nature and use of offsets for spread/spot month margining: Section 1.2.1

- what are offsets
- what is spot month margin
- purpose of spot month margins
- what is spread margin
- purpose of spread margins

7.2.4 *understand* why the clearing house might call intra-day margin: Section 1.2.1

- what is intra-day margin
- purpose of intra-day margin
- when is intra-day margin paid

7.2.5 *know* methods of margining involving delta and SPAN and their implications: Section 1.3

- what is delta
- what is SPAN
- use of SPAN
### Syllabus Unit/Element | Chapter/Section
---|---
- what is TIMS
- use of TIMS
- effect of price change in the underlying
- use of Net Liquidation Value

**Element 7.3 Collateral/Credit**

On completion, the candidate should:

7.3.1 *know* the definition, purpose and uses of collateral and the types of acceptable collateral by LCH.Clearnet Limited (cash vs non-cash)

<table>
<thead>
<tr>
<th>Section 1.4</th>
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7.3.2 *know* the definition and significance of credit lines

<table>
<thead>
<tr>
<th>Section 1.5</th>
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</table>

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<tr>
<th>7.3.2</th>
<th></th>
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</thead>
</table>
| • what is a credit line
| • what do credit lines cover
| • deals in excess of a credit line
| • significance of collateral |

**SECTION 8 DELIVERY AND SETTLEMENT**

**Element 8.1 Aspects of Delivery**

On completion, the candidate should:

8.1.1 *understand* the functionality of the Exchange Delivery Settlement Price (EDSP) and the factors affecting it

<table>
<thead>
<tr>
<th>Section 1.4</th>
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8.1.2 *understand* the differences between cash settlement and physically delivered contracts and the final payment process

<table>
<thead>
<tr>
<th>Section 1.3</th>
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</table>

<table>
<thead>
<tr>
<th>8.1.2</th>
<th></th>
</tr>
</thead>
</table>
| • what is cash settlement
| • what is physical delivery
| • factors used in ascertaining the invoice amount
| • who calculates the invoice amount |

8.1.3 *understand* the importance and implications of the delivery of open contracts at expiry and the significance of the short position

<table>
<thead>
<tr>
<th>Section 1.3</th>
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<table>
<thead>
<tr>
<th>8.1.3</th>
<th></th>
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</thead>
</table>
| • what are open contracts
| • physical v’s cash delivery
| • avoidance of delivery – reasons & methods
| • advantages of cash settlement
| • how is the asset delivered to the clearing house
| • seller’s choice of delivery time and method
| • underlying asset delivered to the clearing house
| • importance of the following in the settlement cycle
| • first notice day
| • last notice day
| • delivery day |

8.1.4 *know* the role of the clearing house as counterparty in delivery

<table>
<thead>
<tr>
<th>Section 1.1</th>
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</table>

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<thead>
<tr>
<th>8.1.4</th>
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</table>
| • use of warrants in delivery
| • when does the clearing house become the counterparty
| • role of the clearing house as counterparty
| • as guarantor
<p>| • counterparty risk |</p>
<table>
<thead>
<tr>
<th>Syllabus Unit/Element</th>
<th>Chapter/Section</th>
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<tbody>
<tr>
<td>• assignment</td>
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<tr>
<td>8.1.5 understand the purpose of closing contracts</td>
<td>Section 1.2</td>
</tr>
<tr>
<td>• what are closing contracts</td>
<td></td>
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<tr>
<td>• why would they be used</td>
<td></td>
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<tr>
<td>Element 8.2 Options</td>
<td></td>
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<tr>
<td>On completion, the candidate should:</td>
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<tr>
<td>8.2.1 understand the significance and implications of the exercise of options, the assignment of obligations, abandonment and expiry</td>
<td>Section 2</td>
</tr>
<tr>
<td>• what is meant by the assignment of obligations</td>
<td></td>
</tr>
<tr>
<td>• which party instigates an assignment notice</td>
<td></td>
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<tr>
<td>• who would receive an assignment notice</td>
<td></td>
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<tr>
<td>• what is abandonment</td>
<td></td>
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<tr>
<td>• which options are most likely to be exercised before expiry</td>
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<tr>
<td>• exercise at expiry</td>
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<tr>
<td>• European and American options</td>
<td></td>
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<tr>
<td>• action upon exercise</td>
<td></td>
</tr>
<tr>
<td>• reasons for assignments</td>
<td></td>
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<td>• effect of assignment</td>
<td></td>
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<tr>
<td>• advantages to the investor</td>
<td></td>
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<td>• probability of assignment</td>
<td></td>
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<tr>
<td>8.2.2 understand the meaning of automatic exercise</td>
<td>Section 2.5</td>
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<tr>
<td>• what is automatic exercise</td>
<td></td>
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<tr>
<td>• purpose of automatic exercise</td>
<td></td>
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<tr>
<td>• options that may be subject to automatic exercise</td>
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<tr>
<td>• reasons for clearing houses to adopt automatic exercise</td>
<td></td>
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<tr>
<td>• benefits to members and holders of long positions</td>
<td></td>
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<tr>
<td>• prevention of automatic exercise</td>
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</tbody>
</table>

**SECTION 9 TRADING, HEDGING AND INVESTMENT STRATEGIES**

Element 9.1 Investment Funds, Styles and Users

On completion, the candidate should:

| 9.1.1 know the characteristics, advantages and types of investment vehicle off-shore and on-shore investments including Futures and Options Funds (FOFs) and Geared Futures and Options Funds (GFOFs) | Section 9.2 |
| • what are off-shore investment vehicles |                |
| • what are on-shore investment vehicles |                |
| • what are FOFs |                |
| • what are GFOFs |                |
| • requirement for authorisation of FOFs and GFOFs by the FSA |                |
| • volatility |                |
| • what are the benefits to the investor |                |
| • what are the risks to the investor |                |
| • FOFs’ and GFOFs’ power to borrow |                |
| 9.1.2 understand the uses, requirements and advantages of accounts and pools/funds as investment methods | Section 9 |
| • what are pooled funds |                |
| • what are the advantages to investors |                |
| • what are the risks to investors |                |
| • costs |                |
| 9.1.3 understand the characteristics of speculative, guaranteed and synthetic investment styles | Section 9.1 |
| • what are speculative, guaranteed and synthetic investments |                |
### Syllabus Unit/Element | Chapter/Section
--- | ---
- how are synthetic longs and shorts created | 
- hedging adverse interest rate fluctuations | 
9.1.4 | understand the categories of users of derivatives and their respective use of derivative products: Section 1
- Hedger | 
- Speculator | 
- Arbitrageur | 
9.1.5 | understand and be able to create basic synthetic options and futures Section 8
- synthetic long | 
- synthetic short | 
- synthetic put | 
- synthetic call | 
**Element 9.2 Futures Spread Trading**

On completion, the candidate should:

9.2.1 | know the distinctions between intramarket spreads and intermarket spreads and the scenarios in which they may be appropriate Section 2
- what is an intramarket spread | 
- what is an intermarket spread | 
- use in differing market conditions | 
- situations resulting in profitability/loss | 
**Element 9.3 Options Strategies**

On completion, the candidate should:

9.3.1 | know the characteristics and effects of vertical spreads: Section 6
- what are vertical spreads | 
- what are bull call and bear call spreads | 
- what are bull put and bear put spreads | 
- use in differing market conditions | 
- reasons for investment | 
- anticipating modest market rises/falls (bull/bear markets) | 
- risks | 
some aspects of this learning objective may be tested by the use of simple calculations | 
9.3.2 | know the characteristics and effects of long and short straddles and strangles Section 7
- what are straddles | 
- what are strangles | 
- use in differing market conditions | 
- reasons for investment | 
- anticipating modest market rises/falls (bull/bear markets) | 
- risks | 
some aspects of this learning objective may be tested by the use of simple calculations | 
9.3.3 | be able to calculate maximum profits/losses in simple examples of the above strategies Sections 6.1, 7 | 
9.3.4 | know the uses, characteristics and effects of horizontal and diagonal spreads Section 6
- what are horizontal spreads | 
- what are diagonal spreads | 
- use in differing market conditions | 
- reasons for investment | 
- anticipating modest market rises/falls (bull/bear markets) | 
- risks | 
**Element 9.4 Basics of Hedging (Futures)**
<table>
<thead>
<tr>
<th>Syllabus Unit/Element</th>
<th>Chapter/Section</th>
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<tbody>
<tr>
<td><strong>On completion, the candidate should:</strong></td>
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<tr>
<td><strong>9.4.1</strong></td>
<td><strong>know</strong> the characteristics and implications of long and short positions</td>
</tr>
<tr>
<td><strong>9.4.2</strong></td>
<td><strong>understand</strong> the importance of hedging ratios in Cheapest To Deliver bonds (CTDs)</td>
</tr>
<tr>
<td></td>
<td>• what are CTDs</td>
</tr>
<tr>
<td></td>
<td>• what are price factors</td>
</tr>
<tr>
<td></td>
<td>• highest implied repo rate</td>
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<td></td>
<td>• number of contracts to hedge an exposure to the CTD bond</td>
</tr>
<tr>
<td></td>
<td>some aspects of this learning objective may be tested by the use of simple calculations</td>
</tr>
<tr>
<td><strong>9.4.3</strong></td>
<td><strong>understand</strong> basis, basis trading and basis risk</td>
</tr>
<tr>
<td></td>
<td>• what is basis trading</td>
</tr>
<tr>
<td></td>
<td>• what is basis risk</td>
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<td></td>
<td>• problems caused by changes in basis</td>
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<td></td>
<td>• how changes in basis be used to advantage by an investor</td>
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<tr>
<td><strong>Element 9.5 Basics of Hedging (Options)</strong></td>
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<td><strong>On completion, the candidate should:</strong></td>
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<tr>
<td><strong>9.5.1</strong></td>
<td><strong>understand</strong> the application and effects of delta hedging</td>
</tr>
<tr>
<td></td>
<td>• what is delta hedging</td>
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<tr>
<td></td>
<td>• be able to establish an investor’s net long/short position</td>
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<tr>
<td></td>
<td>some aspects of this learning objective may be tested by the use of simple calculations</td>
</tr>
<tr>
<td><strong>9.5.2</strong></td>
<td><strong>understand</strong> the uses and advantages of covered calls and covered puts</td>
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<tr>
<td></td>
<td>• what are covered calls</td>
</tr>
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<td></td>
<td>• what are covered puts</td>
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<td></td>
<td>• what is the motivation for the writer of a covered call</td>
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<td>• what is the motivation for the buyer of a protective put</td>
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<td>• risks / maximum losses</td>
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<td></td>
<td>• use in different market conditions</td>
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Examination Specification

Each examination paper is constructed from a specification that determines the weightings that will be given to each unit. The specification is given below.

It is important to note that the numbers quoted may vary slightly from examination to examination as there is an element of flexibility to ensure that each examination has a consistent level of difficulty. However, the number of questions from each section should not change by more than 2.

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<th>Section</th>
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<th>Student</th>
<th>Associate</th>
<th>Member</th>
<th>Fellow</th>
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<tr>
<td></td>
<td>ASI</td>
<td>MSI</td>
<td>FSI</td>
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</tbody>
</table>

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- Pass in IAQ, IFA, IFQ, ICFA, SII Certificate or Advanced Certificate; or
- 1 or 2 Diploma paper(s) or another relevant qualification

**Requires:**
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CHAPTER 1
INTRODUCTION TO DERIVATIVES

1. What type of option gives the holder the right to sell?
   A. Put option
   B. Call option
   C. Long option
   D. Short option

2. How can a speculator avoid taking delivery of an underlying asset in their long futures position?
   A. By selling an option on the underlying
   B. By extending the terms of the future
   C. By selling an equivalent future
   D. By renegotiating the contract

3. What type of option gives the holder the right to buy?
   A. Put option
   B. Call option
   C. Long option
   D. Short option

4. Which ONE of the following features is usually NOT associated with futures?
   A. Avoidance of having to deal with actual assets
   B. Low gearing
   C. Minimise the need for capital
   D. High gearing, high rewards

5. What makes futures contracts tradable?
   A. Their standardised nature
   B. The wide variety of delivery dates available
   C. Their OTC nature
   D. Their international nature
6. Which ONE of the following best describes the contract size for a futures contract?
   A. A variable quantity of the underlying negotiated with the futures exchange
   B. A standardised quantity of the underlying set by the futures exchange
   C. A standardised quantity of the underlying set by the buyer
   D. The price of an agreed quantity of the underlying set as standard by the futures exchange

7. If you buy an option, what is the effect of gearing for a given price change in the underlying asset?
   A. A similar proportionate change in the option value
   B. A greater proportionate change in the option value
   C. A smaller proportionate change in the option value
   D. There is no link

8. Which ONE of these statements is most accurate in relation to buying and selling options?
   A. The buyer of an option is the one who always buys the underlying from the seller of the option
   B. The seller sells the buyer the right to buy the underlying
   C. The buyer of an option is buying the right either to buy or sell the underlying
   D. The buyer buys the right to either buy or sell the underlying to the seller with a single option

9. Which ONE of the following is not a specific exercise style in options?
   A. Exotic option
   B. European option
   C. Asian option
   D. American option

10. If I have an option to buy an oil company's shares and its stock market value rises by 25 %, by how much will the value of the option rise?
    A. By a greater cash value, but a lesser percentage
    B. By a similar cash value, but a greater percentage
    C. By a similar cash value and a lesser percentage
    D. By the same percentage, but a lesser cash value
11. An investor buys a January £5 call option at 25 pence. At the expiry, the stock is at £4.75. How much will the investor lose per share?
   A. 50 pence
   B. £4.75
   C. 25 pence
   D. £5.00

12. If I write an option agreeing to buy the underlying at a given date and price, which of these have I done?
   A. Gone short a call option
   B. Gone long a call option
   C. Gone long a put option
   D. Gone short a put option

13. Which ONE of the following is an advantage of OTC options?
   A. They are often illiquid, so writers and traders are more likely to get stuck with their obligations
   B. There is no authority to guarantee obligations, creating a greater risk of defaults
   C. The transaction costs are often higher
   D. They are not standardised

14. What is a European-style option?
   A. An option traded in the European markets
   B. An option which can be executed at any time
   C. An option which can only be exercised at expiry
   D. An option on a European share

15. Who pays the premium on an option?
   A. The holder of a put
   B. The writer of a put
   C. The writer of a call
   D. The seller of a put
16. Which ONE of the following best describes a long put option?
   A. It has potential for unlimited profit and unlimited loss
   B. It has potential for limited profit and limited loss
   C. It has potential for unlimited profit and limited loss
   D. It has potential for limited profit and unlimited loss

17. If you were to buy a 100 put for a premium of 13, what would be your maximum potential profit?
   A. 100
   B. 87
   C. 13
   D. Unlimited

18. If you were to sell a 240 put option for 17, what would be your maximum profit?
   A. 240
   B. 233
   C. 17
   D. Unlimited

19. What would an investor looking to secure a minimum sale price for his assets, but to still leave potential for further profit do?
   A. Buy a call
   B. Buy a put
   C. Buy a future
   D. Sell a future

20. If you were to buy a 100 call for a premium of 13, what would be your maximum potential profit?
   A. 100
   B. 87
   C. 13
   D. Unlimited
CHAPTER 1: ANSWERS

Q1. Answer: A  
Ref: Section 3.2
A 'put option is an option to sell an asset for a specified price at a specified date or range of dates.

Q2. Answer: C  
Ref: Sections 2.1
A trader can remove any delivery obligations by taking an equal and opposite position before the expiry. This will crystallise any gains or losses.

Q3. Answer: B  
Ref: Section 3.2
A 'call option' is an option to buy an asset for a specified price at a specified date or range of dates.

Q4. Answer: B  
Ref: Sections 2.5 & 4
Futures are highly geared - what speculators can get out of them can be large in comparison to what they must put in. (On the negative side, of course, losses can likewise be comparatively large).

Q5. Answer: A  
Ref: Section 2.1 & 8
Because the futures on a given asset are standardised, each trader knows exactly what the others are offering or expecting. Delivery dates are restricted to concentrate liquidity, they are exchange-traded and not OTC and they are mainly nationally based, not international.

Q6. Answer: B  
Ref: Section 2.1
The futures exchange sets contract sizes at specific quantities of the underlying, so investors can buy multiples of that amount but not fractions - investors cannot buy part of a contract.

Q7. Answer: B  
Ref: Section 4
The option value, or premium, is much smaller than the price of the underlying so a change in the value of the underlying will tend to produce a much greater proportionate change in the value of the option.

Q8. Answer: C  
Ref: Section 3.2
An option buyer buys either an option to buy (call) or an option to sell (put) the underlying from or to the seller (or writer) for a premium.

Q9. Answer: A  
Ref: Section 3.2
Unlike the other terms, an exotic option does not specify a particular exercise style, but is a blanket term for options that are more complex than simple puts or calls.
Q10. Answer: B  Ref: Section 4
This is how gearing or leverage works and is the reason why it is possible to make large profits through options on only a modest increase in the value of the underlying - although it can, of course, also result in large losses on only a small fall in the value of the underlying.

Q11. Answer: C  Ref: Section 3.3
Rather than exercise the option, the investor abandons it and loses his premium - 25 pence.

Q12. Answer: D  Ref: Sections 3.2 & 3.3
As the writer I have sold (gone short) the option for the buyer to sell me the underlying at a fixed price in the future, hoping the price will rise and the buyer will abandon the option leaving me with the premium.

Q13. Answer: D  Ref: Section 8
Lack of standardisation is one of the benefits of OTCs because it allows all the specifications of each contract to be tailored. Disadvantages include a greater risk of default, that the transaction costs are often higher for OTC transactions and the OTC contracts are sometimes illiquid.

Q14. Answer: C  Ref: Section 3.2
European-style options are traded all over the world and may only be exercised at expiry, in contrast to American-style options which may be exercised at any time.

Q15. Answer: A  Ref: Section 3.2
The buyer of any kind of option must pay the premium to the writer (seller) of the option.

Q16. Answer: B  Ref: Sections 3.3 & 3.4
Loss is limited to the premium paid. Profit is limited to the exercise price, less the premium (as the underlying price cannot fall below zero).

Q17. Answer: B  Ref: Section 3.4
The maximum gain on a long put = strike price - premium (100 - 13 = 87).

Q18. Answer: C  Ref: Section 3.4
The maximum profit for the writer of an option is the premium.

Q19. Answer: B  Ref: Section 3.3
The put ensures the minimum price, but does not limit profits the holder of the put will let the option lapse should prices rise. Selling a future would ensure a minimum price, but would also limit potential for profit.
Q20. Answer: D Ref: Section 3.3 & 3.4
Loss is limited to the premium paid, but for the buyer of a call profit is potentially unlimited.
CHAPTER 2
SPECIAL REGULATORY REQUIREMENTS

1. Which ONE of the following would NOT be included in the FSA derivatives risk warning?
   A. An explanation of the effects of gearing
   B. Information on off-exchange transactions
   C. Details of the type of margin that is acceptable
   D. The basis on which commissions are charged

2. For how long may a firm finance a private customer’s under-margined derivatives trading without the need to have a written agreement?
   A. Three business days
   B. Five business days
   C. There is no limit as long as the firm has an adequate credit management policy
   D. The firm cannot execute the transaction if there are insufficient funds in the customers account

3. A UK, FSA authorised firm is approached by a US resident. Which ONE of the following is the firm allowed or required to do?
   A. Trade all contracts whether UK or US
   B. Only trade in UK contracts if the firm does not have CFTC part 30 exemption
   C. Must provide a segregated account
   D. May trade US contracts if the firm has CFTC part 30 exemption

4. In which ONE of the following circumstances must an FSA derivatives risk warning notice be signed and returned by the customer?
   A. Prior to recommending a derivatives transaction for an intermediate customer
   B. Prior to transacting an execution only derivatives order for a private customer
   C. Prior to recommending a contingent liability transaction to an intermediate customer
   D. Prior to acting as a discretionary manager for an intermediate customer
5. Which of the following is NOT included in a confirmation note for a derivatives transaction?
   A. Date of transaction
   B. Firm’s charges
   C. Firm’s name
   D. Time of the trade

6. A confirmation note for a derivatives transaction will include which ONE of the following?
   A. Details of profits or losses in the ‘worst’ cases
   B. Full details of the new transaction for the account
   C. Full details of the new and linked transactions
   D. The required risk warning

7. Which ONE of the following must an FSA member firm include in its derivatives risk warning statements?
   A. The effect of margin calls on the customer
   B. The level of the initial margin required from the customer
   C. A warning of the hazards of gearing and its implications
   D. A warning that these are not best execution investments

8. Where is a firm NOT permitted to hold a private customer’s margin funds?
   A. In a separate customer account
   B. In the firm’s own account
   C. In a general customer ‘pooled’ account
   D. In an exchange account designated to the customer

9. Within what period from the statement date must a periodic statement be sent to a customer for derivatives transactions?
   A. 2 days
   B. 5 days
   C. 7 days
   D. 10 days
10. Which organisation regulates options on stock indices in the US?
   A. CBOT
   B. CFTC
   C. NFA
   D. SEC
CHAPTER 2: ANSWERS

Q1. Answer: C  Ref: Section 2.2
Margin only needs to be explained - the type of margin that is acceptable varies according to the clearing house and the contracts entered into.

Q2. Answer: B  Ref: Section 3.2
This is effectively lending money to the customer which would normally require a suitability assessment and a two-way agreement. However, the firm may finance the margin requirement but only for a period of 5 business days.

Q3. Answer: C  Ref: Sections 6.3 & 6.3.1
The UK firm is only allowed to deal in UK contracts with CFTC part 30 exemption. The US resident must always be provided with a segregated account.

Q4. Answer: B  Ref: Section 2.2
The two-way risk warning requirement only relates to private customers.

Q5. Answer: D  Ref: Section 4.1
A statement that the time is available on request is sufficient.

Q6. Answer: B  Ref: Section 4.1
The profit or loss can only be provided when closing a position. The risk warnings are provided before entering into any transactions.

Q7. Answer: C  Ref: Section 2.2
The implications of gearing always have to be explained. Margins have to be explained but not their effect on the customer or the precise initial margin requirements (which vary across different contracts). Best execution is about the price at which the investments are purchased, not the investments themselves.

Q8. Answer: B  Ref: Section 3.2
Margin funds received from a customer must be placed in a client account that is segregated from the firm’s own funds or in an exchange account and credited to the account of the customer. The customers’ accounts can be general ‘pooled’ accounts or individually designated accounts. Firm’s are not permitted to hold private customers’ margin funds in house accounts.

Q9. Answer: D  Ref: Section 4.4
Firms must send customers periodic reports for derivative transactions at intervals of not greater than one month. The statements must be sent within 10 days of the date to which they relate.
Q10. **Answer: D**  
**Ref: Section 6.2.1**
The SEC regulates most US option products and option exchanges but does not regulate futures products or exchanges. The CFTC regulates options not covered by the SEC. See details in Sections 6.2.1 and 6.2.2.
CHAPTER 3
MARKETS

1. What is the rate quoted for accepting deposits in the interbank market?
   A. LIBID
   B. LIBOR
   C. LIMEAN
   D. LISTIR

2. When do UK Treasury bills typically mature?
   A. 15 days
   B. 31 days
   C. 91 days
   D. 121 days

3. What is the rate quoted for offering deposits in the interbank market?
   A. LIBID
   B. LIBOR
   C. LIMEAN
   D. LISTIR

4. What is the average rate at which funds are offered and deposits accepted in the interbank market?
   A. LIBID
   B. LIBOR
   C. LIMEAN
   D. LISTIR

5. Which ONE of the following issues Treasury Bills in the UK?
   A. The DMO
   B. The Bank of England
   C. Large corporate entities
   D. The FSA
CHAPTER 3: ANSWERS

Q1. Answer: A  Ref: Section 4.1  
The rate at which banks will accept deposits (bid) is LIBID (the London Interbank Bid) whereas LIBOR is the rate at which they will make funds available (offer).

Q2. Answer: C  Ref: Section 4.2  
UK Treasury bills are issued by the DMO and have typically a maturity of 91 days.

Q3. Answer: B  Ref: Section 1.1  
The rate at which banks will offer deposits (bid) is LIBID (the London Interbank Bid) whereas LIBOR is the rate at which they will make funds available (offer).

Q4. Answer: C  Ref: Section 1.1  
LIMEAN is the average of LIBOR and LIBID.

Q5. Answer: A  Ref: Section 1.2  
The Debt Management Office issues Treasury Bills on behalf of the UK Government.
CHAPTER 4
FINANCIAL FUTURES AND OPTIONS

1. An investor believes that a security is going to fall in price. Which ONE of the following would be an appropriate trade to benefit from the fall?
   A. Buy an in-the-money call
   B. Write an out-of-the-money put
   C. Sell an in-the-money put
   D. Buy an at-the-money put

2. Which ONE of the following explains why a trader would write a put option?
   A. He expects the price of the underlying to decrease
   B. He expects the price of the underlying to move a lot
   C. He expects the price of the underlying to move within a limited range
   D. He expects the price of the underlying to increase

3. A short call makes money in which market condition?
   A. Bullish
   B. Bearish/neutral
   C. Uncertain
   D. Volatile

4. What is the value of a 760 index put when the value at expiry of the underlying index is 772?
   A. 12
   B. 0
   C. -12
   D. 760
5. If tick size is half a point for a future on the FTSE 100 index and is valued at £5, what would be the profit for an investor who went long with the index at 4260 and then settled at expiry with the index at 4300?
   A. £4,260
   B. £200
   C. £20
   D. £400

6. An investor is short long gilt futures. If he holds this position to expiry, which ONE of the following actions will take place?
   A. He must wait until a buyer sets a delivery date
   B. He must take delivery of the gilts
   C. He must deliver the gilts
   D. He must forego any interest on the gilts delivered

7. How does a speculator seek to profit from an anticipated fall in prices?
   A. By increasing exposure to price rises
   B. By going long futures
   C. By selling a future before the term of expiry
   D. By going short futures

8. Which ONE of the following Euronext.liffe contracts is physically deliverable?
   A. FTSE 100 equity index futures
   B. JGB futures
   C. Long Gilt futures
   D. Short sterling futures

9. What is the usual underlying currency for Euro future contracts traded on CME?
   A. Euros
   B. Sterling
   C. US Dollars
   D. Yen

10. On which exchange are Yen options traded?
    A. CME
    B. EUREX
    C. Euronext.liffe
    D. PHLX
11. Which exchange has a two-way futures trading link for JGB futures with CME?
   A. CBOE
   B. Euronext.liffe
   C. MEFF
   D. SGX

12. When does delivery take place for cash settled Italian shares for Universal Stock Future traded on Euronext.liffe?
   A. First business day following the last trading day
   B. Second business day following the last trading day
   C. Third business day following the last trading day
   D. Fifth business day following the last trading day

13. Which contracts on Euronext.liffe have settlement in cash or physical delivery depending on the underlying?
   A. FTSE 100 Index Options
   B. Short Sterling Futures
   C. 10 year $ Swapnote Future
   D. Universal Stock Futures

14. Which ONE of the following is a type of wholesale trade recognised by LIFFE CONNECT™?
   A. Basis trade
   B. CMO trade
   C. Cross trade
   D. Limit trade

15. Which overseas exchange also uses LIFFE CONNECT™?
   A. CME
   B. CBOT
   C. NYMEX
   D. SGX
16. Which category of member of Euronext.liffe is restricted to trading only for third parties?
   A. Brokers
   B. Broker-Dealers
   C. Dealers
   D. General Clearing Member

17. Which order type on Euronext.liffe is to be executed at the best price available?
   A. Basis trade
   B. Contingent multiple orders
   C. Market orders
   D. Normal limit orders

18. Which contract traded on Euronext.liffe is designed to facilitate OTC products?
   A. 3-month Euribor
   B. 10 Year $ Swapnote Future
   C. Coffee Futures
   D. Universal Stock Futures

19. What did the Commodity Futures Modernisation Act 2000 permit?
   A. FLEX options
   B. Single stock futures
   C. Swap futures
   D. Synthetic futures

20. A US equity fund manager wants to hedge a $15m portfolio that tracks the S&P 500. The S&P future is at 1125 and the contract is $500 an index point. How many futures are required for the hedge?
   A. 13
   B. 27
   C. 54
   D. 300

21. What is the main difference between an equity warrant and an equity option?
   A. Warrants are only issued by the company on whose shares they are based
   B. Warrants are usually longer dated
   C. Warrants give the buyer the obligation to take up the underlying
   D. Warrants cannot be traded
22. Which ONE of the following is NOT a characteristic of warrants?
   A. They are similar to call options
   B. They form part of the equity share capital of a company
   C. They are traded on stock exchanges
   D. They give the right, not the obligation, to buy shares

23. A trader sells yen futures as a new speculative position. Which ONE of the following is TRUE?
   A. He is worried that the yen will strengthen
   B. He can reduce this position’s risk by buying a yen put
   C. He is looking to reduce the risk of any upcoming yen payments
   D. To avoid taking delivery he must buy back the equivalent yen future

24. What style is the FTSE100 option traded on Euronext.liffe?
   A. American
   B. Asian
   C. European
   D. Exotic

25. On 1 September a US importer contracts to buy German cars at a total cost of €500,000 for payment on 1 December. On 1 September the spot exchange rate is €1=$0.9978 while the December future is $0.996. By 1 December the spot rate is €1=$0.997, and the future is $0.995. What is the net cost presuming the importer has hedged using the future?
   A. $498,000
   B. $498,900
   C. $497,500
   D. $499,000
CHAPTER 4: ANSWERS

Q1. Answer: D  Ref: Section 2.4.1
If he expects the price of the underlying asset to fall, the investor is bearish and should undertake bearish trades.

Q2. Answer: D  Ref: Section 2.4
If the price of the underlying rises, the holder will not benefit from selling at the exercise price and will therefore abandon the option, leaving the writer with the premium as profit.

Q3. Answer: B  Ref: Section 2.4.1
If prices fall, the holder of the call option will let it lapse and the writer will retain the premium.

Q4. Answer: B  Ref: Section 2.3
At expiry, the put has no value to the holder as strike price is below the underlying price.

Q5. Answer: D  Ref: Section 2.3
The profit is the tick value (£5) times the number of ticks moved. Because the tick size is half a point, number of ticks moved is twice the number of points moved (40). So the equation is £5 x 40 x 2 = £400.

Q6. Answer: C  Ref: Section 1.8
The investor has sold bond futures and so must deliver one of the deliverable bonds specified on the contract. An exchange-set price factor will be applied to the bonds to ensure that the counterparty pays a fair price for the actual bonds delivered.

Q7. Answer: D  Ref: Section 2.4.1
If the price on the spot market goes down the speculator will be able purchase the underlying and sell it at the higher price agreed in the futures contract.

Q8. Answer: C  Ref: Sections 1.4, 1.5, 1.7 & 1.8
The Long Gilt future traded on Euronext.liffe is based on a notional underlying gilt but is physically deliverable using the cheapest to deliver gilt within a deliverable basket. The other contracts are cash settled.

Q9. Answer: C  Ref: Section 2.7
The CME is a US exchange and the underlying currency is usually the US Dollar.

Q10. Answer: D  Ref: Section 2.7
Yen options are traded on PHLX whilst Yen futures are traded on CME.
Q11. **Answer: D**  
Ref: Section 2.8
Since 1984, CME has had an agreement with SGX (Singapore Exchange) for a two-way futures trading link that allows traders to open a futures position on one exchange and liquidate it on the other.

Q12. **Answer: B**  
Ref: Section 2.1.2
Delivery day for all cash settled stocks except Italian stocks takes place on the first business day following the last trading day. For Italian stocks it takes place on two business days following the last trading day.

Q13. **Answer: D**  
Ref: Section 2.1.2
Universal Stock Futures based on UK stocks and all the European stocks except Finland, Norway and Denmark settle in cash. Finland, Norway, Denmark and US stocks are all physically delivered.

Q14. **Answer: A**  
Ref: Section 1.3
A basis trade is one of two types of wholesale trade recognised by LIFFE CONNECT™. It is the simultaneous exchange of a financial asset or instrument together with an appropriate offsetting number of futures contacts in a privately negotiated transaction between two parties.

Q15. **Answer: B**  
Ref: Section 1.1
LIFFE CONNECT™ has also been supplied to Chicago Board of Trade (CBOT) and the Tokyo International Financial Futures Exchange (TIFFE).

Q16. **Answer: A**  
Ref: Section 1.2
Euronext.liffe’s membership category of broker may only trade for third parties. Dealers may trade for their own account and trade for other members. Broker-Dealers are entitled to trade for both third parties and their own account. General Clearing Members are able to clear for their own principal trades, on behalf of their clients and on behalf of other Non-Clearing Members.

Q17. **Answer: C**  
Ref: Section 1.3
Market orders are to be executed at the best price available. Normal limit orders are to be executed at the stated price or better.

Q18. **Answer: B**  
Ref: Section 1.4
Swap contracts are designed to facilitate OTC swaps such as the 10 Year $ Swapnote Future.

Q19. **Answer: B**  
Ref: Section 2.1.1
In the USA single stock futures were permitted under the Commodity Futures Modernisation Act 2000.
Q20. Answer: B  Ref: Section 2.4.3
No. of futures required = value of holding divided by value of contract: 15m/(1125 x 500) = 26.67. You cannot buy fractions of contracts so you round up to 27.

Q21. Answer: B  Ref: Section 2.5
Warrants give the buyer the right to take up the underlying at a defined strike price at some time in the future. The buy or does not have an obligation to take up. Warrants are usually longer dated that stock options and can be traded on exchanges as well as over-the-counter. Warrants are issued both by the underlying company or by another organisation.

Q22. Answer: B  Ref: Section 2.5
Warrants do not become part of equity share capital until they are exercised and converted into actual shares.

Q23. Answer: D  Ref: Section 2.7
He has opened with a sale and if he does not close out he will have to make delivery of the yen. He is worried that the yen will weaken relative to the dollar.

Q24. Answer: C  Ref: Section 1.6
All FTSE 100 options on Euronext.liffe are European style.

Q25. Answer: D  Ref: Section 2.7
The future is closed out at a loss of 0.996 - 0.995 = 0.001 combined with the December spot rate of $0.997 results in an effective rate of $0.998. The net cost is $0.998 x €500,000 = $499,000.
CHAPTER 5
PRINCIPLES OF
EXCHANGE-TRADED
FUTURES AND OPTIONS

1. Which ONE of the following is a description of the activity of an ‘arbitrageur’?
   A. Using the cash market to reduce gearing
   B. Using derivatives to minimise risk on a position
   C. Seeking to profit from mis-pricings between markets
   D. Mainly trading contracts on the same underlying but different maturities

2. If a futures contract were trading significantly below its fair value, what strategy would an arbitrageur use?
   A. Spread
   B. Cash and carry arbitrage
   C. Reverse cash and carry arbitrage
   D. Reversal

3. What use would arbitrageurs make of a future when it is in the arbitrage channel?
   A. Sell it to capitalise on its low value in relation to the underlying
   B. Buy it to capitalise on its low value in relation to the underlying
   C. Buy it to capitalise on its high value in relation to the underlying
   D. Take no action

4. Which ONE of the following is an example of backwardation?
   A. Futures price at fair value, slightly higher than the cash value of the underlying
   B. Futures price below fair value, but above cash value
   C. Futures price below cash value
   D. Futures price has risen out of the arbitrage channel
5. Which ONE of these describe a situation in which the futures price is lower than the cash price of the underlying?
   A. Positive basis
   B. Carrying
   C. Negative basis
   D. In contango

6. If volatility were to rise, what would this do to options prices?
   A. Call and put premiums rise
   B. Call and put premiums fall
   C. Call premiums rise, put premiums fall
   D. Call premiums fall, put premiums rise

7. An increase in which of the following factors would cause all option premiums to increase?
   A. Time to maturity
   B. Risk-free interest rate
   C. A lower strike price
   D. Price of the underlying

8. You are short a future and buy a put. To achieve delta neutrality, what would you do?
   A. Buy calls
   B. Sell calls
   C. Buy puts
   D. Sell futures

9. Which of these statements is true in relation to intrinsic value and for time value?
   A. Time value is based on the length of an option’s risk period
   B. Time is measured by gamma
   C. Intrinsic value is negative for puts and positive for calls
   D. Only time value can fall to zero as expirations get closer
10. To liquidate a long position when the price falls below a price that is below the prevailing market would require which of the following orders?
   A. Sell stop
   B. Buy stop
   C. Sell limit
   D. Buy limit

11. If I wish my dealer to open a position by buying at the best available price once the limit has been reached, what kind of order should I give?
   A. Limit stop order
   B. Limit order
   C. MIT order
   D. Spread order

12. If I go long a call on three S&P 500 index futures where the premium is $1,500, what additional margin do I pay?
   A. $1,500
   B. $3,500
   C. $4,500
   D. Nothing

13. If the price of a future rises out of the arbitrage channel, what would arbitrageurs do?
   A. Sell the underlying and buy the future
   B. Sell the future and buy the underlying
   C. Buy the underlying and sell it at a profit
   D. Buy the underlying and buy the future

14. What would be the approximate delta of a deep in-the-money short call position?
   A. -0.5
   B. +0.5
   C. -1.0
   D. +1.0
15. A European put option has a strike price of 350p and the current price of the underlying instrument is 275p and the premium 65p. What is the best course of action for an investor?
   A. Buy the option and sell the underlying
   B. Sell the option and buy the underlying
   C. Buy the option and buy the underlying
   D. Sell the option and sell the underlying

16. I am long a coffee future at £17 a tonne and ideally want to make a profit of at least £10 and limit my loss to £7. What should I say to my dealer?
   A. Sell at limit £27, buy at £10 stop
   B. Sell at limit £10, sell at £7 stop
   C. Sell at limit £10, buy at £7 stop
   D. Sell at £27 limit, sell at £10 stop

17. Which ONE of the following transactions requires a premium to be paid rather than margin?
   A. Written options
   B. Bought options
   C. Short futures
   D. Long futures

18. You are holding a call option with a strike price of £3. If the share is currently trading at £3.30, what is the intrinsic value of this option today?
   A. 10p
   B. 25p
   C. 30p
   D. 35p

19. You are holding a call option with a strike price of £4. If the share is currently trading at £3.85, what is the intrinsic value of this option today?
   A. -15p
   B. Nil
   C. 5p
   D. 20p
20. The strike price of a put option is £2.00 and the current price is £2.20. The premium when you purchased this option was 15p and it is now 12p. What is the time value of this option today?
   A. 3p  
   B. 12p  
   C. 20p  
   D. 32p

21. Which ONE of the following best describes when a put option is out-of-the-money?
   A. When the strike price plus the premium is greater than the current market price  
   B. When the strike price plus the premium is less than the current market price  
   C. When the strike price minus the premium is less than the current market price  
   D. When the strike price is less than the current market price

22. Which one of the following is the option premium?
   A. Strike price minus time value  
   B. Intrinsic value plus strike price  
   C. Time value plus strike price  
   D. Intrinsic value plus time value

23. What is ONE advantage of Exchange Price Feeds?
   A. To allocate limit orders  
   B. To display clearing information  
   C. To match trading parties  
   D. To provide real-time prices

24. Within what time period must a block trade be reported on Euronext.liffe?
   A. 3 minutes of agreement  
   B. 5 minutes of agreement  
   C. 10 minutes of agreement  
   D. 30 minutes of agreement
25. A basis trade is agreed on Euronext.liffe at 11.00am. By what time must the trade have been reported?
   A. 11.03am  
    B. 11.05am  
    C. 11.30am  
    D. 11.35am

26. A member firm, ABC executes, confirms and matches a trade, which it pre-registers to allocate the trade to another member firm, XYZ. What is the term for this action?
   A. Assign to  
    B. Call-up  
    C. Give-in  
    D. Give-up

27. Which ONE of the following is used by an exchange to prevent traders from ‘cornering’ the market?
   A. Access restrictions  
    B. Position limits  
    C. Price limits  
    D. Contract standardisation

28. Which ONE of the following applies to segregated accounts?
   A. The customer does not have the same protection as segregated customers  
    B. The transaction ends up in a house account, separate from all other customers  
    C. Assets are protected in the event of a default by the firm  
    D. All the assets will be held in a single portfolio

29. What function does a pit observer have in relating to cross trades in an open outcry market?
   A. To allocate the position to the relevant account  
    B. To confirm time of execution  
    C. To input trades into the trade reporting system  
    D. To verify and sign off trades
30. Which TWO of the following are out-the-money? (I) put option where strike is below market price; (II) put option where strike is above market price; (III) call option where strike is above market price; (IV) call option where strike is below market price.
   A. (I) and (III)
   B. (II) and (IV)
   C. (I) and (IV)
   D. (II) and (III)
CHAPTER 5: ANSWERS

Q1. **Answer: C**  
Ref: Chapter 7, Section 1.7  
Arbitrage involves spotting mis-pricings between any two markets, including derivative markets, and profiting from the price differential.

Q2. **Answer: C**  
Ref: Section 1.7.2  
He would buy the future as it is relatively cheap and sell the cash asset - a reverse cash and carry arbitrage.

Q3. **Answer: D**  
Ref: Section 1.7  
When a future is in the arbitrage channel it is either at its fair value or transactions costs cancel out any gains that can be made from engaging in arbitrage.

Q4. **Answer: C**  
Ref: Section 1.4  
The market is said to be in backwardation when the futures prices are lower than the cash prices. Where the futures prices are higher than cash prices the market is said to be in contango.

Q5. **Answer: A**  
Ref: Sections 1.4 & 1.6  
Positive basis describes a situation in which the futures price is in backwardation - below the cash price. Basis is calculated by subtracting the futures price from the cash price, resulting in a negative basis if the market is carrying/in contango.

Q6. **Answer: A**  
Ref: Section 2.1.3  
The more volatile the price of an asset, the greater the uncertainty so the higher the time value and hence the premium. Premiums rise to compensate the writer for this additional risk.

Q7. **Answer: A**  
Ref: Sections 2.1.3 & 2.1.4  
An increase in interest rates and the price of the underlying would cause call premiums to rise, and put premiums to fall.

Q8. **Answer: A**  
Ref: Section 2.3  
Short future and buy put are negative delta positions, therefore a positive delta trade is required, so buy calls is the right choice.

Q9. **Answer: A**  
Ref: Sections 2.1.1 & 2.1.2  
The intrinsic value is the difference between the strike value and the market price. Since the buyer is not obliged to exercise, the intrinsic value cannot be negative. Time value increases in proportion to the length of time the writer is at risk from the buyer exercising.
Q10. **Answer: A**  
Ref: Section 3.2
The stop will not necessarily be executed at the stop level - it will become a market order when the price falls to the stop level. A sell limit order could sit on the order book and remain unsatisfied.

Q11. **Answer: C**  
Ref: Section 3.2
An MIT (Market If Touched) order is an order to open a position that becomes a market order once the limit has been reached.

Q12. **Answer: D**  
Ref: Section 2.3.3
There is no initial margin payment on the purchase of an option because the counterparty’s risk is covered by the premium. See table in Section 2.3.3.

Q13. **Answer: B**  
Ref: Section 1.7.1
Arbitrage works by buying whichever thing is cheaper and selling the other to generate a risk free profit.

Q14. **Answer: C**  
Ref: Section 2.3
Delta equals the change in option premium divided by the change in price of the underlying. Therefore, \( \Delta = -1 \times 1 = -1.0 \).

Q15. **Answer: C**  
Ref: Section 2.1.1
Exercise price (350p) - underlying price (275p) = intrinsic value (75p). The premium is 10p under its intrinsic value. The investor takes advantage of the low premium to buy both the option and the underlying so as to be able to deliver the underlying for a risk free profit of 10p.

Q16. **Answer: D**  
Ref: Section 3.2
Sell at £27 limit is an instruction to sell at at no less than that figure and sell at £10 stop indicates that I would like to sell as soon as the price goes to £10 or drops below.

Q17. **Answer: B**  
Ref: Section 2.1
Purchased options have no margin requirements.

Q18. **Answer: C**  
Ref: Section 2.1.1
The intrinsic value is the difference between the current share price and the strike price. Therefore the intrinsic value is 330p - 300p = 30p.

Q19. **Answer: B**  
Ref: Section 2.1.1
The intrinsic value is the difference between the current share price and the strike price, but only if that is a positive figure. The intrinsic value is zero.
Q20. Answer: B Ref: Section 2.1.2
The premium is calculated as intrinsic value plus the time value. Because we know the premium is 12p and the intrinsic value is nothing (because the option is out-of-the-money) we know that the time value must be 12p.

Q21. Answer: D Ref: Section 2.1.1
An out-of-the-money option is where there is no intrinsic value. The intrinsic value is the difference between the strike price and the underlying asset price. Where the strike price is less than the current market price, a put option is out-of-the-money.

Q22. Answer: D Ref: Section 2.1
The price paid for an option is made up of two parts, how much in-the-money the option is (intrinsic value) and expectation that it will move more into-the-money before expiry (time value).

Q23. Answer: D Ref: Section 3.5.2
Exchanges disseminate the trade reporting information through a price feed. Real-time prices and trade information is included in the feed that is available to exchange members through quote vendors.

Q24. Answer: A Ref: Section 3.5.1
On Euronext.liffe, block trades must be reported to the exchange within 3 minutes of verbal agreement being reached. Basis trades are to be reported within 30 minutes of the time the trade was organised.

Q25. Answer: C Ref: Section 3.5.1
On Euronext.liffe, basis trades are to be reported within 30 minutes of the time the trade was organised.

Q26. Answer: D Ref: Section 3.4.2
Give-ups are the sending of a trade to another member of the exchange. The member to whom the trade is given-up is said to be performing a 'give-in'.

Q27. Answer: B Ref: Section 3.3
It is always possible for someone to try and ‘corner’ the market in any asset by building up large derivatives positions. Position limits attempt to prevent this happening. Price limits are imposed to try to prevent prices moving too far, too quickly.

Q28. Answer: C Ref: Section 3.4.1
Customer’s whose accounts are segregated are protected from having to meet a defaulting firm’s liability. All of the customers’ accounts that are not segregated are treated as if they are the firm’s house positions. As a result, they will not be protected in the event of default by the firm.
Q29.  **Answer: D  Ref: Section 3.1.6**  
Cross trades in an open outcry market must be verified and signed off by pit observers when the order is executed.

Q30.  **Answer: A  Ref: Section 2.1.1**  
The intrinsic value is the difference between the exercise price and the underlying price. If you would not benefit from the price difference by exercising right now, the option has no intrinsic value and is 'out-of-the-money'. This is the case for I (selling below market price) and III (buying above market price).
CHAPTER 6
PRINCIPLES OF CLEARING

1. What activity is NOT addressed by clearing?
   A. Default
   B. Settlement
   C. Screen trading
   D. Margining

2. By which method does LCH.Clearnet become the counterparty to all Euronext.liffe trades?
   A. Assignment
   B. Novation
   C. Offsetting
   D. Registration

3. Which ONE of the following is the correct order in which LCH.Clearnet draws on its sources to cover losses arising from a member’s default?
   A. Insurance policy, default member’s margin monies and collateral, member default fund, LCH’s capital and reserves
   B. Default member’s margin monies and collateral, member default fund, insurance policy, LCH’s capital and reserves
   C. Member Default Fund, default member’s margin monies and collateral, insurance policy, LCH’s capital and reserves
   D. LCH’s capital and reserves, insurance policy, default member’s margin monies and collateral, member default fund

4. How are member’s contributions to the Member Default Fund calculated?
   A. According to the volume of clearing activity
   B. As an annual flat fee
   C. As a percentage of the annual volume of clearing activity
   D. Based on the previous 3 month’s volume of clearing activity

5. What is the role of LCH.Clearnet’s treasury function?
   A. To arrange payments for margin calls
   B. To manage the funds belonging to members
   C. To provide collateral for member’s open positions
   D. To raise funds for the Member’s Default Fund
6. What funds can LCH.Clearnet call upon as a last resort in covering a defaulting member’s liabilities?
   A. Initial margins
   B. Insurance policy
   C. LCH.Clearnet’s retained profits and capital
   D. Members Default Fund

7. How does LCH.Clearnet collect margin due on positions from members?
   A. By assigning collateral lodged by members
   B. By payments through a Bank of England account
   C. By requesting cash or collateral for each transaction
   D. By debiting members’ accounts via the Protected Payments System

8. How is the Members Default Fund funded?
   A. By bank guarantees
   B. By cash contributions
   C. By margin deposits
   D. By collateral deposits

9. Clearing members who wish to act for themselves, other members and their own clients through LCH.Clearnet are classed as which ONE of the following types of members?
   A. Exchange Members
   B. General Clearing Members
   C. Individual Clearing Members
   D. Non-Clearing Members

10. Which ONE of the following distinguishes LCH.Clearnet as operating a mutual guarantee system?
    A. A collective default fund
    B. Financial Services Compensation Fund eligibility
    C. Insurance cover
    D. Balance sheet reserves
CHAPTER 6: ANSWERS

Q1. Answer: C Ref: Section 1.1
Screen trading is under the remit of the exchange. In general, the exchange looks after the business of trading whereas clearing looks after what happens after trading.

Q2. Answer: B Ref: Section 1.1
Novation is the legal process whereby the clearing house becomes the counterparty to all trades. LCH.Clearnet is the central counterparty to Euronext.liffe.

Q3. Answer: B Ref: Section 1.3.3
In the event of a member default, LCH would first utilise the margin monies and collateral placed by the defaulting member, then the default fund contributions of that member, then other clearing member’s default fund contributions, then the insurance policy and finally the share capital and reserves of LCH.

Q4. Answer: A Ref: Section 1.3.3
Every clearing member contributes in cash to the Member Default Fund according to the volume of its clearing activities.

Q5. Answer: B Ref: Section 1.3.3
The LCH.Clearnet’s treasury function is to manage the funds belonging to members to generate a return.

Q6. Answer: C Ref: Section 1.3.3
The last source of funding to cover a defaulting member’s liabilities is the retained profits and capital of LCH.Clearnet. See details in Section 1.3.3.

Q7. Answer: D Ref: Section 1.2.1
LCH.Clearnet calls on members for margin payments as necessary and these are paid through the Protected Payments System, an automatic debit from members’ bank accounts.

Q8. Answer: B Ref: Section 1.3.3
Every clearing member contributes in cash to the Members Default Fund according to the volume of their clearing activities.

Q9. Answer: B Ref: Section 1.2
Clearing Members can be General Clearing Members or Individual Clearing Members, which means respectively that they either clear for themselves, other exchange members and direct clients or just for themselves and direct clients.
Q10.  Answer: A  Ref: Section 1.3.3
All members of LCH.Clearnet contribute to a Member Default Fund, which is available to cover the liabilities of a defaulting member. This system is known as a mutual guarantee system.
CHAPTER 7
MARGIN

1. What is the purpose of variation margining?
   A. To settle profits or losses over a period
   B. To remunerate traders
   C. To act as a one-off initial deposit
   D. To take account of changing interest rates

2. Which ONE of the following applies to broker margins?
   A. They can be greater than the corresponding LCH margin
   B. They are 15% of the underlying contract value
   C. They are based on SPAN
   D. They must be equal to the margin determined by LCH

3. What type of margin represents daily movements on open positions in derivatives?
   A. Variation
   B. Realised
   C. Initial
   D. Spread

4. What is required by the clearing house when a position is first established?
   A. House margin
   B. Initial margin
   C. Maintenance margin
   D. Variation margin

5. How does LCH.Clearnet usually collect variation margin from members?
   A. By cash payments from members
   B. By debiting the members’ central margin fund
   C. By direct debit from members’ bank accounts
   D. By bank draft from members’ Bank of England accounts
6. What price is used to mark to market all positions?
   A. Opening traded price
   B. Daily settlement price
   C. Mid market traded price
   D. Weighted average traded price

7. Which ONE of the following is accepted by LCH.Clearnet as collateral?
   A. Australian Dollars in cash
   B. Equities that are traded on AIM
   C. Japanese bonds
   D. US$ Certificates of Deposit

8. Bonds from which country are NOT acceptable as collateral by LCH.Clearnet?
   A. Australia
   B. Germany
   C. Switzerland
   D. USA

9. Where permitted, what does a credit line cover?
   A. Margin requirements of members’ clients
   B. Members’ liabilities when in default
   C. Purchase of the underlying asset on exercise
   D. Settlement payments of members

10. What is the purpose of ‘marking to market’?
    A. To calculate the value of collateral
    B. To calculate any variation margin due
    C. To establish the daily settlement price
    D. To establish the spread margin requirement

11. What type of margin is expected to be paid before the markets open?
    A. Intra-day margin
    B. Maintenance margin
    C. Spot margin
    D. Spread margin
12. What does LCH.Clearnet use London SPAN to calculate?
   A. Daily settlement prices  
   B. Initial margins  
   C. Maintenance margin  
   D. Value of collateral

13. Which ONE of the following types of margin is exclusively paid by a client to the member?
   A. Intra-day margin  
   B. Maintenance margin  
   C. Spread margin  
   D. Variation margin

14. How many possible changes in prices and volatility are examined by SPAN?
   A. 10  
   B. 13  
   C. 16  
   D. 20

15. Which ONE of the following types of margin covers the risk the default during the delivery process?
   A. Intra-day margin  
   B. Maintenance margin  
   C. Spot month margin  
   D. Variation margin

16. What method is used by London SPAN to assess volatility in options positions?
   A. Basis  
   B. Deltas  
   C. Gammas  
   D. NLVs

17. How does LCH.Clearnet calculate the amount of initial margin required to cover all contracts for each member?
   A. The difference between the settlement price and variation margin  
   B. The gross value of all positions  
   C. The 'marked to market value' of net positions  
   D. The net liquidation values
18. Spread offsets involve which ONE of the following positions?
   A. Long and short positions in the same contract in different months
   B. Long and short positions in the same contract in the same month
   C. Long positions in different contracts for the same month
   D. Short positions in different contracts for different months

19. Which ONE of the following would be the least preferable collateral for a broker to take against a written BSkyB Put option?
   A. BSkyB shares
   B. Cash
   C. Certificate of Deposit
   D. T Bill
CHAPTER 7: ANSWERS

Q1. Answer: A  Ref: Section 1.2.2
Variation margining helps protect against default by settling the profit or loss on a position daily.

Q2. Answer: A  Ref: Section 1.1
Broker margin must be at least equal to the margin required by the LCH. As long as they meet this requirement, all other aspects are determined by the broker.

Q3. Answer: A  Ref: Section 1.2.2
Initial margin is the amount paid by both parties at the outset of a contract to the clearing house. Variation margin is the amount calculated against daily price movements and paid by whomever the price is moving against.

Q4. Answer: B  Ref: Section 1.1
Initial margin is collected when a position is first established and then variation margin may be collected as the daily price of the position fluctuates.

Q5. Answer: C  Ref: Section 1.2.2
Each clearing member has at least one bank account to which LCH.Clearnet has access via a direct debit system so that variation margin payments can be transferred.

Q6. Answer: B  Ref: Section 1.2.2
At the close of each trading day all positions are ‘marked to market’ based on the daily settlement price. The daily settlement price can be referred to as the closing price as it is established at the end of the trading day. Other markets have different methods for calculating the daily settlement price.

Q7. Answer: D  Ref: Section 1.4
Certificates of Deposit denominated in £ Sterling or US Dollars are acceptable. Cash must be in one of 8 approved currencies. Details of assets acceptable and not acceptable as collateral are set out in Section 1.4.

Q8. Answer: C  Ref: Section 1.4
Swiss and Japanese bonds are not acceptable assets for collateral by LCH.Clearnet. See details in Section 1.4.

Q9. Answer: A  Ref: Section 1.5
Some exchanges allow their members to extend credit to their clients to cover margin requirements. These credit lines are subject to regulatory rules.
Q10. Answer: B  Ref: Section 1.2.1
At the close of each trading day all positions are ‘marked to market’ based on the daily settlement price. The profit/loss on the day is measured and must be paid/received from the clearing house as variation margin.

Q11. Answer: A  Ref: Section 1.2.1
Initial margin is re-computed every business day and effectively called first thing in the morning before the markets open. Where addition margin is required, the exchange may call for an extra intra-day margin, which is taken immediately from members’ PPS accounts.

Q12. Answer: B  Ref: Section 1.2.1
SPAN is a scenario-based risk programme used by LCH.Clearnet for calculating initial margins.

Q13. Answer: B  Ref: Section 1.2.3
Maintenance margin is an arrangement between the member firm and its client. A firm will usually require a client to deposit more than the initial margin and allows for the payment of some variation margin to avoid referring back to the client every day. Once the credit breaches a preset limit the member will issue a margin call expecting the client to replenish the account.

Q14. Answer: C  Ref: Section 1.3
SPAN examines price movements and changes in volatility. It then applies 16 scenarios and measures the impact on the position.

Q15. Answer: C  Ref: Section 1.2.1
A clearing house will try to minimise the speculative and delivery pressures by increasing the initial margin for those contracts where final settlement is by physical delivery. This is known as a spot month margin. This ensures that those position holders contemplating taking the contract to delivery have either the underlying asset to deliver or have allocated sufficient funds to effect settlement.

Q16. Answer: B  Ref: Section 1.3
Options positions will be affected by volatility and London SPAN uses deltas to calculate the equivalent number of futures to quantify any potential offset.

Q17. Answer: D  Ref: Section 1.3
Because initial margin requirements are based on the net positions held by the member firm and there may be a variety of positions held, the calculation of the amount due is based on the net liquidation values (NLVs) of the constituent parts of the portfolio.
Q18.  Answer: A  Ref: Section 1.2.1
Spreads involve more than one position across different delivery months in the same contract. The two positions largely offset each other.

Q19.  Answer: A  Ref: Section 1.4
The writer of a BSkyB Put option has an obligation to take delivery of the shares and therefore needs cash to pay for those shares. If the Put is exercised it will be because the value of BSkyB shares is falling.
CHAPTER 8
DELIVERY AND SETTLEMENT

1. Which ONE of the following is normally used to settle a contract for differences?
   A. Exchange of documents
   B. Exchange of financial futures
   C. Exchange of the underlying
   D. Cash

2. Which ONE of the following option positions would usually be exercised before its expiry date?
   A. Long dated, deep-in-the-money, European style
   B. Long dated, out-of-the-money, American style
   C. Short dated, deep-in-the-money, American style
   D. Short dated, out-of-the-money European style

3. Which formula is generally used to calculate the Invoice Amount on a physically delivered contract?
   A. EDSP x Scaling Factor x Number of Contracts
   B. (EDSP/Scaling Factor) x Number of Contracts
   C. (Settlement Price/Scaling Factor) x Number of Contracts
   D. Traded Price x Scaling Factor x Number of Contracts

4. What are the FIFO and LIFO methods used for?
   A. Contract close outs
   B. Price conditions
   C. Settlement calculations
   D. Warrant exercise

5. What does Euronext.liffe use the EDSP for?
   A. The closing price of a future
   B. It is the amount to be paid on delivery
   C. The maximum profit or loss on a contract
   D. The price of the underlying asset on open positions
6. What is the term used when a trader closes-out a position for a nominal amount to crystallise a loss?
   A. Abandonment
   B. Assignment
   C. Cabinet trade
   D. Basis trade

7. Which ONE of the following is the usual procedure when a futures contract is being physically delivered?
   A. The buyer nominates the time and place of delivery
   B. The clearing house gives instructions on delivery
   C. The exchange stipulates the delivery time
   D. The seller gives notice of intention to deliver

8. How is the automatic exercise by LCH.Clearnet of ICE Futures’ options prevented?
   A. By filing an assignment notice
   B. By filing a give-up notice
   C. By filing a registration notice
   D. By filing a suppression notice
CHAPTER 8: ANSWERS

Q1. Answer: D Ref: Section 1.3.2
A contract for differences can only be settled in cash.

Q2. Answer: C Ref: Section 2.6
American style options can be exercised before their expiry date. It is feasible to exercise early when the following three criteria are met: i) American style; ii) deep-in-the-money - having intrinsic value; and iii) close to expiry or short dated, with very little time value left.

Q3. Answer: A Ref: Section 1.3.1
For physically delivered contracts the futures buyers will receive an invoice for the asset and have to pay the amount stated in the invoice. This is calculated using the formula EDSP X Scale Factor x Number of Contracts. For bond futures the calculation differs to include the Price Factor and Accrued Interest.

Q4. Answer: A Ref: Section 1.2
There are various common methods used to perform close-outs where positions have been held gross. See details in Section 1.2.

Q5. Answer: A Ref: Section 1.4
Euronext.liffe uses the EDSP as a future’s closing price.

Q6. Answer: C Ref: Section 2.4
A trader may need to crystallise a loss for tax or accounting purposes and instead of abandoning the option will close-out the position for a nominal amount. This is known as a cabinet trade.

Q7. Answer: D Ref: Section 1.3
Futures sellers give notice declaring their intention to deliver the asset to the clearing house. The clearing house assigns the assets to the futures buyers and if there is any flexibility in the contract, the seller can nominate what, where and when to deliver.

Q8. Answer: D Ref: Section 2.5
If an ICE Futures option is not to be automatically exercised by LCH.Clearnet a suppression notice must be filed.
CHAPTER 9
TRADING, HEDGING AND INVESTMENT STRATEGIES

1. What do speculators investing in derivatives seek to maximise?
   A. Revenue
   B. Profits
   C. Portfolio size
   D. Fair value

2. Which ONE of the following might be a likely scenario for a futures hedge?
   A. An investor notices that grain futures can be purchased more cheaply in London than in Chicago
   B. A company dealing in a commodity wishes to capitalise on the rising price of that commodity
   C. A company requiring a commodity wishes to protect itself against possible price rises
   D. An investor anticipating a rise in bond yields following an interest rate change

3. How would you create a synthetic long future?
   A. Buy a call and buy a put
   B. Buy a call and sell a put
   C. Sell a call and sell a put
   D. Sell a call and buy a call

4. What action would an investor take if he expected volatility to rise?
   A. Sell a call and buy a call on the same underlying
   B. Sell a put and buy a put on the same underlying
   C. Sell a call and sell a put on the same underlying
   D. Buy a call and buy a put on the same underlying
5. Which one of the following is a type of calendar spread?
   A. Vertical spread
   B. Temporal option
   C. Directional spread
   D. Horizontal spread

6. How is a bear spread constructed?
   A. Selling a put and buying a call with a higher strike price
   B. Buying a call and selling a call with a higher strike price
   C. Selling a put and buying a put with a higher strike price
   D. Buying a put and selling a put with a higher strike price

7. An investor bought 1 June 100 call for 22 and sold 1 June 120 call for 6. What market expectation did he have?
   A. Neutral
   B. Volatile
   C. Moderately bullish
   D. Bearish

8. Where does breakeven occur in a naked short call?
   A. Stock price at expiry = strike price - premium
   B. Stock price at expiry = strike price
   C. Stock price at expiry = strike price + premium
   D. Stock price at expiry + premium = strike price

9. If you sell a straddle, what are you seeking to profit from?
   A. Time value
   B. Decreasing volatility
   C. Increasing volatility
   D. A rise in the price of the underlying

10. An investor sells a July 100 call and buys a July 90 call on the same underlying. What strategy is this?
    A. Vertical spread
    B. Horizontal spread
    C. Diagonal spread
    D. Simple spread
11. If an investor bought a call with a higher strike and a put with a lower strike on an oil future, what would this strategy be called?  
A. Short straddle  
B. Long strangle  
C. Bear spread  
D. Bull spread  

12. Which TWO of the following are types of bull spread? (I) a long spread; (II) a short spread; (III) a put spread; (IV) a call spread.  
A. (I) and (II)  
B. (I) and (IV)  
C. (III) and (IV)  
D. (II) and (III)  

13. What action would an investor take where he was anticipating a change in the difference between a futures price and the cash price of its underlying asset?  
A. Naked purchase  
B. Basis trade  
C. Intermarket spread  
D. Naked sale  

14. Which of the following is an example of an intra-market spread?  
A. Buying 250 June calls, selling 250 September calls  
B. Selling 200 June puts, selling 220 September calls  
C. Buying 240 June calls, buying 260 September calls  
D. Buying September futures, buying November futures  

15. A covered call is closest to which of these?  
A. Synthetic short put position  
B. Synthetic short call position  
C. Synthetic long call position  
D. Synthetic long put position  

16. Which of the following is involved in a long hedge?  
A. A stop order  
B. Selling short  
C. Buying futures  
D. Intra-market spread
17. How many bond futures would be traded to hedge an anticipated holding of €50 million nominal of the cheapest to deliver bond? The contract size is €250,000, the price factor of the CTD is 1.112233 and the notional coupon is 6%.
   A. 180
   B. 200
   C. 222
   D. 247

18. When is a change in basis profitable for the short hedger (short the future, long the underlying)?
   A. Cash prices go down while futures remain steady
   B. Cash prices move from a premium over to a discount under futures
   C. Futures and cash move in unison
   D. Future prices goes down while the cash price remains unchanged

19. Which ONE of the following is a characteristic of Geared Futures and Options Funds?
   A. Short-term borrowings are permitted
   B. Freely marketable to private customers
   C. Initial margin payments are limited
   D. All outstanding derivative transactions must be covered

20. What is considered a disadvantage of using a Collective Investment Scheme for investing in derivatives?
   A. Diversification of derivative instruments
   B. Higher management fees
   C. Losses are restricted
   D. Professional management
CHAPTER 9: ANSWERS

Q1. Answer: B  Ref: Section 1
Speculators seek to maximise profits.

Q2. Answer: C  Ref: Section 3
This is the typical reason for a hedge. If the company goes long a future in the commodity it wishes to purchase, then even if the price goes up, the value of the future will go up too, offsetting the extra expenditure the company will have to make on the commodity in the spot market. This is a ‘long hedge’.

Q3. Answer: B  Ref: Section 8
A synthetic long future results where ‘matching’ short put and long call options positions are taken on a future. An investor would buy a call and sell a put with the same strike price and expiry.

Q4. Answer: D  Ref: Sections 7.1 & 7.3
Calls and puts are bought in combination if volatility is expected to rise, creating a long straddle or long strangle.

Q5. Answer: D  Ref: Section 6
A horizontal spread is one type of calendar spread, involving buying and selling the same option across different expiry months.

Q6. Answer: C  Ref: Section 6.1
For a bear spread you buy the high strike and sell the low strike.

Q7. Answer: C  Ref: Section 6.1
The investor has bought the call with the lower strike price, and sold the call with the higher strike price, creating a bull spread.

Q8. Answer: C  Ref: Section 5.1
The writer of a call option will break even if the price of the underlying is equal to the price agreed for the holder to pay at expiry, plus the premium already paid.

Q9. Answer: B  Ref: Section 7.2
Straddles are volatility trades, and an investor selling a straddle will profit if the underlying price is stable.
Q10. **Answer: A**  
*Ref: Section 6*  
Vertical spreads, or price spreads, take place when an investor buys and sells options that have varying strike prices, but have the same expiry date. This investor has created a vertical, bull spread.

Q11. **Answer: B**  
*Ref: Section 7.3*  
Strangles are constructed using calls and puts with different exercise prices. Here, the options are bought, so it is a long strangle.

Q12. **Answer: C**  
*Ref: Section 6.1*  
A bull spread is one in which the investor goes long on an option with a lower exercise price and short on an option with a higher exercise price. These may both be calls or may both be puts.

Q13. **Answer: B**  
*Ref: Section 3.1*  
Basis traders profit from the fluctuating difference between a futures price and the cash price of its underlying asset - that is, the basis. They take the form of intramarket, not intermarket, spreads.

Q14. **Answer: A**  
*Ref: Section 2.1*  
Spreads require buy and sell transactions on the same underlying asset. Intra-market spreads are trades based on the simultaneous buying and selling of futures with different expiry dates on the same underlying asset.

Q15. **Answer: A**  
*Ref: Sections 5.1 & 8*  
A long underlying and a short call together create the profit and loss profile of a short put. A synthetic short put is where an investor sells a call and buys a future - effectively a covered short call position.

Q16. **Answer: C**  
*Ref: Section 3*  
‘Long’ means ‘buy’ in derivatives jargon. Hedgers will offset risk by taking an opposite position in the futures market.

Q17. **Answer: C**  
*Ref: Section 3*  
To calculate the number of contracts needed the Price factor is multiplied by the Nominal value of the CTD portfolio divided by the Nominal value of the contract. Therefore \(1.112233 \times (\text{€50m} / \text{€250,000}) = 222\).

Q18. **Answer: D**  
*Ref: Section 3.1*  
Basis is the difference between the cash and futures prices. The short hedger has sold the future and holds the physical asset. Therefore he will benefit if he can close out his position by buying back the future at a lower price whilst still getting the same cash price for the underlying physical asset.
Q19. Answer: C  Ref: Section 9.2
Geared Futures and Options Funds are restricted to a maximum of 20% of the current fund value that can be used for initial margins or premiums. They are not required to cover outstanding derivative transactions, they cannot borrow and have marketing restrictions.

Q20. Answer: B  Ref: Section 9
Although there are advantages of investing in derivatives by way of pooled funds, the management fees are relatively high. See details in Section 9.
PRACTICE EXAMINATION
1. What is the tick size?
   A. The maximum price movement in the spot market
   B. The minimum price movement in the spot market
   C. The maximum price movement in the futures market
   D. The minimum price movement in the futures market

2. What is the fair value of the S&P 500 future to the nearest index point, given that the S&P index is at 1150, interest rates are 5% pa, the dividend yield is 3.5% pa and there are 105 days to expiry?
   A. 1144
   B. 1150
   C. 1155
   D. 1183

3. Euronext.liffe uses the trade registration system for all of the following, EXCEPT:
   A. Account assignment
   B. Trade allocation
   C. Trade matching
   D. Trade settlement

4. Who issues the tender notice for physically delivered futures?
   A. The buyer
   B. The clearing house
   C. The exchange
   D. The seller

5. What is a feature of speculative derivative positions?
   A. They offset risk
   B. They are highly risky
   C. They guarantee returns
   D. They provide liquidity
6. Which ONE of the following is an inter-market spread that anticipates a steepening of the yield curve?
   A. Buying October short sterling contracts and selling July short sterling contracts
   B. Buying October short sterling contracts and selling October long gilt contracts
   C. Buying July short sterling contracts and selling October long gilt contracts
   D. Buying July short sterling contracts and selling October short sterling contracts

7. For which ONE of the following are direct offer promotions to private customers permitted without restriction?
   A. Futures
   B. Options
   C. Open Ended Investment Companies
   D. Warrants

8. What is the initial step taken by LCH.Clearnet when a member defaults?
   A. It calls upon its insurance cover
   B. It cancels both positions
   C. It draws upon that member’s margin monies
   D. It finds another party to take on the position

9. What is ‘spot month margin’?
   A. Additional margin to minimise any volatility near expiry date
   B. Final margin payable in the delivery month
   C. Balance of margin charged at the end of each month
   D. Refund of margin in the delivery month

10. What is the fair value of a futures contract with 40 days to expiry where the cash price of the asset is £650, the short-term interest rate is 4% pa and the estimated storage costs are 0.5% pa?
    A. £646.81
    B. £647.51
    C. £651.24
    D. £653.19
11. An investor who takes a bull position has which ONE of the following views?
   A. He thinks prices are stable
   B. He thinks prices are volatile
   C. He thinks prices will fall
   D. He thinks prices will rise

12. What is the main reason why a futures position might be closed out?
   A. To avoid possible delivery of the underlying
   B. To create an arbitrage position
   C. To enable delivery of the underlying
   D. To generate an offset for spread margin

13. Which ONE of the following is NOT required to be disclosed before a private customer deals in contingent liability investments?
   A. Acceptable forms of margin
   B. Amount of margin required
   C. Circumstances under which margin may be required
   D. Steps taken by the firm if margin is not provided

14. Which ONE of the following option strategies is a spread?
   A. Buying a call on one asset and selling a call on a related asset
   B. Buying a call and selling a call on the same asset
   C. Selling two calls with the same exercise price and expiry in the same asset
   D. Selling a call on one asset and selling a call on a related asset with the same exercise price and expiry

15. What is the contract size for universal stock futures on UK shares that are traded on Euronext.liffe?
   A. 10 shares
   B. 100 shares
   C. 1000 shares
   D. 10,000 shares
16. If the future is trading above its fair value, which of the following trades is the arbitrager most likely to undertake?
   A. Basis trade
   B. Cash and carry
   C. Contango trade
   D. Reverse cash and carry

17. Clearing members who wish to act for themselves and their direct clients only through LCH.Clearnet are classed as which ONE of the following types of members?
   A. Exchange Members
   B. General Clearing Members
   C. Individual Clearing Members
   D. Non-Clearing Members

18. What is the purpose of EDSP for physically delivered contracts?
   A. To calculate daily variation margin
   B. To calculate the number of futures a hedge requires
   C. To create an option strike price
   D. To provide the final price to close outstanding futures

19. The reporting and allocating of trades on Euronext.liffe is carried out by which system?
   A. Clearing Process System
   B. Trade Registration System
   C. LIFFE CONNECT
   D. SELECT

20. There is potential unlimited downside in the options market for which ONE of the following?
   A. Buying a call
   B. Writing a call
   C. Buying a put
   D. Writing a put
21. What percentage of the value of a Futures and Options Fund can be used to buy approved derivatives?
   A. 5%
   B. 10%
   C. 15%
   D. 20%

22. What type of market is it where future prices are lower than cash prices?
   A. Arbitrage
   B. Backwardation
   C. Basis
   D. Contango

23. How do the clearing houses demand margin in the UK and US?
   A. On gross positions in both UK and US
   B. On net positions in both UK and US
   C. On gross positions in the UK and net positions in the US
   D. On net positions in the UK and gross positions in the UK

24. Which of the following creates a synthetic short call?
   A. Buy a future and buy a put
   B. Sell a future and sell a put
   C. Sell a call and buy a future
   D. Sell a call and buy a put

25. What style are FTSE 100 Index options on Euronext.liffe?
   A. American
   B. Asian
   C. European
   D. Exotic

26. Which ONE of the following investments would normally be expected to have the highest gearing to share price movements?
   A. Cumulative Redeemable Preference Shares 2010
   B. Deferred Ordinary Shares converting in 2010
   C. Unsecured Loan Stock 2010
   D. Warrants exercisable until 2010
27. By which process is each registered trade is cancelled and substituted by two new ones by the clearing house?
   A. Assignment
   B. Novation
   C. Principal-To-Principal
   D. Registration

28. What is the contract size for Italian universal stock futures traded on Euronext.liffe?
   A. 10 shares
   B. 100 shares
   C. 1,000 shares
   D. 10,000 shares

29. On which exchange are Russian Rouble futures traded?
   A. CME
   B. Eurex
   C. Euronext.liffe
   D. PHLX

30. How is a short strangle constructed?
   A. Buy a call and a put with the same expiry but different strikes
   B. Buy a call and sell a put with different expiry and strikes
   C. Sell a call and a put with same expiry but different strikes
   D. Sell a call and buy a put with different expiry and strikes

31. The difference between cash and futures prices is measured by which ONE of the following?
   A. Basis
   B. Delta
   C. Fair value
   D. Gamma
32. Which ONE of the following products can be traded on both the SGX and the CME?
   A. S&P 500 futures
   B. CAC futures
   C. DAX futures
   D. Nikkei 225 futures

33. An option where the price is based on an average over a period of time is known as what style?
   A. American
   B. Asian
   C. European
   D. Exotic

34. What is NOT an acceptable form of margin by LCH.Clearnet?
   A. Cash in Australian Dollars
   B. Gilts denominated in euros
   C. US Dollar Certificates of Deposit
   D. UK T Bills

35. What action would an investor be likely to take if he considered that the spread in a backwardation market between futures traded on the same underlying asset was going to narrow?
   A. Buy the spread
   B. Sell the spread
   C. Buy a future
   D. Sell a future

36. A US equity fund manager wants to hedge a $20m portfolio that tracks the S&P 500. The S&P future is at 1225 and the contract is $500 an index point. How many futures are required for the hedge?
   A. 13
   B. 33
   C. 54
   D. 300
37. If the 1800 call premium is 149, the 1800 put premium is 147 and the underlying is 1835. What is the time value?
   A. Call = 114, Put = 0
   B. Call = 114, Put = 147
   C. Call = 184, Put = 0
   D. Call = 184, Put = 147

38. What is the PPS used by LCH.Clearnet?
   A. A margin system
   B. A payment collection system
   C. A registration system
   D. A trading system

39. Net Liquidation Value is associated with which ONE of the following?
   A. Brent Crude Delivery Range
   B. Euronext.liffe TRS system
   C. LCH.Clearnet Span margin
   D. LME Copper warrants

40. What is the maximum loss for a buyer of a put and call on ABC plc shares, where the December 525 call has been purchased for 49 pence and the December 525 put has been purchased for 23 pence?
   A. 23 pence
   B. 26 pence
   C. 49 pence
   D. 72 pence

41. If the underlying is at 250, which TWO of the following options are regarded as in-the-money?
   I. 240 call
   II. 240 put
   III. 260 call
   IV. 260 put
   A. I and II
   B. I and IV
   C. II and III
   D. III and IV
42. Under which ONE of the following circumstances would a signed risk warning be required from private customers?
   A. When they are ordinarily resident outside the UK
   B. When the firm deals in warrants on a discretionary basis
   C. When dealing in a warrant attached to a bond
   D. When realising an existing warrant

43. For what period of time are credit lines permitted by the FSA without a formal written agreement?
   A. 2 days
   B. 5 days
   C. 7 days
   D. 10 days

44. What is a feature of Geared Futures and Options Funds (GFOFs)?
   A. Cover for open positions is not required
   B. Marketing to investors is not restricted
   C. Maximum of 15% of fund to buy derivatives
   D. Short-term borrowings are permitted

46. Which dealings does CFTC Part 30 make illegal without NFA authorisation?
   A. US customers dealing on non-US exchanges
   B. US customers dealing on US exchanges
   C. US customers dealing on any exchanges
   D. Overseas customers dealing on US exchanges

47. Time decay works in favour of which ONE of the following?
   A. Option holders
   B. Option writers
   C. Futures buyers
   D. Futures sellers

48. What is the strategy where an investor sells a December 500 put and buys a January 500 put?
   A. Diagonal spread
   B. Horizontal spread
   C. Inter-market spread
   D. Vertical spread
49. Which type of derivative user is looking to take advantage of mis-pricings?
   A. Arbitrageurs
   B. Hedgers
   C. Speculators
   D. Traders

50. What is a futures contract where the underlying CANNOT be physically delivered also called?
   A. Agency cross
   B. Backwardation contract
   C. Contract for difference
   D. Traded future

51. What is the price quote of long gilt futures on Euronext.liffe?
   A. £100 nominal
   B. £1,000 nominal
   C. £10,000 nominal
   D. £100,000 nominal

52. Which ONE of the following forms of collateral is NOT subject to being ‘marked to market’ daily?
   A. Euros in cash
   B. FTSE 100 equities
   C. UK T Bills
   D. US dollar Certificates of Deposit

53. What is the likely outcome at expiry for a far out-of-the-money option?
   A. Be abandoned
   B. Be assigned
   C. Be closed out
   D. Be exercised

54. What is the movement of the price of the option in relation to the movement of the price in the underlying asset known as?
   A. Beta
   B. Delta
   C. Gamma
   D. Theta
55. How frequently does the DMO issue Treasury Bills?
A. Daily
B. Weekly
C. Monthly
D. Quarterly

56. How is a bull spread constructed?
A. Buying a call and selling a call with a higher strike price
B. Buying a call and selling a put with a higher strike price
C. Selling a put and buying a call with a higher strike price
D. Selling a put and buying a put with a higher strike price

57. What is the measure of the rate of change of delta known as?
A. Beta
B. Basis
C. Gamma
D. Fair value

58. Which ONE of the following would sell short-term interest rate calls to hedge?
A. A bank which has made a floating rate loan
B. A company with a floating-rate loan
C. A trader with a long bond position
D. A trader who is exposed to the euro market

59. Which ONE of the following is NOT required to be included in periodic statements in respect of derivatives transactions?
A. Collateral held and its value
B. Delivery details for open positions
C. Option account valuations
D. Payments received and made

60. When is payment of an option’s premium normally received by the seller?
A. Immediately
B. Morning of the next business day
C. Upon receipt of the confirmation
D. After 3 business days
61. What is the breakeven point for a holder of a call option with a premium of 15p, a strike price of 200p and a current market price of 210p?
   A. 185p
   B. 210p
   C. 215p
   D. 225p

62. What is the average rate quoted for banks accepting deposits in the interbank market?
   A. LIBID
   B. LIBOR
   C. LIMEAN
   D. LISTIR

63. If I have a long position in an Euronext.liffe 3 month sterling option, what margin do I pay?
   A. None
   B. Initial
   C. Spot month
   D. Variation

64. The daily payment on the profit/loss on futures positions measured by the clearing house is known as which ONE of the following?
   A. Initial margin
   B. Intra-day margin
   C. Maintenance margin
   D. Variation margin

65. What is the tick value of Euronext.liffe’s 3 month short sterling contract?
   A. £1.00
   B. £5.00
   C. £10.00
   D. £12.50
66. Who initiates the exercise process for physically delivered options?
   A. The buyer
   B. The clearing house
   C. The exchange
   D. The seller

67. Open interest is best described by which ONE of the following?
   A. Average number of long and short contracts awaiting delivery
   B. Daily volume in contracts after deduction of closed positions
   C. Difference between the number of long and short positions
   D. Total number of all open positions for delivery month

68. Futures products traded on PHLX are regulated by which ONE of the following?
   A. CFTC
   B. FSA
   C. NRA
   D. SEC

69. How do members of Euronext.liffe report open interest?
   A. Through SWORD
   B. Through TRS
   C. Via LIFFE CONNECT™
   D. Via LCH.Clearnet

70. An investor buys 3 futures contracts in a Universal Stock Future in ABC shares. It is currently priced at €15, the October future is priced as €15.30 and the contract size is 100 shares. On the last trading day the share price has risen to €16.20. What is the profit?
   A. €90
   B. €180
   C. €270
   D. €360
PRACTICE EXAMINATION ANSWERS
Q1. Answer: D Ref: Chapter 1, Section 2.1
The tick size is the smallest possible move in the price of a future.

Q2. Answer: C Ref: Chapter 5, Section 1.3.1
Fair value = cash price + costs of carry. To calculate the cost of carry, you must look at the interest and add back the benefit from dividends. Interest is $1150 \times 5\% \times 105/360 = 16.77$. Dividend is $1150 \times 3.5\% \times 105/306 = 11.73$. So the fair value is $1150 + 16.77 - 11.73 = 1155$.

Q3. Answer: D Ref: Chapter 4, Section 1.3
The Trade Registration System used by Euronext.liffe confirms and matches trades and assigns those trades to the appropriate clearing member’s segregated or non-segregated account. Settlement of Euronext.liffe’s trades take place with LCH’s procedures.

Q4. Answer: D Ref: Chapter 8, Section 1.3
Futures sellers give notice declaring their intentions to deliver the asset to the clearing house. This is known as a ‘tender notice’.

Q5. Answer: B Ref: Chapter 1, Section 2.5.1
Speculative positions taken in derivatives involve a high degree of risk.

Q6. Answer: B Ref: Chapter 9, Section 2.2
Inter-market spreads are based on simultaneously buying and selling futures on different underlying assets. The motivation for these trades is often that the price relationship between two correlated products has temporarily broken down or has moved outside its normal range. A trade that anticipates a steepening of the yield curve would involve buying short sterling contracts and selling long gilt contracts for the same month.

Q7. Answer: C Ref: Chapter 2, Section 2.1
Direct offer promotions are only allowed for derivatives (including warrants) if the firm has adequate evidence to suggest it is suitable for the person to whom it is communicated.

Q8. Answer: C Ref: Chapter 6, Section 1.3.3
In the event of a clearing member defaulting on its obligations, LCH.Clearnet first draws on the default member’s margin monies, then the default member’s default fund contributions, then other member’s default fund contributions, then the insurance policy and finally the retained profits and capital of LCH.Clearnet.

Q9. Answer: A Ref: Chapter 7, Section 1.2.1
As a contract nears its expiry date, its volatility can increase. The clearing house tries to minimise the speculative and delivery pressures by increasing the initial margin, known as ‘spot month margin’ as delivery draws near.
Q10. Answer: D  Ref: Chapter 5, Section 1.3.1
The cost of carry is made up of the interest and storage costs. Interest is £650 \times 4\% \times \frac{40}{365} = 2.84. Storage costs are £650 \times 0.5\% \times \frac{40}{365} = 0.35. The fair value = £650 + 2.84 + 0.35 = £653.19.

Q11. Answer: D  Ref: Chapter 1, Section 7
A bull is someone who thinks prices will rise. A bear thinks prices will fall.

Q12. Answer: A  Ref: Chapter 8, Section 1.2
Holders of futures contracts have three choices - i) to close-out before expiry; ii) to roll the position forward by closing out and simultaneously taking a new position; or iii) proceeding to delivery. Closing contracts before delivery will avoid the need to make or take delivery and enable the holder to realise any profit or loss on the position.

Q13. Answer: B  Ref: Chapter 2, Section 3
There are clear guidelines from the FSA as to the information regarding margin to be disclosed to a private customer prior to dealing in a contingent liability transactions. The amount of margin required will only be known once the customer deals.

Q14. Answer: B  Ref: Chapter 9, Section 6
In the options market a spread is created by buying & selling either puts or calls, in the same underlying asset.

Q15. Answer: C  Ref: Chapter 4, Section 2.1.1
Euronext.liffe universal stock futures on UK shares are for 1,000 shares per contract.

Q16. Answer: B  Ref: Chapter 5, Section 1.7.2
The arbitrageur would sell futures and buy the cash asset, known as a cash and carry trade.

Q17. Answer: C  Ref: Chapter 6, Section 1.2
Clearing Members can be Individual Clearing Members, which means that they either clear for themselves and direct clients, or General Clearing Members who can clear for themselves, other exchange members and direct clients.

Q18. Answer: D  Ref: Chapter 8, Section 1.4
The EDSP is the sole price at which all outstanding futures (bought and sold) will be closed. For cash settled contracts EDSP is the final price at which variation margin changes hands.

Q19. Answer: B  Ref: Chapter 4, Section 1.3
Euronext.liffe uses the Trade Registration System to report and allocate trades. LIFFE CONNECT™ is the electronic trading system used by Euronext.liffe.
Q20. Answer: B Ref: Chapter 1, Section 3.4
Only a writer of an option, either a call or put, has a risk greater than their initial investment. The holder or buyer of options has the choice not to exercise and would only lose the premium cost. The writer of a put option could only suffer a loss of the strike price less the premium, if the underlying price fell to zero. However, the writer of a call option could be forced to buy the share to deliver if exercised against and has the potential maximum loss.

Q21. Answer: B Ref: Chapter 9, Section 9.2
A Futures and Options Fund is permitted to have a maximum of 10% of the fund value to buy approved derivatives.

Q22. Answer: B Ref: Chapter 5, Section 1.4
A market where there is a net benefit in holding the asset to delivery means futures prices are lower than cash prices. The market is said to be in backwardation.

Q23. Answer: D Ref: Chapter 7, Section 1.1
In the UK, LCH.Clearnet demands margins from each type of account on the basis of the net positions. Clearing houses in the US demand margin on gross positions.

Q24. Answer: B Ref: Chapter 9, Section 8
A synthetic short call is created where an investor sells a future and sells a put.

Q25. Answer: C Ref: Chapter 4, Section 1.6
All of the FTSE 100 index options on Euronext.liffe are European style. The American style options were de-listed in 2004.

Q26. Answer: D Ref: Chapter 1, Section 4
Warrants are more highly geared than other types of shares or debt as they cost very little in comparison to the value of the share that they give the right to buy.

Q27. Answer: B Ref: Chapter 6, Section 1.1
Novation is the legal process whereby the clearing house becomes the legal counterparty to all trades. In this process the clearing house is substituted as the buyer to every seller and the seller to every buyer. Hence the original contract becomes two new contracts.

Q28. Answer: C Ref: Chapter 4, Section 2.1.2
Universal stock futures traded on Euronext.liffe have a contract size of 100 shares with the exception of UK and Italian stocks, which are set at 1,000 shares per contract.
Q29. Answer: A Ref: Chapter 4, Section 2.6
CME (Chicago Mercantile Exchange) trades a range of currency futures including Russian Roubles. PHLX trades currency options.

Q30. Answer: C Ref: Chapter 9, Section 7.4
A short strangle is created by selling a call and a put with different strike prices but the same expiry date.

Q31. Answer: A Ref: Chapter 5, Section 1.6
Basis is a measure of the difference between cash and future prices.

Q32. Answer: D Ref: Chapter 4, Section 2.2
Nikkei 225 futures can be traded on the OSE, SGX and CME.

Q33. Answer: B Ref: Chapter 1, Section 3.2
An Asian style option is where the pricing is based on an average price over a period of time. American style options can be exercised at any time up to and including the expiry date. European options can only be exercised on its expiry date.

Q34. Answer: A Ref: Chapter 7, Section 1.4

Q35. Answer: B Ref: Chapter 5, Section 1.6.2
To take advantage of a narrowing spread in a backwardation market, an investor would sell the spread. This involves selling the near-dated instrument and simultaneously buying the far-dated instrument.

Q36. Answer: B Ref: Chapter 4, Section 2.4.3
No. of futures required = value of holding divided by value of contract: 20m/(1225 x 500) = 32.6. You cannot buy fractions of contracts so you round up to 33.

Q37. Answer: B Ref: Chapter 5, Section 2.1.2
Remember, intrinsic value is never negative, so the time value is the whole premium for the out-of-the-money options - 1800 Put. For the others, the time value is the premium minus the intrinsic value, which is the underlying price minus the exercise price for a call, and the exercise price minus the underlying price for a put. 1800 Call = 149 - (1835 -1800) = 114.

Q38. Answer: B Ref: Chapter 6, Section 1.2.1
The PPS - Protection Payment System is used by LCH.Clearnet to collect any margin due from members by way of an automatic debit from members’ bank accounts.
Q39. Answer: C  Ref: Chapter 7, Section 1.3
London SPAN is used by LCH.Clearnet to calculate overall initial margin requirements for each member. As this is based on the net positions and there may be a variety of positions held, the calculation of the amount due is based on the net liquidation values (NLVs) of the constituent parts of the portfolio.

Q40. Answer: D  Ref: Chapter 9, Section 7.1
This is a long straddle where a call and put are bought with the same strike and expiry. The maximum loss is the total sum of the premiums paid, ie 49 pence + 23 pence = 72 pence.

Q41. Answer: B  Ref: Chapter 5, Section 2.1.2
The 260 call and 240 put would have no intrinsic value and are regarded as out-of-the-money. The 240 call and 260 put would be regarded as in-the-money.

Q42. Answer: B  Ref: Chapter 2, Section 2.2
The FSA requires risk warning notices must be sent to all private customers before a firm deals, recommends or acts on a discretionary basis in respect of derivative instruments (including warrants). The notice must be signed and returned to the firm. The two-way risk warning notices are not required from a private customer for derivative transactions: i) where the private customer is ordinarily resident outside the UK and the firm has taken reasonable steps to determine the customer does not wish to receive the warning; ii) where the private customer simply wants to realise a warrant already held; and iii) where the warrant is attached to another instrument such as a bond.

Q43. Answer: B  Ref: Chapter 7, Section 1.5
Under the FSA rules credit may be extended for up to 5 days without a formal written loan agreement.

Q44. Answer: A  Ref: Chapter 9, Section 9.2
GFOFs have marketing restrictions, do not require cover for transactions, cannot borrow and can use a maximum of 20% of the fund value for initial margins or premiums. FOFs are restricted to a maximum of 10% of the fund that can be used to buy approved derivatives, all outstanding transactions must be covered by holdings in the underlying assets, can have short-term borrowings and are freely marketable.

Q45. Answer: D  Ref: Chapter 5, Section 2.1.1
A call option with intrinsic value, where the strike price is less than the underlying asset price, is described as being in-the-money.
Q46. Answer: B  Ref: Chapter 2, Section 6.3
It is illegal to trade with US customers on a US exchange without being an NFA authorised firm or conduct the trade via an NFA firm. Non-US firms are prohibited from dealing with US customers on a non-US exchange unless they have been granted exemption under CFTC Part 30 or trade via a US-registered firm.

Q47. Answer: B  Ref: Chapter 5, Section 2.1.3
Time decay or erosion of time value works in favour of an option writer.

Q48. Answer: B  Ref: Chapter 9, Section 6.2
Horizontal spreads are used to take advantage of a static market. They are constructed using the sale of short-dated calls or puts and the simultaneous purchase of longer dated calls or puts at the same strike price.

Q49. Answer: A  Ref: Chapter 9, Section 1
Arbitrage activities take advantage of mis-pricings, hedging involves reducing the risk of adverse price movements and speculators are placing bets on the direction of the price of the underlying.

Q50. Answer: C  Ref: Chapter 1, Section 2.3
A contract for difference is where at expiry a payment is made between the parties, representing the difference between the futures price and the cash price.

Q51. Answer: A  Ref: Chapter 4, Section 1.8
The price quote of long gilt futures on Euronext.liffe is per £100 nominal value of the bonds in the contract. The contract size is £100,000 nominal value.

Q52. Answer: A  Ref: Chapter 7, Section 1.4
Collateral, other than cash is marked to market daily and subject to a published ‘haircut’ or discount, which means that the full market value is not credited.

Q53. Answer: A  Ref: Chapter 5, Section 2.1.3
Out-of-the-money options, especially far out-of-the-money options have a high probability of being abandoned.

Q54. Answer: B  Ref: Chapter 5, Section 2.3
The delta of an option is a measure of the sensitivity of the option’s price to changes in the price of the underlying asset.

Q55. Answer: B  Ref: Chapter 3, Section 4.2
Treasury Bills are issued weekly by the DMO on behalf of the UK Government.
Q56. Answer: A Ref: Chapter 9, Section 6.1
For a bull spread you sell the lower strike price and buy the higher strike.

Q57. Answer: C Ref: Chapter 5, Section 2.3.2
Gamma is the measure of how delta changes (the rate of change of delta) with respect to movements in the price of the underlying.

Q58. Answer: B Ref: Chapter 3, Section 4.4.2
A borrower who is exposed to a rise in short-term interest rates would sell futures, buy puts or sell calls to hedge the risk.

Q59. Answer: B Ref: Chapter 2, Section 4.4
Delivery details are given for each transaction in the Confirmation Note and are not repeated in the periodic statement.

Q60. Answer: B Ref: Chapter 5, Section 2.3.3
The buyer of an option is requested to pay the premium immediately. The seller of the option will receive the premium into his broker’s account on the morning of the next business day.

Q61. Answer: C Ref: Chapter 1, Section 3.3
The holder has paid a premium of 15p to buy the option. If the holder exercises, he will spend a further 200p buying the underlying asset. His total outlay will be 215p, which is the breakeven point.

Q62. Answer: A Ref: Chapter 3, Section 4.1
The rate at which banks will accept deposits (bid) is LIBID (the London Interbank Bid), whereas the rate used for lending funds (offer) is LIBOR (London InterBank Offered Rate).

Q63. Answer: D Ref: Chapter 5, Section 2.3.3
For long positions in bond and STIR options on Euronext.liffe there is no initial margin but variation margin. For short positions both initial and variation margin is payable.

Q64. Answer: D Ref: Chapter 7, Section 1.2.2
At the close of each trading day all positions are ‘marked to market’ and the profit/loss is measured. This must be paid to/received from the clearing house as variation margin by the following day.

Q65. Answer: D Ref: Chapter 4, Section 1.7
The tick value of the 3 month short sterling contract is £12.50. The tick value of long gilt contracts is £10 and for FTSE 100 index futures is £5.00.
Q66. Answer: A  Ref: Chapter 8, Section 2.1
An option holder (the buyer) has the right to exercise the option and if he decides to exercise, an exercise notice will be completed by the buyer’s broker and delivered to the clearing house. With a future contract it is the seller who commences the delivery cycle.

Q67. Answer: D  Ref: Chapter 5, Section 3.1.5
Open interest shows the total number of contracts for any delivery month that remain open. It is the sum of all open long positions or the sum of all open short positions, not the sum of both.

Q68. Answer: A  Ref: Chapter 2, Section 6.2.2
The CFTC (Commodity Futures Trading Commission) regulates all on-exchange derivatives transactions that are not covered by the SEC. It regulates all futures products and exchanges (including PHLX) and all of the options not covered by the SEC (including currency options on the CME).

Q69. Answer: B  Ref: Chapter 5, Section 3.6.3
Euronext.liffe’s members use TRS (Trade Registration System) for reporting open interest on a daily basis.

Q70. Answer: C  Ref: Chapter 4, Section 2.1.3
The calculation of the profit or loss is the EDSP less the opening purchase x contract size. The investor has made a profit of €270, calculated as (€16.20 - €15.30) = €0.90 x 100 shares = €90 x 3 contracts = €270.