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Welcome to the Chartered Institute for Securities & Investment's Derivatives study material.

This workbook has been written to prepare you for the Chartered Institute for Securities & Investment's Derivatives examination.

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Learning workbook version: 21.1 (November 2025)

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It is estimated that this manual will require approximately 100 hours of study time.

What next?

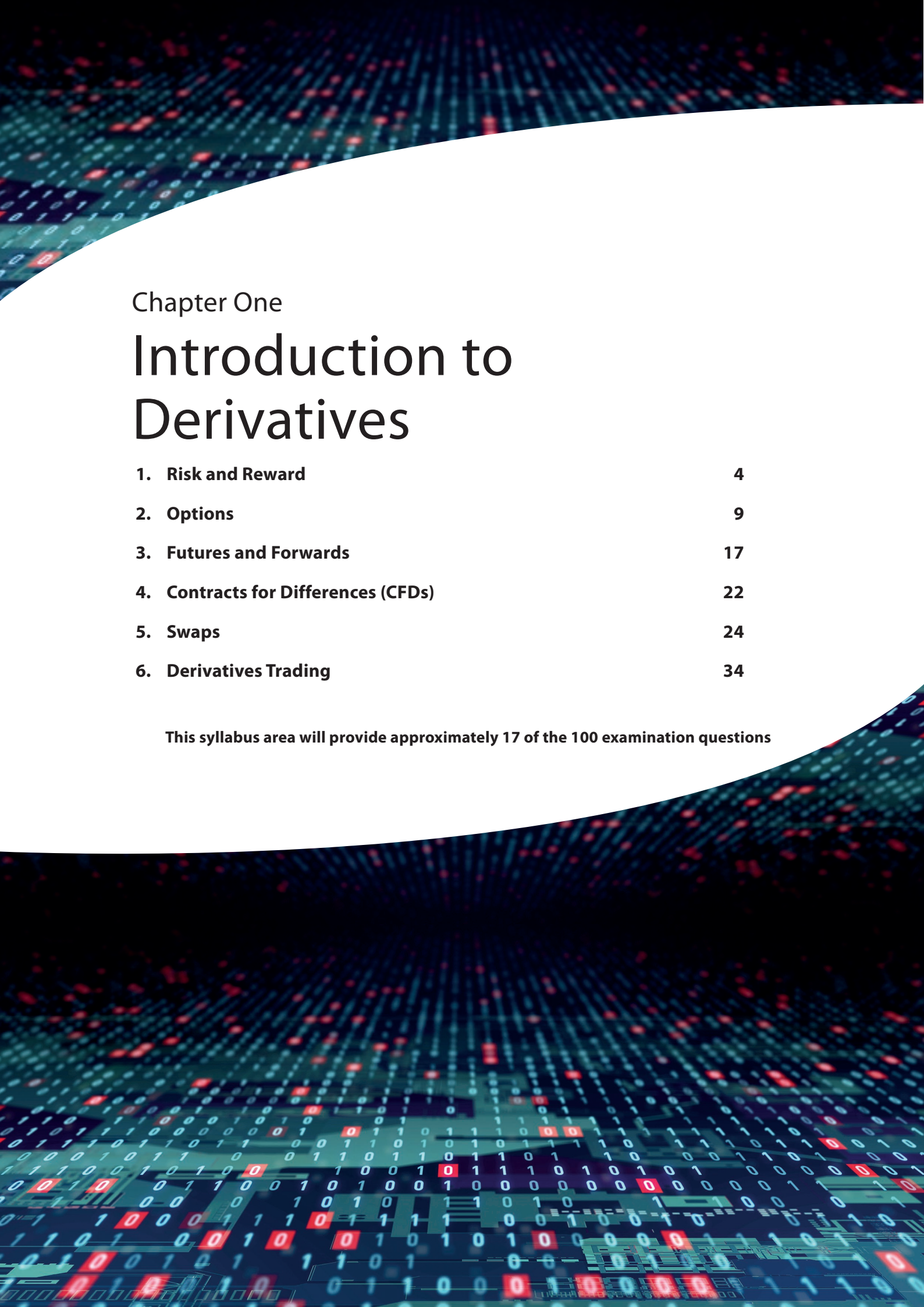
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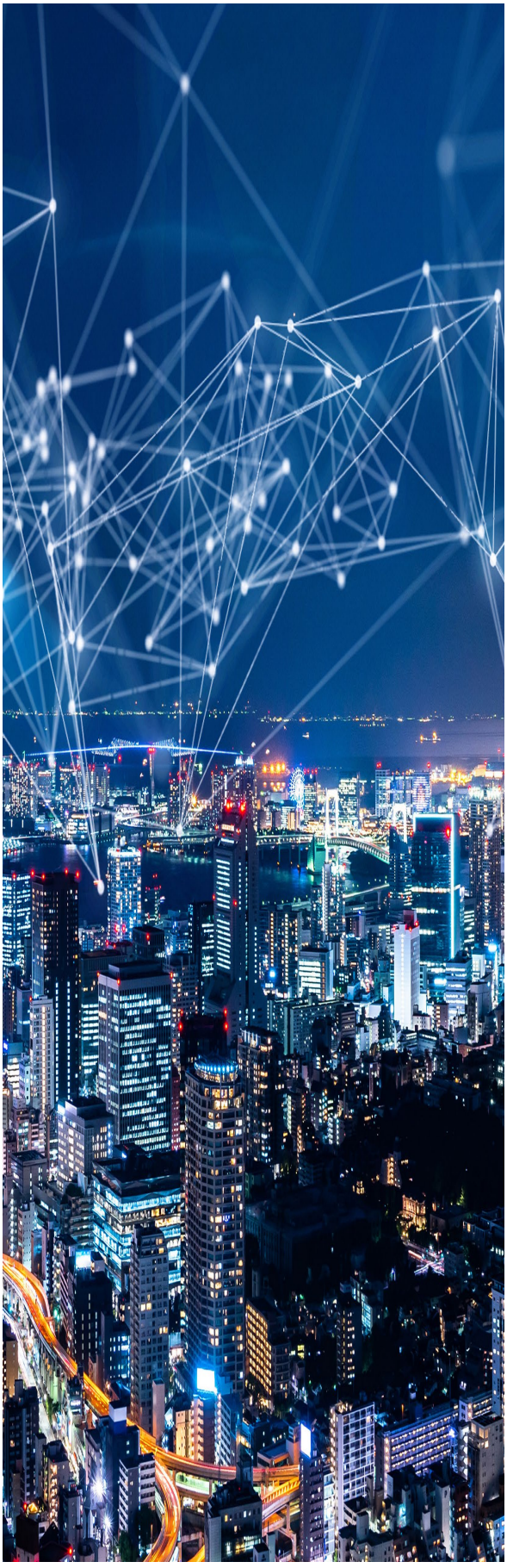


Chapter One

Introduction to Derivatives

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This syllabus area will provide approximately 17 of the 100 examination questions



General Introduction

Mention **derivatives** and people tend to think of high-risk instruments that are impenetrably complex. Derivatives can be high risk; after all, it was mainly trading in derivatives that brought about the collapse of Lehman Brothers in 2008. 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 want 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).

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 it has agreed to sell at a future date.

That said, since the sofa future was not traded on an exchange, technically it should be described as a sofa forward, which is another type of derivative. **Forwards** are similar to futures, except that futures are traded on an exchange with standardised contracts; in contrast, forwards are traded **over-**

the-counter (OTC) with customisable terms. Exchanges and OTC trading are covered in more detail in chapter 3, section 1.

Futures and forwards are not the only types of derivative – one other type is **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. Note that this is not a deposit, where it would be ordinarily deducted from the final price, but rather a charge in addition to the price of the sofa, which is paid regardless of whether you choose to purchase it later or not. It will become yours on the payment of a further £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 buy the sofa for £1,000. You are not obliged to buy the sofa, but, if you decide not to buy, you will lose the £30 you paid at the outset.
- The furniture store is short the option because they have given you the right to buy the sofa for £1,000 in return for the receipt of an agreed sum (here £30).

Note that in both rather simplified cases, you have guaranteed the ability to buy a sofa at £1,000 in the future. Even if the store raises prices in the interim, you have locked in the price for your sofa, therefore you have hedged your position.

1. Risk and Reward

1.1 Risks and Rewards

Learning Objective

1.1.1 Understand the risks and rewards associated with derivatives: rewards; counterparty risk; market risk; liquidity risk; operational risk

There are certain risks that arise with derivatives contracts:

- **Counterparty risk** – whenever a buyer or seller enters into a derivatives contract, there is a risk that the other side of the contract (the counterparty) does not or cannot fulfil their obligations. Counterparty risk exists between the broker and their client, and the broker and the clearing house. It should be noted that in the case of exchange-traded derivatives, counterparty risk is extremely low when compared to most OTC derivatives. This is due to the fact that futures are exchange-traded

contracts (ETCs); therefore, once a trade takes place, the clearing house becomes the counterparty to both the buyer and the seller. This will be explained in chapter 6, section 1.

- **Liquidity risk** – this arises from situations in which a party interested in trading a specific contract/asset cannot do so because no one in the market is willing to quote a reasonable price for that contract/asset at which the party is prepared to trade. Liquidity risk becomes particularly important when a market participant wishes to buy or sell a contract/asset that they currently hold especially in a large quantity, since it affects their ability to eliminate market risk by closing out an open position. Low liquidity can lead to more volatility in prices.
- **Market risk** – the risk of an adverse movement in the value of a derivative as it relates to your position. If you are speculating that a price will increase (a long position), then a decline in prices is your market risk. This particular risk can be disaggregated into specific risk associated with a given underlying market. For example, if you have a complex derivative position that has a reward linked to both equity prices and interest rates, an adverse movement in equity and/or interest rate prices would be your market risk.
- **Operational risk** – this is defined as a risk incurred by a failure in an organisation's internal activities – eg, the risk associated with a loss from a derivative trade that was caused by an error/fault in a firm's processing of the transaction. Operational risk is broadly defined as focusing on the risks arising from the people, systems and processes through which a company operates. It can also include other classes of risk such as fraud, legal, physical and environmental.

A widely used definition of operational risk is in the Basel II regulations. This states that operational risk is:

> *'the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events'.*

Operational risk management differs from other types of risk because it is not used to generate profit. It occurs only due to a failure within a firm's/market participant's internal structure/systems. In essence, operational risk is the prospect of any loss resulting from inadequate or failed procedures, systems or policies due to employee errors, systems failures, fraud or other criminal activity, supply chain disruption, unexpected regulatory changes, or any event that disrupts business processes.

The rewards associated with derivatives use are covered by the uses of derivatives, namely speculation, hedging and **arbitrage**. The speculators and arbitrageurs aim to be rewarded by profit, while hedgers aim to reduce risk.

1.2 Uses of Derivatives

There are three ways that futures can be used.

1.2.1 Speculation

Speculators take a view on the market's direction and seek to make a profit from price movements by buying or selling futures contracts. Speculative investments may involve a high degree of risk and usually have short holding periods. For example, if an investor feels the price of the underlying is going to go up, they can speculate by buying the underlying itself, or alternatively, by buying futures contracts on that underlying.

Derivatives are often seen to be more attractive than the underlying because they can be highly geared. Put simply, this means that a small expenditure/initial investment gives the holder a big exposure to a market (ie, the potential for large profits or losses). However, a speculator has to allow for **margin** requirements (see chapter 6, section 3) and must have sufficient capital to sustain the open position.

1.2.2 Hedging

Participants who want to guard themselves against adverse price movements **hedge** using derivatives. A hedger seeks to protect a position, or anticipated position, in the underlying 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 or reduce their exposure to a stock market fall that will affect the portfolio of shares they manage, by taking a temporary short position in futures in the relevant equity index. This will deliver profits to offset the impact a fall in the stock market would have had (the extent to which the risk is offset will depend on how closely their portfolio is correlated to the index – also known as '**basis**'). Fund managers often use hedging strategies as temporary 'shields' against market movements.

1.2.3 Arbitrage

Arbitrageurs exploit price anomalies between two markets. They observe that the same underlying asset or financial instrument is selling at two different prices in two different markets. They undertake a transaction whereby they buy the asset/instrument at the lower price in one market and, at the same time, sell it at the higher price in the other market. Arbitrage gives them a risk-free profit that will be realised when the prices in the two markets come back into line and the arbitrageur closes out both positions.

The classic definition of arbitrage includes the word 'mispricing' across contracts, which implies that prices must come back in line. The three most common forms of arbitrage are:

- **intertemporal** – when the prices between the one-month and six-month LME zinc contracts are 'out-of-line'
- **geographic** – as between two identical contracts across multiple exchanges; when the prices of the Singapore Exchange's June Eurodollar future is different from the CME's June contract, and
- **value-chain** – as between the prices of crude oil and refined products.

1.3 Gearing

Learning Objective

1.1.2 Understand the significance of gearing to derivatives: how trading on margin facilitates gearing; effect on derivative positions; reward versus outlay; reward versus risk

Derivatives, such as futures and options, are all highly geared (or leveraged). In the derivatives market, **gearing** is the measure of the amount of cash or initial investment spent on establishing a futures or options position, compared to the actual value of the underlying asset.

At its simplest, gearing is the ability for the value of a derivative to rise faster (say, by 100%) over a very short timescale, when the underlying asset has only risen by a far smaller amount (say, by 10%). A small change in the price of the underlying asset can result in a much bigger proportionate change in the value of the derivatives position – this is due to the fact that the initial investment (eg, the option premium) is relatively small compared to the face value of the underlying asset.

This principle can be illustrated by looking at the gearing in the context of buying a house and taking out a mortgage.

Example – Gearing Illustration

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, the equity (ie, the value of their invested funds) has risen to £20,000 – a 100% increase on their investment on a 10% increase in the underlying property.

Had they bought the flat outright for £100,000 without a mortgage, an increase in value of 10% would translate to a 10% increase on their investment.

1.3.1 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 asset can produce disproportionate changes in the price of the option.

Example

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 50% (ie, 10 ÷ 20).

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

Buying the **call** option might appear to be a more attractive reward than buying the share, but it is also riskier. If the share price only rises to 808, then you will lose 100% of your investment (ie, the premium of 20), whereas holding the underlying share will have produced a profit of 1% (ie, 8 ÷ 800). The amount of gearing in an option is a direct function of the premium paid for it, relative to the price of the underlying asset; the smaller the premium, the higher the potential gearing.

Options can also be volatile, offering high potential returns and losses (although the losses are limited to the initial investment) to investors. Time is also a factor, as options have limited lives and their value erodes as the expiry date approaches, due to the fact that the likelihood of them being exercised decreases over time.

1.3.2 Futures Gearing

Gearing in a futures contract comes about through the margining system. When you buy a future, although you do not pay for the underlying asset, you must keep some collateral aside in case things go wrong. This collateral (**initial margin**) is a small fraction of the contract's face value. However, when you make any profits or suffer any losses, it is based on the contract's full face value. See chapter 6, section 3.2.1 for an in-depth explanation of the concept of initial margin. The fact that exchanges, and therefore brokers, require only a small percentage of a contract's full value as an initial investment, in the form of initial margin, leads to the ability to gear futures trading positions.

In other words, the gearing on a future exists because the buyers or sellers only pay a small proportion of the market price of the underlying asset as initial margin, yet have the potential to gain or lose the full amount of any subsequent change in the price of the underlying asset.

It is important to note that gearing, sometimes also used interchangeably with the term 'leverage', is a key aspect for those participants using derivatives for speculation purposes. However, just as gearing magnifies potential profit, it can also magnify losses, relative to a similar sized position in the underlying asset. As mentioned in the sections above on CFDs and spread betting, regulators in most jurisdictions across the world take a strongly interventionist view towards retail investors participating in derivatives, as they are likely not fully qualified to assess the magnitude of the losses they are opening themselves to. Indeed, this is why many of these products are prohibited in the world's largest economies.

Example

The Singapore Exchange (SGX) Japanese Government Bond (JGB) futures contract is based on a bond with a face value of JPY100 million. A broker normally requires only a percentage of the contract's full face value as initial margin – say, 20%. This means that their client will incur profits or losses on each contract based on JPY100 million, with only an initial payment of, say, JPY20 million. This is how gearing works.

Example

You go long, or buy, a **FTSE 100** Index future at 7200. As per the exchange's margin requirements, you will need to put aside a proportion of the value of the contract, say, 300 points – as each point is worth £10, this equals £3,000 of collateral.

Later, you close your position for 7260, giving a profit of 60 points. In monetary terms, this is a profit of £600 or, in percentage terms, of 20% on your collateral (ie, 600 ÷ 3,000). In contrast, the index has only moved 60 points, which is less than 1% (ie, 60 ÷ 7200).

2. Options

Learning Objective

1.2.1 Know the basic concepts and fundamental characteristics of options contracts, including: basic puts and calls; options on cash and derivative products; American, European, Asian; exotics

2.1 What is an Option?

As illustrated by the sofa option in the introduction to this chapter, an option is a contract that gives the buyer the right, but not the obligation, to buy (call) or sell (put) a particular asset at a particular price, on or before a specified future date. Conversely, the seller of the option assumes an obligation in respect of the underlying asset upon which the option has been traded.

Options are available on a variety of underlying assets – physical assets (such as crude oil and sugar) and financial assets (such as cash, shares, **bonds**, foreign currency and indices). The option may be based on the current cash price, an OTC forward agreement, or a futures contract, where the underlying asset is a future (known as options on futures). Options on futures give the holder the right, but not the obligation, to become the buyer (call) or seller (put) of a specified futures contract – in this way, they are a derivative of a derivative. All major derivatives exchanges offer options based on their futures contracts.

Example

You sell two February calls on a Euronext Paris' rapeseed oil futures contract. If the corresponding futures contract is above the call's strike price at expiration, it will be automatically exercised and you will now be short two futures at the option's strike price.

As with futures, investors attempting to place directional bets in options are known as speculators, but options can also be used to hedge existing positions, and indeed execute arbitrage opportunities. 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.

2.2 Options Terminology

- **Long** – the buyer of an options contract, also called the holder or owner of the contract.
- **Short** – the seller of an options contract, also called the writer of the contract.
- **Call option** – an option giving the holder the right to buy an underlying asset for a specified price (the strike or exercise price) on or before a specified date.
- **Put** option – an option giving the holder the right to sell an underlying asset for a specified price on or before a specified date.
- **Strike price** – the price at which the option can be exercised. Also called the exercise price or, simply, strike.
- **Settlement price** – the price that determines the pay-off when the option expires.

- **Premium** – the cost of the option to the buyer. Premiums are non-returnable and are paid by the option holder to the option writer – the holder pays the premium via their broker, who then passes it on to the clearing house for the account of the counterparty's broker.
- **In-(out)-of-the-money** – the extent to which an options contract is in profit (or loss), quoted as the difference between the strike price of the contract and the current price of the underlying asset. An '**at-the-money**' option is considered breaking even.
- **Intrinsic value (IV)** – only options that are in-the-money have intrinsic value.
- **Extrinsic value** – where option premiums differ from the option's intrinsic value, the option has value that is being derived from factors other than just the price of the underlying asset, for example time value, implied volatility and interest rates.
- **Time value** – the extrinsic value that the market **assigns** to an option, given the probability that there may be an increase in the intrinsic value of the option. Options with long expiration dates tend to have higher time value, as the likelihood of the option being **in-the-money (ITM)** is theoretically higher because there is more time remaining on the option.

The **exercise** style of an option describes how it may be exercised:

- **European-style option** – an option that can be exercised on its expiry day only (remember 'E' for 'European' and 'expiry day').
- **American-style option** – an option that the holder can exercise on any day during its life (remember 'A' for 'American' and 'any day').
- **Bermudan-style option** – an option where early exercise is restricted to certain dates during its life, usually a **series** of dates over the contract's life that are spaced in regular intervals. It derives its name from the fact that its exercise characteristics are somewhere between those of the American and the European styles. Since Bermudan options are more flexible regarding exercise than European-style options, but less flexible than **American-style options**, their premiums are more expensive than the former but cheaper than the latter, if all other factors are the same.

European- and American-style options are described as standard, so are often referred to as 'plain vanilla' options. **Asian-** and **Bermudan-style options** are described as non-standard (ie, their pay-offs are based on how the underlying asset's price moves over the whole or part of the option's life, or they may be an option on another option rather than an underlying asset). There are a number of exotic options, and the most common types that are currently traded are as follows:

- A **lookback option** is path-dependent, meaning the strike price is dependent on the historical price of the underlying market. and is where the option owner has the right to buy (or sell) the underlying instrument at its lowest (or highest) price over some preceding period.
- A **barrier option** is another type of **path-dependent option** whose existence and pay-off depends on whether the underlying asset has reached a predetermined price. There are two types of barrier options:
  - A **knock-in option** is one that is activated or starts to exist once the underlying asset has reached the predetermined price.
  - A **knock-out option** is the opposite: when it is purchased, it exists, but it ceases to exist if the underlying asset reaches the predetermined price.
- A **binary option** (also known as a digital option) pays a fixed amount or nothing at all, depending on the price of the underlying instrument at maturity or at stated times prior to maturity.
- A **chooser option** is an option that allows its holder to decide whether the option is a call or a put, at a predetermined time during the option's life.

- A **compound option** is an option that gives the owner the right to purchase another option, with specific strike prices at predetermined dates, during the option's life. There are four types of compound options: calls on calls, calls on puts, puts on calls and puts on puts. There will, therefore, be two strike prices and two expiration dates.
- A **rainbow option** is an option on multiple underlying assets (eg, a group or basket of commodities, securities or currencies). They are also referred to as multi-asset options, correlation options and basket options.

2.3 Options – Risks, Rewards and Profit and Loss Profiles

Learning Objective

1.2.2 Understand how to interpret basic options diagrams (long call, long put, short call, short put)

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

2.3.1 Buying a Call (Long Call)

eg, March ABC plc 700 Call @ 30

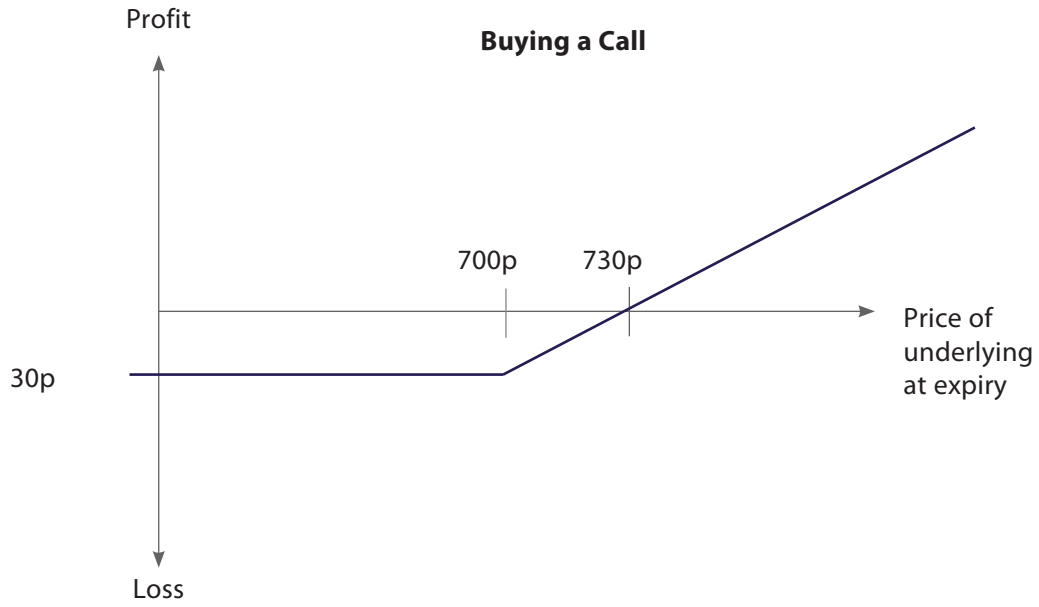
The buyer of the option (holder) pays the premium (30p), which is the amount due per share, quoted in pence to the seller. The holder now has the right, but not the obligation, to buy one share in ABC for 700p, until the defined time on the expiry day in March.

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 700p, the option expires 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, which is a lower price than in the cash market. They 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 per options contract, which can then be used to offset the upfront cost of the premium.
- The break-even price of the call is its strike plus its premium; in this case, the break-even is 730p (ie, 700p + 30p).

The potential for gain or loss can be represented diagrammatically, with profit or loss shown on the Y-axis (vertical axis) and the price of the underlying at expiry on the X-axis (horizontal 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 break-even point is the strike price plus the premium.
- The maximum potential profit for the buyer is unlimited as the long call option will become increasingly valuable to them as the share price rises above the exercise price.

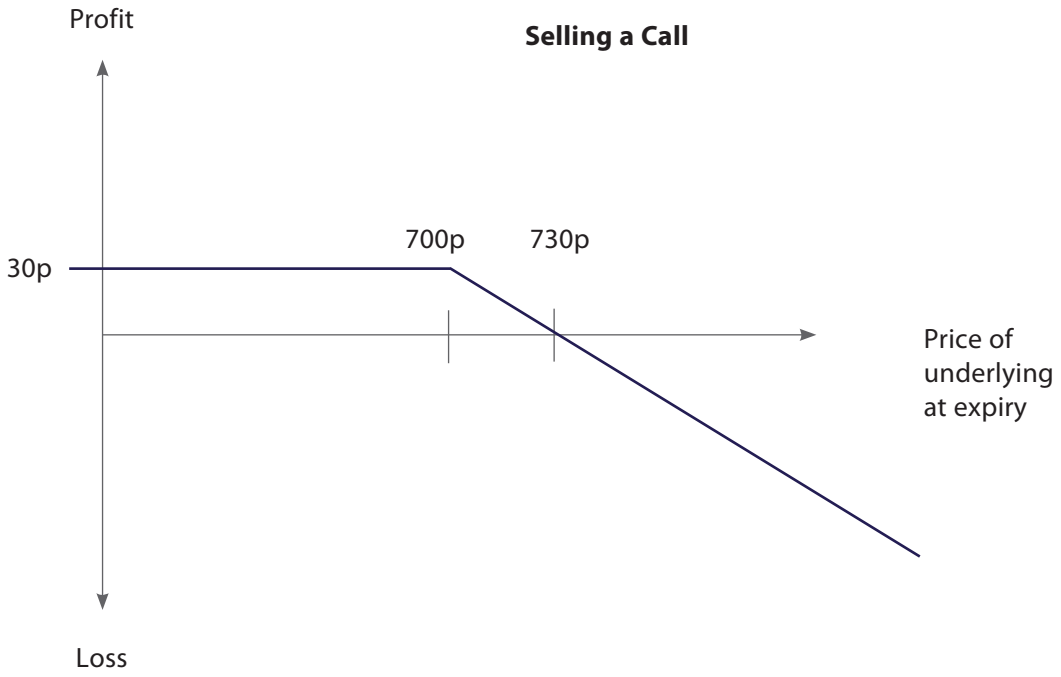
2.3.2 Selling a Call (Short Call)

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 deliver the share should the holder of the option decide to exercise.

What Happens at Expiry?

- If the share price prevailing in the market is below 700p, as indicated in the first example, the buyer will abandon the option and the seller 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 buyer will exercise the option against the seller. The seller is obliged to deliver the share for 700p. The seller may not already own the share so will have to acquire it in the market at a higher price and take the loss. Provided that the loss is lower than the premium received, the seller will still make an overall profit.



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 break-even point is the strike price plus the premium.
- The seller's maximum potential profit is limited to the premium received.

2.3.3 Buying a Put (Long Put)

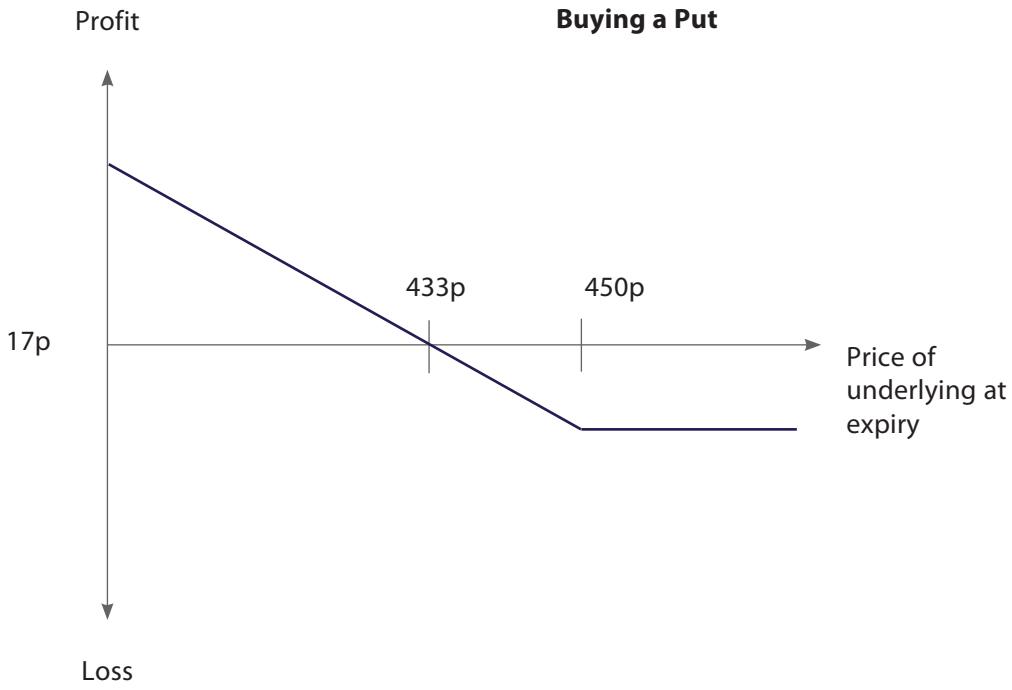
eg, March XYZ plc 450 Put @ 17

Similarly to the earlier examples, the buyer of the option pays the premium (this time, say, 17p) to the seller. The buyer now has the right to sell one share in XYZ for 450p.

What Happens at Expiry?

It will depend on the price of XYZ shares on the expiry day:

- If the share price is above 450p, the holder will abandon the option as the option is worthless. Would you sell the share for 450p 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 buyer will make a profit of 1p per options contract, which can be used to offset the cost of the original premium.



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 break-even point is the strike price less the premium.
- The buyer's maximum potential profit will arise if the share price falls to zero, and is the strike price less the premium.

2.3.4 Selling a Put (Short Put)

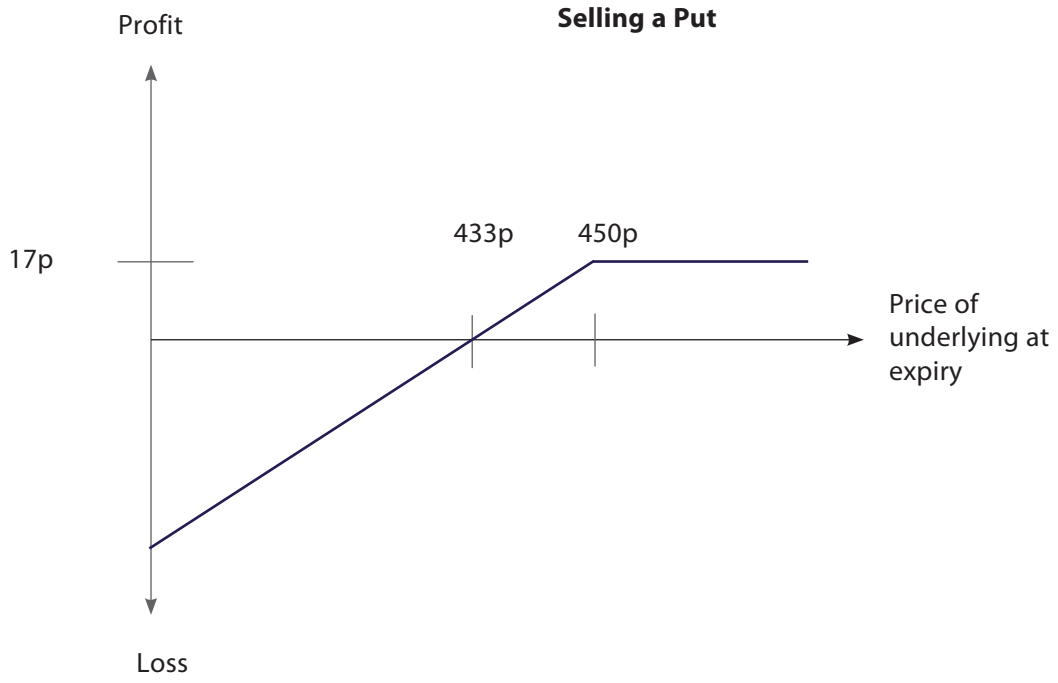
eg, March XYZ plc 450 Put @ 17

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

What Happens at Expiry?

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

- If the share price is above 450p, the buyer will abandon the option (as they can receive a higher price in the market for the share, as explained earlier). The seller keeps the premium received.
- If the share price is below 450p, the buyer will exercise the option (as they can achieve a higher price by exercising than is possible in the market). The seller will be obliged to buy the share for 450p and sell it on in the market at the lower price, thus taking the loss. Provided the loss is lower than the premium received, the seller will still make an overall profit.



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 break-even point is the strike price less the premium.
- The seller's maximum potential loss is the strike price less the premium, and will arise if the share price falls to zero.

2.4 Profit and Loss Calculator

The following table summarises the potential maximum loss and profit in each of the four option positions:

Position	Maximum Loss	Maximum Profit
Long call	Limited to premium	Unlimited
Short call	Unlimited	Limited to premium
Long put	Limited to premium	Strike price less premium (underlying asset price would have to fall to zero)
Short put	Strike price less premium (underlying asset price would have to fall to zero)	Limited to premium

The counterparty risk associated with options reflects the fact that, when an option is **out-of-the-money (OTM)**, there is no risk that it will be exercised. Therefore, for an option seller, under normal circumstances, they do not have any counterparty risk once they have received the premium, since after that the buyer has no obligation to the seller.

In the case of an option buyer, they do have counterparty risk relative to the seller, but only when the option has **intrinsic value (IV)** – that is, when the option is **at-the-money (ATM)** or **in-the-money (ITM)**. This is because the seller will have to either buy the underlying asset (in the case of a put) or sell the underlying asset (in the case of a call) at a loss, based on its current market price.

The following table provides the formulae for calculating the profit or loss made on each of the four positions at expiry:

	Expiry price < strike	Expiry price > strike
Long call	Loss = premium	Gain = (expiry price – strike) – premium
Short call	Gain = premium	Loss = (strike – expiry price) + premium
Long put	Gain = (strike – expiry price) – premium	Loss = premium
Short put	Loss = (expiry price – strike price) + premium	Gain = premium

Exercise 1

If a call option with a premium of 10p gave the buyer the right to buy a share for 100p, what would be the gain (or loss) if at expiry the share was priced at:

a. 120p
b. 100p
c. 95p

The answers to this exercise can be found in the appendix at the end of this chapter.

3. Futures and Forwards

Learning Objective

1.3.1 Know the basic concepts and fundamental characteristics of: forwards; futures contracts

3.1 Futures

3.1.1 What is a Future?

A future is a legal agreement between two parties to make or take **delivery** of a specific quantity and quality of a specified asset on a fixed future date at a price agreed today. They originated in the agricultural market where they were based on commodities, with some of the earliest recorded examples including rice futures traded in Japan in 1730 and cotton contracts in Egypt in 1861.

Unlike our example of a sofa future above, futures are often described as futures contracts because they are traded on organised exchanges, such as ICE Futures (Europe), the CME Group in the US, and the Shanghai Futures Exchange (SHFE) in China.

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 precisely satisfy every single trader's requirements regarding particular underlying assets (or 'underlying' for short). The aim of the contract specifications is to allow participants to take positions on general price movements in any given market. Contract specification also promotes transparency across all users of the exchange, as it goes to great lengths to detail precisely what is acceptable in terms of the quality and type of asset to be traded. When using derivatives, it is very important to be familiar with the contract specifications as these will help determine the profit and loss from the contract as well as other key terms such as, where applicable, which underlying assets must be delivered upon maturity.

The price is agreed between the buyer and the 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 a wheat future contract, for example, the quote is on a 'per bushel' basis and the minimum movement is 0.25 of a cent ($0.0025) per bushel (known as the full **tick** size). Since each contract represents 5,000 bushels, the value of the minimum price movement per contract (the full tick value) is $12.50 per contract.

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 contract month. In respect of wheat futures traded on the CBOT, the delivery months are March, May, July, September and December.

Alongside wheat and other commodity futures, there are also financial futures (which are based on interest rates, bonds, currency exchange rates and stock market indices), among a broad range of other underlying assets.

For all futures contracts, the contract specification standardises the futures product and, provided 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 ICE Futures Europe are fungible. A March long gilt future on ICE Futures, Europe 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:

- contracts are easy to trade as they have set terms, and
- the concentration of activity provides liquidity, as measured by volume.

Note that while standardisation is attractive to many market participants, the demand for flexibility is a key factor in the demands met by the over-the-counter (OTC) market. With OTC derivatives, the features of the contract are negotiated between the two parties to that contract, rather than standardised in the contract specification.

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 exited the trade or closed out their position.

3.1.2 How Do Futures Work?

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

By opening either a long or short 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 (long position) will make a profit – this is because the trader will take delivery at the lower price and be able to sell the asset in the cash market at the higher price. At the same time, the futures seller (short position) will make a loss.

Conversely, if the price is lower than the agreed price, the futures buyer will make a loss since they will take delivery at the higher price, while the futures seller will make a profit.

It is worth noting that the profit and loss of each counterparty is not exactly opposite, as the charges incurred by each will differ based on their specific brokerage arrangements.

The main advantages of futures are:

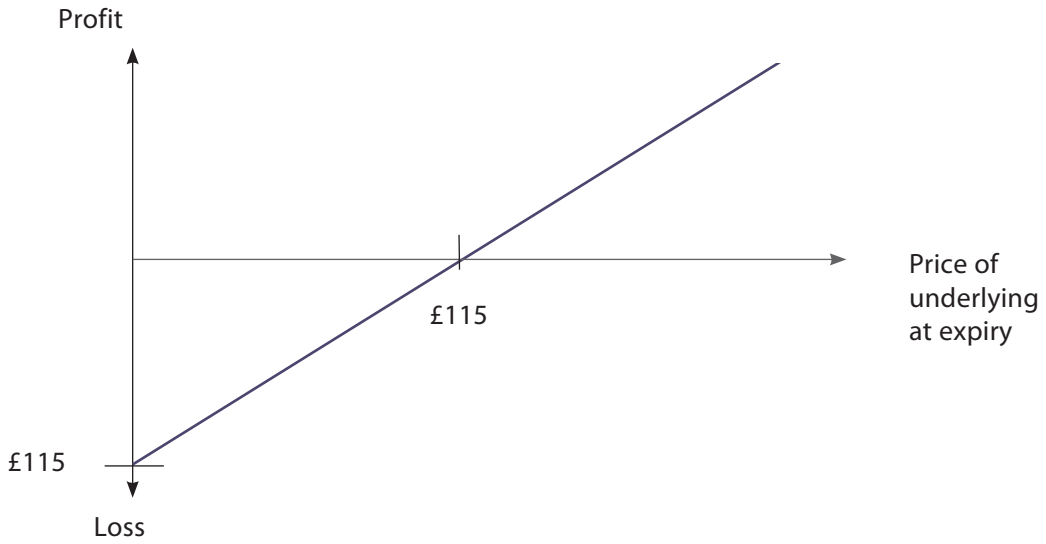
- **Fungibility** – the standardisation of contract specifications on exchange draws liquidity to the contract, as participants know that all counterparties will be trading the same product.
- **Counterparty risk** – with exchange-traded futures, counterparty risk is reduced considerably by **novation** through the central clearing house – novation is the legal process whereby the clearing house becomes the counterparty to all trades, and is covered in section 1.1 of chapter 6.
- **Cost** – given the low counterparty risk, high fungibility and high volume associated with exchange-traded futures, the brokerage fees associated with trading tend to be low.

3.1.3 Futures Profit and Loss Profiles

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:

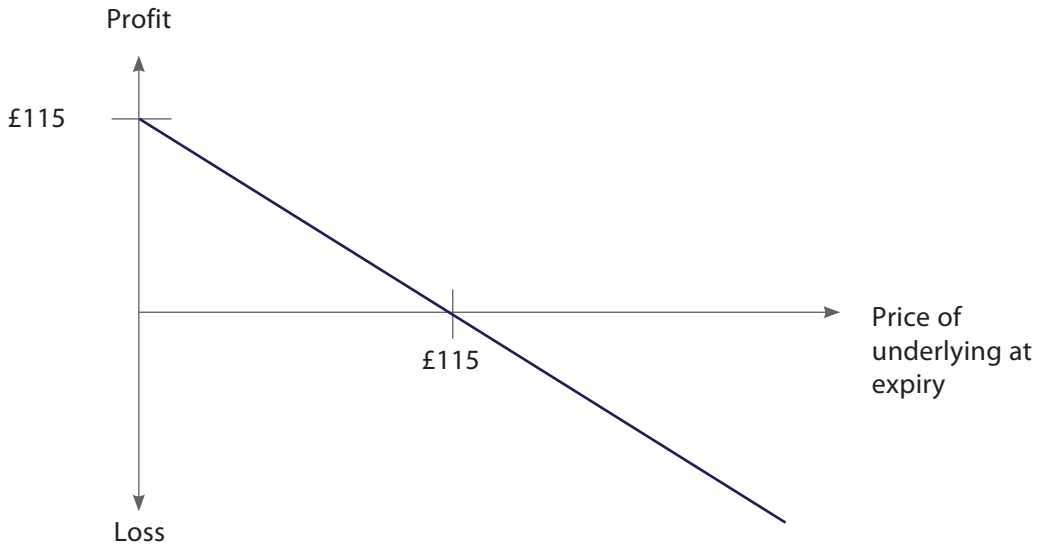


As shown, the risk to the buyer of a futures contract is maximised when the value of the underlying at expiry falls to zero. In that case, the buyer will pay the pre-agreed sum (£115) for an asset worth nothing, losing the £115. The reward to the buyer is, theoretically, unlimited – the higher the price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

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 a loss since they 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, whereas the seller can deliver the underlying asset that has cost nothing in exchange for the pre-agreed futures price.

Exercise 2

An investor has the view that economic growth will slow down in the next 12 months. This slower growth will cause metal prices to fall, due to a drop in demand. Based on this view, the investor sells 20 contracts of the LME's June (one-year maturity) **LMEX** futures at 3400.

The LMEX is a cash-settled index-based futures contract that is based on the weighted average of the price of the LME's six primary metals (aluminium, copper, lead, nickel, tin and zinc).

One month before its maturity, the June LMEX future is trading at 3190. The contract's specification is $10 per index point. What is the investor's profit or loss?

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

3.2 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. Forwards are, therefore, settled only on the delivery date. Thus, forwards can also be used for the same purposes as futures. Forward contracts are traded on a wide variety of assets such as currencies, commodities and equities.

The key difference between futures and forwards is that futures are always, by definition, exchange-traded, while forwards are usually traded OTC (usually with banks or investment firms) although similar contracts are also traded on-exchange. Although some market participants value the fungibility that standardisation of contract terms brings to futures, forwards have a degree of customisability that make them attractive to participants requiring a more tailored product. Additionally, they may not be marked-to-market (revalued) daily or, if they are, the resulting profits are not paid out until maturity. This can reduce the working capital intensity of hedging, for example, as hedgers do not face the possibility of 'topping-up' their brokerage account every day to sustain a losing position.

Example

A French company has a series of future yen payments over the next 12 months and is concerned that the euro will weaken against the yen, thus making its materials more expensive. In order to lock in its cost now, the company can enter into a series of EUR/JPY forward contracts that will allow it to set the exchange rate today for its future payments. This is done through FX forwards contracts where the company buys yen against the euro, for specific future dates at rates that are agreed today.

Since this is an OTC transaction, the company can arrange the amounts and dates to match exactly the payments it must make to its Japanese supplier. The forward contracts' rates will be based on the current FX spot rate and the interest rate differential between euros and yen. Since euro interest rates are slightly lower than yen rates over the period, the euro will be at a slight premium to the yen, thereby making it less expensive at that forward date.

The main advantages of forwards compared with futures are:

- flexibility (eg, the size, date, specific grade, quality, or delivery point)
- better margining and collateral terms
- a wide range of underlying assets, and
- they are available from most commercial banks.

The main disadvantages are potential counterparty risk, particularly where forwards are not cleared, as this increases the potential for default (termed credit or default risk). In some cases liquidity on forwards can be low, given more specialised contract specifications will reduce the fungibility of the contracts and therefore the amount of participants willing to trade. The combination of these factors usually leads to higher fees across OTC products, as compared to those traded on exchange.

Outright forwards are a common product traded in the **foreign exchange (FX)** market. Corporations, institutional investors and banks use forwards to manage their FX transaction risks. If an organisation is

importing or exporting goods (or investing) in another 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 and foodstuffs. For example, in the physical markets (where **physical delivery** is common), an airline might use forward prices on jet fuel to lock in one of their major costs.

The future price agreed for a forward is based on the **spot** price of the underlying asset (usually known as just 'the underlying'). In the case of a currency, it will be adjusted for the interest rates in the relevant currencies.

4. Contracts for Differences (CFDs)

Learning Objective

1.4.1 Know the basic concepts and fundamental characteristics of CFDs

1.4.2 Know how spread betting differs from other contracts for difference (CFDs)

Contracts for difference (CFDs) allow investors to benefit from the capital gains from a particular underlying index, stock, currency or commodity without having to actually physically own or pay for it. The investor enters into an agreement with a CFD provider (usually a stockbroker or a firm offering an online dealing service) to settle the difference between the opening price of a particular asset when the agreement is made and its price when the agreement is ended. The profit or loss is determined by the difference between the prices at which the investor buys and sells the contract and the contract amount.

Example

An investor buys a FTSE 100 CFD at an agreed 'price' of 7200 points and chooses to close their position when the index stands at 7350 points. The investor has made a profit, not by buying or selling a tangible asset such as shares, grain or a bond, but by receiving a set amount of cash for each point gained. The amount of money for each point is specified in the CFD contract.

Most brokers will usually provide a CFD contract to investors that closely mimics the most fungible exchange-traded product. In this case, assuming the broker mimics the ICE Futures Europe FTSE 100 futures contract, the value of each point is £10, so the broker simply pays the buyer 150 points multiplied by £10, ie, £1,500.

It is important to note that, although CFDs can be a 'mirror' of exchange-traded products, actual prices on the broker's platform can deviate from those shown on exchange, partly due to trading fees that are often included in the quoted price (known as '**spreads**').

Investors using CFDs have one key decision to make: do they think the underlying asset is going to go up or down in value? If they get it right, they will win; if they get it wrong, they will lose. The key feature of CFDs is that they do not have a set maturity and, since they are OTC contracts, the contract's specification ranges from the asset to the amount negotiated between the buyer and seller.

CFDs are cost efficient, in that an investor buying a CFD on a share does not have to pay stamp duty, nor the broker's fee that is normally associated with share transactions. CFDs also allow investors who are bearish on a share an easier way to profit from the fall in a share's price, rather than physically going short a share.

CFDs are based on margin trading, so an investor can leverage their position. Most brokers require a margin deposit of 10–30% of the contract's value. This allows investors to increase their risk, based on the size of their initial investment. However, many contracts include an automatic **stop-loss** order as part of the contract, which minimises the risk of a large loss. Most CFD trades are intra-day trades, since each time this type of position is held open overnight, it incurs an interest charge.

CFDs do not have an expiry or maturity date like options or futures. As opposed to an expiry date, a CFD is effectively renewed/rolled over at the close of each trading day if desired. An investor can keep their position open indefinitely, provided there is enough margin in their account to support the position.

Example

An investor is bearish on company ABC plc shares, which are currently trading at 145p. The investor decides to sell a CFD on 5,000 shares at that price. The investor's broker requires a 15% margin:

CFD: Sale proceeds = 5,000 x £1.45 = £7,250

Broker's margin = 15% x £7,250 = £1,087.50

Just before closing, ABC's shares have fallen to 137p. The investor decides to end the cost of CFD = 5,000 x £1.37 = £6,850

Investor's profit = £7,250 – £6,850 = £400

Investor's return = £400 / £1,087.50 = 36.8%.

4.1 Spread Betting

An alternative way of entering into a CFD is to place a bet with a spread-betting firm.

The two key differences between spread betting and CFDs are that:

- CFDs do not have a fixed maturity/expiration date, and
- spread betting in the UK is considered gambling and, therefore, is treated differently from a tax perspective, since CFDs are subject to capital gains tax.

Another common difference between CFDs and spread betting is that CFDs may charge a commission while brokers are compensated by spread bets only through the price spread they quote. Note that, given the overwhelming majority of users of both CFDs and spread betting are retail investors, the leveraged nature of these services puts ordinary investors at risk of significant financial loss, and have therefore been prohibited in the US, China and India. EU countries also have much tougher restrictions on online brokers of these products than the UK, with many making spread betting illegal.

One of the most popular of these types of spread betting trades involves a **short-term interest rate (STIR)** contract, such as the three-month short sterling future.

> Example
>
> If an investor thinks a particular market will continue to rise over the short term, they could place an up bet, which is similar to buying a CFD, where the investor benefits by a set amount for each point that the market price increases. Say they believe the FTSE 100 Index of the UK's largest companies is going to rise after a recent sell-off. If the FTSE 100 is currently 7200 index points, a spread-betting firm may be quoting 7250/7275 for three months into the future.
>
> Let us say the investor places an up bet at £10 a point at the quote of 7275 (the choice of pounds per point is up to the investor), and a month later the index has risen to 7350. The quote from the spread-betting firm is now 7375/7400 and the investor decides to cash in their close-out (profitable position). This is achieved by placing a down bet of £10 per point at 7375. A down bet is similar to selling a CFD contract where the investor benefits by a set amount for each point that the market decreases. The difference between the buy and sell prices is 100 index points (ie, 7375 – 7275), which, multiplied by £10, gives a gain of £1,000.
>
> This gain is not subject to capital gains tax (CGT).

If an investor thinks it likely that the **FTSE 100** will fall, they could speculate by placing a down bet via a spread-betting firm.

5. Swaps

Learning Objective

1.5.1 Know the basic concepts and fundamental characteristics of swaps

A swap is an OTC derivative contract through which two counterparties exchange the cash flows or liabilities from two different financial instruments. Most swaps involve cash flows based on a notional principal amount, such as a loan or bond, although the instrument can be almost anything. Swaps are considered to be derivatives because, like other forms of derivatives, their valuation is based upon the value of other assets or determining factors, such as interest rates, currency rates, default rates, commodity prices and equity prices.

Since swaps are traded on such a wide range of underlying assets, it is the largest (in nominal terms) of all of the derivatives markets, with the largest type of swap being interest rate swaps.

5.1 Interest Rate Swaps and Swaptions

Learning Objective

1.5.2 Know the basic concepts and fundamental characteristics of interest rate swaps: underlying (fixed/fixed, fixed/floating, floating/floating); interest calculation (compared to bond markets)

An interest rate swap is an OTC derivative where two counterparties exchange one stream of future interest payments against another, based on a specified principal amount over a set period. These payment streams are called the legs of the swap.

As they are OTC instruments, swaps come in a variety of forms:

- **Fixed/floating swap** – a 'plain vanilla' swap that is also known as a coupon swap. The two parties agree to swap, or exchange, interest cash flows for fixed- and floating-rate loans.
- **Floating /floating swap** – also known as a basis swap, each of the two payment streams is based on a floating rate.
- **Fixed/fixed swaps** – a type of foreign currency swap in which both parties pay each other a fixed interest rate on the principal amount.

At each payment date, a net payment will be made between the two participants based on the difference between the two rates on the underlying principal sum for the quarter. Whichever rate exceeds the other, the difference will be paid to the party that is due to receive the higher rate and pay the fixed interest.

For example, a straightforward interest rate swap (plain vanilla swap) involves one party exchanging a floating interest rate obligation (eg, SONIA, SOFR, EURIBOR plus a spread) for another party's fixed-rate obligation (rate x notional x day count fraction). The floating rate will be determined on the swap's reset date – for a fixed versus six-month floating swap (where the swap matures in six months ie, less than a year), the reset date will be every six months. Once the floating rate is determined, the swap will start accruing interest as of its effective date. The swap will specify particular periods at the end of which the cash flow exchanges will take place; this is known as the swap's payment date. Unlike two bonds, swap payments are netted and only the difference between fixed and floating amounts is exchanged each period. This makes swaps more efficient as there are less cash movements.

With the agreement of both parties and after an evaluation or mark to market of the swap's value, either party can initiate action to cancel or end the swap after an agreed payment. When this happens, all calculations of **accrued interest** are based on the swap's termination date. This is the date that the swap officially ceases to exist.

For example, a three-year plain vanilla interest rate swap might be arranged with quarterly payments based on a principal sum of £6 million, effective from 1 January 2025, exchanging a fixed interest rate for a floating interest rate based on SONIA. The first payment under the swap will be at the end of March 2025, the second at the end of June 2025, and so on.

A **swaption** is an arrangement where a buyer 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 for options.

Large corporations 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 smaller or retail investors.

5.2 Inflation-Linked Swaps

Learning Objective

1.5.3 Know the purpose of inflation swaps

An inflation swap involves an exchange of cash flows, with one or both of its legs calculated with reference to an inflation index. It provides investors with protection against rising prices on a notional principal or an asset's future value. An investor who wants protection from rising prices agrees to pay a fixed amount based on the expected rate of inflation.

The swap payments are based on benchmarks such as the retail prices index (RPI) in the UK, the eurozone's Harmonised Index of Consumer Prices (HICP), or the US Consumer Price Index (CPI). Maturities normally range from five to 30 years for inflation swaps.

5.2.1 Zero Coupon Inflation Products

Learning Objective

1.5.4 Know the basic concepts and fundamental characteristics of zero-coupon inflation products

A zero coupon inflation product is a standard derivative product based on an inflation rate. The underlying asset is a single price index (inflation measure).

It is called a zero coupon product or swap because there is only one financial flow, at the end, without any intermediate coupon. At the maturity date, there is a swap of a fixed amount against a floating amount.

This type of product allows market participants to:

- hedge against/speculate on future inflation fluctuations
- evaluate inflation-linked securities, including asset swapping **Treasury inflation-protected securities (TIPS)** and other securities, and
- hedge against central bank credit tightening policies (since central banks could tighten monetary policy to fight rising inflation).

5.3 Currency Swaps

Learning Objective

1.5.5 Know the basic concepts and fundamental characteristics of FX and currency forwards and swaps: FX forward (outrights quotes versus pips); currency swaps

A currency swap is an FX transaction that involves trading the principal and interest in one currency for the same in another currency, for an agreed period of time. They are used regularly by banks, multinational corporations and investors.

There are four main use cases for currency swaps:

- Hedging foreign currency exposure: revenue, expenses or loans in different currencies use swaps to manage FX risk.
- Access to cheaper financing: borrowers can sometimes get better borrowing in their domestic market than abroad. They borrow cheaply and then swap into the foreign currency required.
- Matching assets and liabilities: multinational corporations (eg Toyota) want their cash inflows and outflows in the same curreny to reduce risk.
- Speculation/Arbitrage: investors use currency swaps to take views on interest rate differentials or FX movements.

Currency swaps have since 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

A UK company expects 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 FX transactions to achieve this, it could instead use a currency swap. The series of US dollar 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 cash flows. 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 here, the uses of currency swaps include potentially reducing the cost of borrowing and replacing future cash flows that are unpredictable (due to exchange rate movements) with predictable cash flows agreed in a swap. The downside here is, as with all hedges, that using a currency swap removes the possibility of upside from a strengthening in the US dollar/weakening in sterling. Additionally, currency swaps come at a cost, usually in the form of a slightly weaker-than-market exchange rate.

5.4 Equity Swaps

Learning Objective

1.5.6 Know the basic concepts and fundamental characteristics of equity forwards, swaps and swaptions: equity baskets/index; equity forwards; equity swaps

1.5.7 Know common equity swap instruments and their relationship to other markets and products: total return; volatility; variance; dividend swaps

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Equity swaps are swaps whose payments on one or both sides are linked to the performance of equities or an equity index. They are sometimes used to avoid withholding taxes, obtain leverage, or enjoy the returns from ownership without actually owning equity. They can be especially useful in accessing certain emerging markets which have foreign ownership restrictions on cash equities or for which there are no futures available. Thus, equity swaps enable 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.

This type of swap allows an investor or fund manager to exchange the returns on an equity investment (an individual share, a basket or index) for a return on another non-equity or equity-based investment. Its returns are strictly based on the relative volatility of an individual share or index. The simplest type of equity swap is a bullet swap in which all payments are made at maturity.

> Example
>
> Investor A swaps $10 million at ICE SOFR + 0.05% (ICE SOFR + 5 basis points) against the return of the Hang Seng (Hong Kong) index over six months. Investor A will receive from investor B any percentage increase in the Hang Seng applied to the $10 million notional. If the Hang Seng declined over the year, not only will investor A receive nothing from investor B, but investor A will have to pay investor B the value of the fall in the index, thereby creating a synthetic investment in the index.
>
> Let us assume that in six months' time, ICE SOFR is 5.5% and also assume a swap tenure of precisely 180 days. If that is the case, then the floating leg payer/equity receiver (investor A) will owe (5.5% + 0.05%) x $10,000,000 x 180 / 360 = $277,500 to the equity payer/floating leg receiver (investor B).
>
> If, over the same period, the Hang Seng rose from 23,100 to 25,250 or 9.3%, investor B would have to pay investor A 9.3% of $10 million = $930,000. The net payment would be $652,500 from investor B to investor A (ie, $930,000 – $277,500). However, if the Hang Seng fell to 22,100 or by 4.3% over that same period, investor A will have to pay investor B a total of $707,500 ($430,000 due to the drop in the index and $277,500 for the ICE SOFR leg of the swap).

Equity basket swaps are swaps where one or both of the underlying assets is/are a non-index basket of shares. The shares in this basket often have similar characteristics to exchange-traded equity index derivatives, but are always traded OTC, since the basket of shares used is not standardised as an equity index. The shares that are included in these baskets are normally used for correlation trading; that is, they are included in the basket to fulfil the objective that one of the counterparties requires. The fact that these baskets are specific for each swap is the main reason why these are traded on an OTC basis.

An equity forward contract is an OTC contract between two parties to buy or to sell an individual share, basket of shares or equity index at a specified future time at a price agreed upon today. Forward contracts on an equity basket or index work in the same way as on an individual share. Instead of entering into separate contracts for each of the individual shares in the basket, the investor can give a list of securities in the portfolio to their broker who will quote the price for which the dealer will purchase or sell the securities in the basket at a future date.

5.4.1 Variance Swaps

A variance swap takes the concept of an equity swap beyond the movement in equity prices. A variance swap allows an investor to hedge or speculate on the future price movements of an underlying asset, which can be a currency, interest rate, commodity or index. In a variance swap, one side's payment will be linked to the realised variance (ie, the price movements of the specific asset) over the life of the swap. These prices are recorded on a daily basis and are most commonly based on the asset's closing price. The other side of the swap will pay a fixed amount, which is agreed upfront.

The main attraction/advantage of a variance swap is that it provides pure exposure to the volatility of the underlying asset's price as opposed to straight call or put options, which may require delta hedging. It is for this reason that variance swaps are more widely used in the equity markets than volatility swaps. The profit/loss of a variance swap depends solely on the difference between implied and actual volatility.

5.4.2 Dividend Swaps

A dividend swap is a swap that allows one to swap fixed payments (eg, ones which might be based on current interest rates) with dividend payments from an individual share, group of shares or an equity index. Unlike other equity-related swaps, dividend swaps are based solely on the actual dividend payments without taking into account the underlying share price or index level.

The holder of the fixed leg will pay their counterparty a predesignated fixed payment at each interval. The other party – the holder of the floating leg – will pay their counterparty the total dividends that were paid out by a selected underlying asset which can be a single share, a basket of shares or all the members of an index. The payments are multiplied by a notional number of shares which is agreed when the swap is first entered into.

Like most swaps, the contract is usually arranged such that its value at signing is zero. This is accomplished by making the value of the fixed leg equal to the value of the floating leg – in other words, the fixed leg will be equal to the average expected dividends over the term of the swap. Therefore, the fixed leg of the swap can be used to estimate market forecasts of the dividends that will be paid out by the underlying.

It is important to remember that dividends do have an effect on forwards; however, when you compare the effect from a risk management perspective for a basket or equity index, dividends have a minor impact when compared to the price movements in the shares that make up the index or basket.

Most equity forwards do not pay dividends except for forwards that are total return forwards. Total return forwards take into consideration the payments and reinvestment of any dividends paid on any shares that are included in the index. This is in addition to the return on the index itself.

5.5 Asset and Total Return Swaps

Learning Objective

1.5.8 Know the basic concepts of total return and asset swaps

5.5.1 Asset Swaps

An asset swap is a swap that can be used to change the interest rate exposure or currency exposure of an investment. The swap itself can be straightforward. The term 'asset swap' is used to denote the reason for doing the swap and is also used for the whole package of the asset and the swap together.

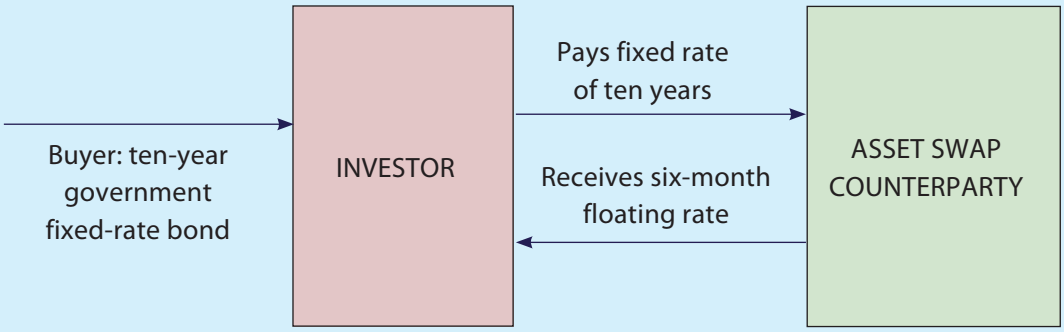
An investor might, for example, buy a floating rate note (FRN) and also transact a swap to receive a fixed interest rate and pay SONIA. The result will be a synthetic fixed-rate investment. Alternatively, in reverse, they might create a synthetic FRN by buying an underlying fixed-rate investment while paying fixed and receiving floating in the swap.

The advantage of such a structure is that the investor is able to choose the underlying asset according to such criteria as availability, credit quality, liquidity and competitive pricing. The choice of whether to invest in fixed or floating rates can be separated from the choice of asset. Typically, a bank offering asset swaps to clients will need to hedge their exposure to the underlying asset, unless they have a mandate to speculate (which is rare due to the risks involved). Therefore, a disadvantage of asset swaps is the ability of the counterpart to hedge their exposure to the underlying asset chosen by the investor. This usually manifests in the lack of available counterparts to transact with from the investor's perspective, and the significant spreads that may be charged to the investor by a willing bank, to provide some insurance that they will be protected from a deterioration in the price correlation of the underlying asset and the instrument used to hedge the bank's exposure.

Example

An investor wishes to buy a ten-year FRN issued by the government (because they want the highest credit rating possible) but no such issue exists. They can instead buy a ten-year government fixed-rate bond and swap it.

Even if such an FRN does already exist, it might be that the synthetic structure using the swap achieves a slightly better yield, if the two markets are not exactly in line.



5.5.2 Total Return Swaps

In a total return swap (TRS), one of the legs pays the total return on a particular financial asset (ie, the total benefit that would have arisen from holding that asset, including all interest payments, dividends, fees and capital appreciation). This amount could be negative if the security's value has fallen rather than risen.

For example, the swap could be linked to the value of a particular bond. In this case, one party will pay the other the total increase in value of the bond from the start of the swap to the end of the swap (or receive the total fall in value) and also pay the value of any coupons received on the bond over the life of the swap. The other leg of the swap will typically be a floating-rate interest rate. In essence, a TRS duplicates borrowing short-term funds and investing in another asset.

One advantage of a TRS is that it allows the investor to maintain liquidity, rather than tying up funds in the actual physical asset. Another advantage of a TRS is that it may offer exposure to markets where it is difficult or impossible to buy securities on local exchanges (for example, countries where foreign investment is restricted). As with asset swaps, a downside is the difficulty for either counterparty to originate liquidity, and the costs incurred as a result.

Example

A UK pension fund wishes to invest in eurozone shares quickly.

One way to do this is to become the receiver of a TRS that has a portfolio of eurozone shares as the underlying instrument.

The price of the TRS will be approximately the same as the cost of a long position of the underlying share portfolio for the pension fund (the TRS buyer), while the seller is financing the position.

The pension fund will receive any increase in the value of the eurozone share portfolio (underlying asset), while the seller will receive any fall in the share portfolio's value (ie, the pension fund will pay the seller if the portfolio decreases in value).

5.6 Mark-to-Market (MTM) Swap

A **mark-to-market (MTM)** swap is one where settlements are calculated by revaluing the swap (ie, marking it to market) regularly and paying or receiving the MTM loss or gain since the previous settlement. The benefit of this is that it removes, at each settlement date, any **credit risk** that has built up.

The effect is the same as closing-out the existing swap, settling its current value, and putting in place a new swap at the current swap rate for the remaining life of the original swap. This can be done for a single-currency swap or a cross-currency swap (an FX resettable swap).

An FX resettable swap has the characteristics and structure of a basic currency swap and an MTM swap. This includes the fact that all payment dates must be set so that they are business days for both currencies, to avoid any mismatch of payments. Also, as is the case with most basic FX swaps, there will be an exchange of principals at the beginning and end of the swap.

In practice, many types of swaps are marked-to-market on at least a quarterly basis, with profits and losses paid out so that the swap value is reset to par. Without doing so, dealers and/or the owner of the profitable leg of the swap could build up unacceptable levels of counterparty risk.

5.7 Commodity Swaps

Learning Objective

1.5.9 Know the basic concepts and fundamental characteristics of commodity forwards, swaps

1.5.10 Know the basic purpose of commodity swaps

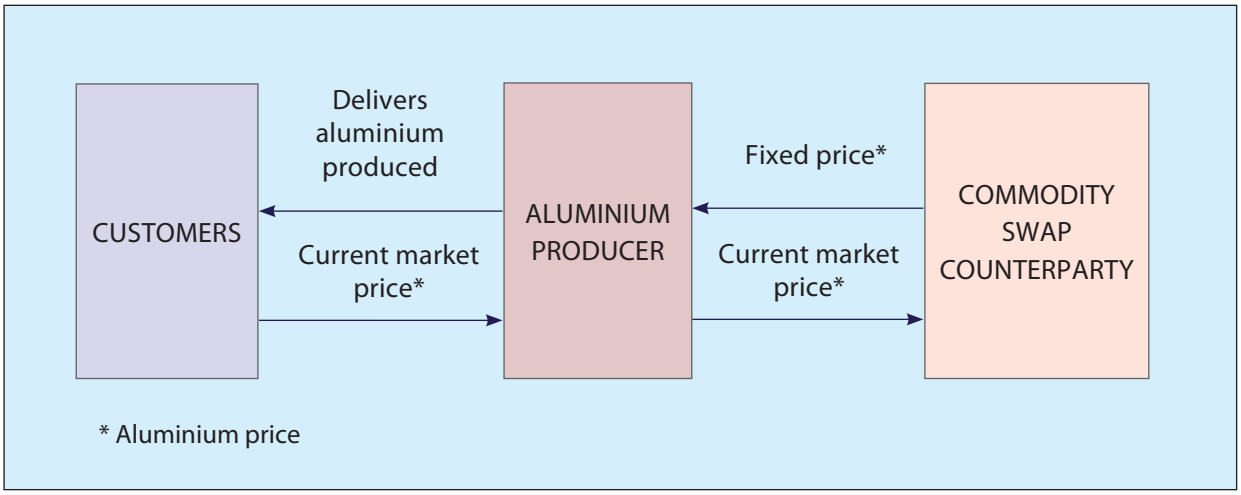
A commodity swap involves paying or receiving a cash flow that is determined by the price or returns of a specific commodity. This type of swap has become increasingly popular given the significant volatility in both the supply and demand for most commodities. The users of this type of swap are interested in hedging their risks – this includes airlines who want to lock in one of their major costs (jet fuel), to farmers looking for a stable income flow from their production.

A fixed-for-floating commodity price swap is one whereby one party periodically pays the other the cash value of that agreed quantity of the underlying commodity multiplied by a fixed price, and the other party in return periodically pays the cash value of an agreed quantity multiplied by a floating price, indexed to current commodity prices. With this swap, there is no exchange of the commodities – this is analogous to a fixed-for-floating interest rate swap.

Example

A producer of aluminium (called aluminum in some countries) makes regular sales of aluminium and receives the market price for sales of their aluminium. They believe that the aluminium price is going to fall over the next 12 months, so they wish to hedge against this risk. They, therefore, undertake a swap to receive, from a swap counterparty, an agreed fixed aluminium price each month, based on an agreed quantity of aluminium. At the same time, they agree to pay that counterparty each month the market price for aluminium, which is then current, based on the same quantity. They will continue to sell aluminium to their customers in the usual way, as the swap is a completely separate transaction from the underlying physical sales.

The net effect is that the producer will receive an approximately fixed price for their sales. The two swap parties will need to agree on an aluminium price index for the purpose of the swap settlements. This index will not necessarily be exactly the same as the price received by the producer from their customers from time to time, such that they will be left with a basis risk, but the two should move closely in line. The timing of the swap settlements might also not be exactly the same as for the physical sales, but again, the producer will be better protected than if they had not hedged at all.



A commodity price-for-interest swap is one whereby the value of a fixed amount of the specified commodity is exchanged for a floating-rate interest payment (usually related to a STIR) or a fixed-rate interest payment.

Commodity swaps can involve any commodity if a producer wishes to fix the net price they will receive over time, a user wishes to fix the net price they will pay over time, or a speculator wishes to take a view on the price over time. Some particular areas in which such swaps are transacted are:

- bullion swaps (gold, silver, platinum and palladium)
- other industrial inputs (eg, fertiliser swaps, for which the CME Group offers a clearing facility), and
- energy swaps (crude oil, natural gas and gasoline).

5.8 Other Types of Swaps

Learning Objective

1.5.11 Know the common interest rate swap features and their relationships to other markets: amortising; accreting; rollercoaster; forward start

There are several types of swaps in common use other than interest rate and currency swaps.

5.8.1 Amortising, Accreting and Rollercoaster Swaps

An interest rate swap is often used by a company to convert the interest rate risk on a borrowing (eg, from floating-rate to fixed-rate).

Suppose that an underlying borrowing arrangement with a bank involves paying the loan back in instalments during its life (an amortising loan). In this case, the swap needs to be amortising also, to match the loan pattern – in other words, the notional principal on the swap payments are based will decrease over the life of the swap.

Other patterns could also be used. For example, the notional principal in the swap might be designed to increase (called an accreting swap) rather than decrease, or it might rise and fall repeatedly in line with seasonal borrowing requirements (called a rollercoaster swap).

5.8.2 Forward Start Swaps

A forward start swap is one that is agreed today, but the exchange of funds takes place at a future date. It is often priced as two partially offsetting swaps – both starting today, but one ending on the deferred start date of the forward swap. For example, a one-year swap and a five-year swap could partially offset to create a four-year swap, starting in a year's time. Forward start swaps are also known as deferred start swaps or delayed start swaps.

6. Derivatives Trading

6.1 FLEX Options

Learning Objective

1.6.1 Know the trading mechanisms by which OTC and exchange-traded markets meet: EFPs (exchange for physical)

The FLexible EXchange (FLEX) 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. **FLEX options** are hybrid exchange-traded products (ETPs) which introduce some OTC features. The concept is to provide an ETP, which will offer greater flexibility by mixing the strengths of classic exchange-traded (ie, fully standardised) options with OTC (freely negotiable terms) options.

FLEX options differ from standardised exchange products in 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 S&P 500 on the CBOE and 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. Credit risk denotes the possibility that a counterparty that has an **out-of-the-money (OTM)** position may not have sufficient capital to pay the counterparty that is in-the-money (ITM). It is generally considered a subset of counterparty risk. Given FLEX options are ETPs, credit risk is substantially reduced due to the exchange's use of a central clearing house. Notably, market, liquidity and operational risks, associated with all derivatives, remain key aspects of FLEX option risk management.

Two aspects of wholesale trading facilities are as follows:

- **Exchange for physical (EFP)** – an off-market transaction that involves the swapping (or exchanging) of an OTC position for a futures position. In order for an EFP transaction to can take place, the OTC side and futures components must be substantially similar in terms of either value and/or quantity.
- **Exchange for swap (EFS)** – similar to EFP, in that it involves the swapping (or exchanging) of an OTC **swap** with a series of futures contracts. The OTC swap must have a price correlation so that the futures are a suitable instrument for hedging the cash market transaction. Price correlation is when the price movement in one instrument is similar to the movement in another; ideally identical.

EFP transactions have a number of benefits for market participants, including the following:

- Counterparty credit exposure can be reduced when an existing OTC position is reversed and replaced with a futures position. In doing so, an EFP allows counterparties to release credit, clearing their credit limits for further OTC trading.
- Reduced balance sheet and margin requirements. By **netting** OTC positions against offsetting futures positions, margin and credit limit requirements can be reduced.
- 24-hour trading – EFP transactions can normally be negotiated around the clock, but must be registered during exchange business days between explicit time brackets.

The risks of EFP transactions include:

- Operational risk can increase substantially when dealing in futures contracts, as opposed to their OTC equivalents (usually swaps and forwards). The mark-to-market (MTM) accounting and daily-margin settling can be an onerous burden for some corporations that primarily use OTC products for hedging their main business activity, which may be food manufacturing for example. Auditors will usually be reticent to grant these non-financial corporates access to futures accounts, without clear internal audit obligations and accounting covenants.

6.1.1 Warrants

A **warrant** is a type of security that is similar to an option, in that it gives its owner the right to buy an asset at a set price. Warrants are often attached to or are part of a bond. Warrants can be separated from the bond and traded on their own. Warrants are covered in detail in chapter 2, section 5.3.

6.2 Liquidity

Learning Objective

1.6.2 Understand the principles and differences between the two major measures of exchange-traded liquidity (open interest and volume)

In the market for shares, the term 'liquidity' represents the ease with which shares can be converted into cash. It is also used to describe how easy it is to trade in an asset without moving the market price significantly or incurring excessive costs. Liquid markets are described as deep, which refers to that market's ability to absorb sudden shifts in supply and demand without dramatic price distortions. A

security is said to be liquid if the spread between the bid and the ask price is narrow, and trades of a reasonable size can be done at those quotes.

Market prices in derivatives markets 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 offer prices is the bid/offer spread (or dealing spread); the tighter this spread (ie, the narrower the difference between the two prices), 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 referred to as a low price elasticity of demand. A consequence is that it is cheaper to trade on liquid markets, as a dealer must 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 traded. In short, liquidity encourages trading – this gives confidence that positions can be entered into and closed out (offset) without too much difficulty or expense. In turn, 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 number 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 long or short positions entered into during that day.

Open interest looks at the total number of long 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 depth and the willingness to take and hold a position, and of long-term commitment to the market.

The higher the open interest and volume figures, the greater the liquidity.

There are three other measures of liquidity:

- **Immediacy** – refers to the time needed to successfully trade a certain amount of a contract or asset at a specific cost.
- **Market depth** – is the size of the order book above (offers) and below (bids) the latest trade or current quoted price. If there are large unfilled orders immediately above and below the current price, then more sizeable orders can be filled without unduly impacting the execution price, representing a more liquid market. A large market order placed when market depth is thin may '**gap**' suddenly to the next order to buy or sell, meaning the average price to fill the order is far from where

the market had previously been trading – this is an example of '**slippage**', and can significantly increase the cost of trading.

- **Resilience** – (the final dimension of liquidity) is the speed with which prices return to former levels after a large transaction. Unlike the other measures, resilience can only be determined over a period of time.

6.3 Exchange-Traded versus OTC-Traded Products

Learning Objective

1.6.3 Know the main features and differences of OTC-traded products in contrast to exchange-traded products: how an OTC-traded product is traded; standard versus bespoke OTC contracts; set maturity or expiry dates versus bespoke OTC contracts; margin requirements versus collateral; counterparty risk; liquidity; market transparency versus confidential transactions

Derivatives can be entered into via one of two ways; they are:

- standardised contracts provided on derivatives exchanges (such as ICE Futures Europe, the CME Group and the Japan Exchange Group's Osaka Exchange), or
- they can be negotiated and entered into away from any exchange, directly between the two counterparties, which are referred to as **OTC** products.

Exchange-traded derivative (ETD) products, such as futures, require market participants to put collateral aside in the form of margin to mitigate the risk of one of the participants not fulfilling their obligations under the contract. The margin is administered by a **central counterparty (CCP)** (the clearing house, such as ICE Clear). The use of margin has become more common and structured for OTC transactions. The Basel Committee on Banking Supervision (BCBS) and the Board of the International Organization of Securities Commissions (IOSCO) have developed a standardised margin schedule for most OTC derivatives, which is being phased in by most market participants. While the margin requirements began entering force for very large OTC transactors in 2016, since September 2022, even smaller OTC participants, with month-end notional OTC values of €8 billion are required to post initial and **variation margin**. The requirements for margin will be explored in more detail later in chapter 6, section 3.

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

	Exchange-Traded	OTC-Traded
Contract terms	Standardised. Size, quality and quantity defined in the product specification.	Customised, specifically negotiated, totally confidential, flexible, large size possible.
Delivery	Standardised, under the exchange's product specification. Fixed dates.	Negotiable.

	Exchange-Traded	OTC-Traded
Liquidity	Excellent on major contracts, fast order execution. Largely an electronic environment.	Can be limited, varies dramatically depending on the underlying asset. Slower execution. Some markets may be made by fewer competing firms, perhaps only one.
Financial integrity	Existence of a CCP means that counterparty risk is removed. Daily MTM, which entails calculation and settling of variation margin at the end of each trading day.	Possibility of counterparty default exists; hence, credit rating is important. A credit rating is an independent assessment of a company's credit risk, and is usually only accepted from one of the large credit-rating agencies (S&P, Fitch and Moody's). Prime brokers can reduce and simplify counterparty risks.
Margin	Margin is always required, in the form of initial and **variation margin**. Initial margin is the required amount of capital that a participant needs to keep a position open, while variation margin is the daily profit or loss on the position that must be settled (see chapter 6, section 3).	While formal margin payments are not usually required, some contracts do require the payment or pledging of collateral. It is agreed on a case-by-case basis to secure the trade; it does not have a fixed payment, such as the margin payments associated with ETD trades, but is often reset to a minimum level (with the associated profits and losses changing hands) on a fixed schedule, such as quarterly. In periods of high volatility, additional collateral could be demanded and the amount could change frequently.
Documentation	Standard and concise.	Tends to be one-off and more complex, although certain standard documentation is provided by trade associates, such as the International Swaps & Derivatives Association (ISDA).
Regulation	Subject to significant regulation.	Since 2008, OTCs have become increasingly more regulated – eg, European Market Infrastructure Regulation (EMIR) in the EU, Dodd-Frank in the US. Under EMIR, many types of trades are required to be cleared through a CCP. Market participants are also required to report trades to a warehouse (trade repository). See also regulation in the table that follows.
Price quotes	Highly transparent, public dissemination.	Limited. Need to shop around.

	Exchange-Traded	OTC-Traded
Transaction costs	Standardised, lower.	Individually priced, more expensive than exchange-traded like-for-like derivatives.

The following table highlights the relative merits of exchange-traded contracts compared to entering into similar OTC contracts:

Feature	Exchange-Traded	OTC-Traded
Standardisation and flexibility	The exchange standardises the expiry dates and underlying for each contract. As a result, the contracts are relatively inflexible.	Contracts are tailor-made between the participants, with the expiry date and underlying agreed between the participants. Highly flexible.
Fungibility	Individual contracts that have the same expiry are totally fungible.	The contracts are customised and are not as fungible.
Trading and liquidity	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.	Contracts are not standardised and are not easily traded, so liquidity can be restricted. The tailor-made nature of contracts means that closing the contract will involve negotiating with the original counterparty. However, some products are regularly traded between dealers in banks.
Counterparty risk	The counterparty in exchange-traded contracts is the CCP (the clearing house). The counterparty risk is relatively small.	The counterparty risk will be driven by the credit standing of the counterparty to the deal. However, some OTC products can be cleared centrally through a clearing house, reducing counterparty risk.
Regulation	There is reasonable regulation for ETPs.	Regulation has historically been very light for OTC products. However, that has changed with the implementation of legislation (such as the Dodd-Frank Act in the US), and is expected to continue changing as new regulation is introduced.

Feature	Exchange-Traded	OTC-Traded
Public information	Trading activity and prices on the exchange are published on a real-time basis – trading details are revealed to the market, although the identification of the participants remains confidential.	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. With the introduction of the Commodity Futures Trading Commission (CFTC) and EMIR reporting, there is real-time reporting of OTC transactions.
Hedging	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 available.	The negotiation of the terms and conditions between participants can result in precisely hedging the underlying position.
Speculation	The available speculative exposures are restricted to exchange-traded products.	The availability to speculate is almost unlimited in terms of constant product innovation, but can be restricted in terms of counterparty availability.

As mentioned in the table above, actively hedging a portfolio using either exchange-traded or OTC derivatives carries its own particular risks. While OTC derivatives contracts allow one to structure a hedge that exactly matches the underlying exposure (in amount, specific asset characteristics and maturity), these contracts do have counterparty risks and may have limited liquidity. In contrast, exchange-traded contracts do not have counterparty risk; however, given their standardised nature, risks may arise from any slight mismatch between the portfolio and the derivatives contract in terms of maturity, contract size or slightly different asset characteristics. This should be taken into account when analysing the hedge's risk profile.

6.4 Markets, Participants and the Trading Environment

Learning Objective

1.6.4 Know the essential details of the trading environment: open outcry, telephone and electronic platforms; whether quote or order driven; how the trading host matches orders; the order types accepted by the markets; recognised trading strategies

6.4.1 Markets and Participants

As we will see in chapter 2, the derivatives markets cover a wide range of products and, while structured differently, they do have a number of aspects in common.

Firstly, most have some sort of regulator, whether it be the respective central bank such as the Federal Reserve, Bank of England (BoE) or European Central Bank (ECB), or a government agency such as the **Financial Conduct Authority (FCA)** or the US Securities and Exchange Commission (SEC).

In addition, all exchanges have the authority to set the minimum standards, such as trading hours, contract specification, margin requirements and delivery procedures. The following is a summary table of the main regulatory bodies for the major derivatives markets.

UK	Bank of England (BoE) with its **Prudential Regulation Authority (PRA)** and Financial Policy Committee (FPC), and the FCA
EU	European Central Bank (ECB) European Banking Authority (EBA) European Securities and Markets Authority (ESMA) Respective country central banks and regulators such as: Autorité des Marchés Financiers (AMF) in France; the Central Bank of Ireland in Ireland; and Bundeszentrale für Finanzdienstleistungsaufsicht – Bundesbank and German Financial Supervisory Authority (BaFin) in Germany
US	Federal Reserve System (Federal Reserve or Fed) Securities and Exchange Commission (SEC) Commodity Futures Trading Commission (CFTC) Federal Deposit Insurance Corporation (FDIC)
Japan	Financial Services Agency (FSA) Securities and Exchange Surveillance Commission (SESC)
India	Reserve Bank of India (RBI) Securities and Exchange Board of India (SEBI)

China	China Securities Regulatory Commission (CSRC) China Insurance Regulatory Commission (CIRC) China Banking Regulatory Commission (CBRC)

Also, for the most part, they have the same main participants, ie, the major global commercial and investment banks, fund managers, **sovereign wealth funds** and international corporations. In addition, most will also have local entities, which in the case of smaller or newly developing markets have links with international players, for either regulatory or customer reasons.

Electronic trading is widely used in both OTC markets, such as FX, as well as many exchanges. Some organised exchanges (often referred to as exchange-traded markets) have both screen-based trading and floor brokers, although an increasing number have moved to screen-based trading only over the years, such as the Intercontinental Exchange (ICE) in 2005.

Exchanges that still have **floor** trading include the CME Group, the CBOE and the LME (the only London-based exchange that still has floor trading, where the trading floor is known as 'The Ring'). However, in 2020, floor trading was temporarily closed in response to the coronavirus (COVID-19) pandemic and all trading shifted to electronic platforms. The CME made this permanent for nearly all contracts in 2021, except for Eurodollar/SOFR trading, while the LME has since resumed Ring trading.

Market makers (also known as price-makers or price-givers) are market participants who quote both a buy and a sell price for a financial instrument or commodity. They quote both sides of a price with the aim of making a profit by making the spread (the difference between their bid and offer prices). If the market remains steady, market makers hope to continually buy at the bid and sell at the offer. A market that relies on market makers for its price is known as a price-driven market. Market makers who are members of an exchange and mainly trade for their own accounts are sometimes called 'locals'.

In contrast, a price-taker is the market participant who either requests the price or deals via an intermediary on another participant's price. By doing so, they pay away the spread; that is, they deal on someone else's price.

The part of the market or securities business that executes orders and is made up of market or price-makers is known as the sell-side. Sell-side market participants (sometimes called prime brokers) usually refers to brokerage firms, investment banks and other entities that make buy/sell recommendations, upgrades, downgrades, target prices and research opinions to money management firms (eg, fund managers and pension funds) and corporate entities. In turn, these firms can use those recommendations to make investing decisions. Sell-side market participants may thus be considered intermediaries that produce market research, whose aim is to generate trading ideas and then act as a counterparty to that trade. Since they only execute trades and do not normally act as intermediaries, most of their profit does not include trading risk.

On the other side, firms that buy securities and derivatives for their own account or their clients' accounts are said to be buy-side market participants. Firms on the buy-side are money management firms that try to create value for their clients by purchasing securities which are underpriced. This usually involves taking on risk (for themselves or their clients) to generate a profit from these strategy-based trades. Most institutional investors (such as mutual funds, pension funds, hedge funds, private equity funds, trusts, insurance companies and proprietary traders) make up the vast majority of the buy-side.

Sell-side firms usually charge buy-side firms for the trade, through a commission or a charge that has been included in the trade's price. This charge is to cover the sell-side firm's costs of trading (trader's salary) and the cost of the research (analyst's salary). Many sell-side firms now delineate the cost of their products so that buy-side firms know they are paying an appropriate price for the best research and trade execution available. The buy-side makes up one half of the financial market, and the sell-side makes up the other.

Many market participants will find themselves as both price-makers and price-takers at any given time, depending on the circumstances and their positions. Liquidity in most markets comes from both market makers and order-driven prices from customer orders.

Example

Bank GHI quotes a two-way (bid/offer) price in spot GBP/USD to a client. If the client deals and the bank trader does not like the resulting position, they might call a few other banks for a spot GBP/USD price and deal on their price to regain the original position. In the first case, Bank GHI is a price-maker; while in the second case, it is a price-taker (since it is dealing on another bank's price).

In contrast, most exchanges operate on an order-driven or matched bargain basis. Such a system does not have designated market makers; instead, a deal is done when a buyer's bid meets a seller's offer. When this happens, the exchange's matching system will decide that a trade has taken place.

An order-driven market is one where the order flow determines prices. It displays all the unfilled orders from both the buyers and sellers for each security, giving both the price and quantity of each security that is listed. There is typically an order book shown, where increasingly higher bids and lower offers are 'stacked', so participants can see how 'deep' liquidity may be at various price levels.

In a price- or quote-driven market, it is the market makers who determine the prices and the order flow. This type of market only displays the bids and offers of the designated market makers, as opposed to all parties interested in trading the market. The advantage of this type of market is the liquidity that the market makers provide, since they are required to meet their quoted prices. However, a major drawback is that it lacks the degree of transparency of an order-driven market.

6.4.2 The Trading Environment

Pit trading (also called '**open outcry**', and 'ring trading' at the LME) is the original trading method that stock exchanges employed. In pit trading, the exchange floor is split into designated sections, traditionally known as pits, where individual futures or options products are traded.

Pit trading is a quote- or price-driven system, where traders quote the prices for which they are willing to buy or sell specific contracts. 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, since the pits are bustling and noisy spaces) so that all participants have an equal opportunity to trade.

The LME is one of the few European exchanges that operates both ring trading during its most liquid times, along with LMEselect (an electronic platform) for extended trading. On the LME, trading takes

place via either ring trading or its LMEselect system. The LME has four five-minute ring trading sessions per day for each of its major metal contracts – these take place at different times during the main trading day and are limited to the specific contract during its allotted time. As of 2022, the LME had begun a comprehensive upgrade to LMEselect, with a revision to its user interface, including electronic messaging, cybersecurity, order and risk management capabilities and the overall user experience.

Other markets that use pit trading are the CBOT and NYSE in the US; however, even on these exchanges, screen-based trading has become increasingly popular, particularly after the COVID-19 pandemic when all open outcry venues halted to prevent the spread of the virus.

A key aspect of the LME's ring trading is its ring dealing membership category. Each ring dealing member is allowed to trade during each ring dealing session, in addition to the 24-hour inter-office trading that takes place on the LME. Note that seats on open outcry markets are normally more valuable given the limited number of seats due to capacity limitations. This results in waiting lists for seats, and an open market for seat sales and leases.

Both the CME and CBOT formerly had large and very active trading pits; however, since electronic trading became dominant, the CBOT's open outcry floor has been used for complex trades (primarily spreads and combinations of options) – these would be extremely difficult to quote on electronic systems and where the local traders could offer much tighter bid/offers than those of the components.

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. All European exchanges except for the LME are generally screen-based.

Telephone trading most often takes place for (and is exclusively limited to) trades and orders between clients and their executing brokers. This is most often the case when a client calls their broker, who has a direct line to their trader, who quotes a price. If the client deals on it, the trader will trade on the market price. Electronic trading systems have replaced telephone trading in most of the main exchanges.

Most exchange trading is purely electronic via an electronic system, which 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, an exchange member. However, brokers may communicate with other brokers by telephone to gauge interest for large orders, such as block trades or OTC products, which are then dealt off-exchange and confirmed and settled through usual channels.

In contrast, ICE trading takes place on its own designated platform, via applications that are embedded in ICE Connect that includes both online and mobile trading. An example of another electronic trading system is CME Direct, which routes orders to the CME's electronic trading platform Globex. Many exchanges in developing markets (eg, the SHFE, NCDEX and NSE of Kenya) also use electronic trading systems.

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 a trade registration system, such as ICE Clear, as used by ICE in the London market.

In the case of ICE in London, trades that have been registered using ICE Clear are passed automatically to ICE Clear Europe. The trade then novates (which is covered in more detail in chapter 6), and ICE Clear Europe becomes the CCP to the buying and selling clearing members.

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)
- the expiry month, and
- price conditions (if any).

The order is passed by telephone or 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 their 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.

For screen-traded systems (eg, CME Direct), 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.

6.5 Exchange Membership Structures

Learning Objective

1.6.5 Know the exchange membership structures (brokers, dealers and broker/dealers) and their main activities: executing trades for third parties; executing trades for their own account; executing trades for other members; capacity as broker; capacity as dealer

6.5.1 Different Market Participant Roles

There is a wide range of roles and functions that different market participants fulfil to provide market liquidity. Some of these may seem to be far from the market maker's role as price-maker but, without these other services, most markets would not exist or be as liquid or efficient as they are:

- **Prime broker** – refers to the central trade processing, reporting, financing and servicing of the account activities of clients and traders that a broker may provide. These normally include:
  - clearance and settlement of trades in global markets
  - central custodianship of assets and using consolidated positions for the extension of leverage
  - financing in multiple currencies, as required
  - stock borrowing capabilities to support trade strategies
  - integrated web reporting of positions, activities and performance
  - hedge fund consulting services
  - counterparty or intermediary for OTC derivatives trades, and
  - facilitated communication between sales, trading and research.
- **Clearing broker** – a broker-dealer that acts as the clearing agent in connection with a transaction. In addition to handling its own transactions, a clearing broker can provide clearing agent services to other broker-dealers, such as introducing brokers. Broker-dealers can transact on their own account as well as on behalf of clients. This distinction is usually referred to as 'principal-agent', where brokers act exclusively as agents to facilitate a transaction between external parties (eg, clients and the exchange), and dealers can additionally act as principal, where they can also become a counterparty in a transaction.
- **Introducing broker** – a broker-dealer that effects transactions with its customers through a clearing broker and does not hold customer funds or securities.
- **Executing broker** – a broker that finalises or executes an order on behalf of a client. That client could be another financial institution, a corporation, a hedge fund or a private individual.
- **Inter-dealer broker (IDB)** – acts as an intermediary between other market participants, such as brokers and/or market makers, who wish to buy or sell large quantities without revealing their identities. IDBs may also be able to deal in securities and derivatives that are not traded on exchanges. IDBs could be thought of as a wholesale execution house or a 'broker's broker'.
- **Futures commission merchant (FCM)** – an individual or company that is registered with the CFTC, which solicits business from others for execution on a listed commodities exchange. FCMs can also extend credit to their customers.

6.5.2 Membership Structure and Trading Rights

Access to most exchange markets is via membership. Firms may join in a number of different membership categories:

- **Brokers** – may only trade for third parties (including clients and other members).
- **Dealers** – may trade for their own account. They can also trade for other members providing that they are authorised by the appropriate regulatory body.
- **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. The type of membership determines the types of trading services that a firm can execute; the same is true of clearing services.

All exchanges have a clearing house, which serves as the central counterparty (CCP) to all trades executed on the exchange between clearing members. Remember that one of the key attractions of exchange-traded contracts is that there is no counterparty risk to another member: the clearing house guarantees the delivery of all contracts.

Clearing members can be:

- **general clearing members (GCMs)** – which enables them to clear their own principal trades, on behalf of their clients and on behalf of other non-clearing members, or
- **individual clearing members (ICMs)** – only able to clear their own principal trades and trades on behalf of their clients.

Most clearing houses require that their GCMs have a higher level of financial resources than they require from ICMs. Each and every contract (transaction) traded on the exchange will be supported by a clearing member in whose name the transaction is registered.

Certain exchanges use a different terminology, whereby members are either clearing members (CMs) or trading members (TMs). CMs can trade on behalf of clients, and clear for both clients and other non-clearing institutions (the TMs). At the same time, TMs collect collateral and execute trades from clients and must have a clearing relationship with a CM. Also, non-clearing members may have limitations on how many GCMs they can have agreements with, primarily for oversight purposes.

Appendix

Answer to Exercise 1

a If the share was worth 120p, the buyer of the option would exercise and buy the share for 100p, thus – making an immediate gain of 20p (ie, 120p – 100p). However, they have paid 10p as a premium. Therefore, this represents a profit of 10p, which is 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, the buyer of the option would be indifferent as to whether to exercise or not, since the share is no cheaper under the terms of the option than it is on the market. Thus, the buyer of the option would lose the 10p premium (ie, – 100% of the investment) when the underlying share did not rise or fall.

c If the share was worth 95p, the buyer of the option would not exercise; the share is cheaper on the market. Again, the premium has been paid upfront as required by the option contract. The buyer of the option would have paid the 10p premium (ie, – 100% of the investment) when the underlying share fell by just 5%.

Answer to Exercise 2

The investor would have a profit of $42,000.

Index value sold	3400
Less index value at close-out	–3190
	210 index points

Profit = 210 index points x $10 per index point x 20 contracts = $42,000.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **What causes liquidity risk?**
   Answer reference: Section 1.1

2. **Describe the activities of an arbitrageur.**
   Answer reference: Section 1.2.3

3. **In the derivatives market, what is meant by gearing?**
   Answer reference: Section 1.3

4. **How would you describe an Asian option?**
   Answer reference: Section 2.2

5. **What are contracts for difference?**
   Answer reference: Section 4

6. **How do flexible exchange (FLEX) options differ from standardised exchange products?**
   Answer reference: Section 6.1

7. **What are the main elements of a liquid market?**
   Answer reference: Section 6.2

8. **What are over-the-counter (OTC) products?**
   Answer reference: Section 6.3

9. **Who are market makers?**
   Answer reference: Section 6.4

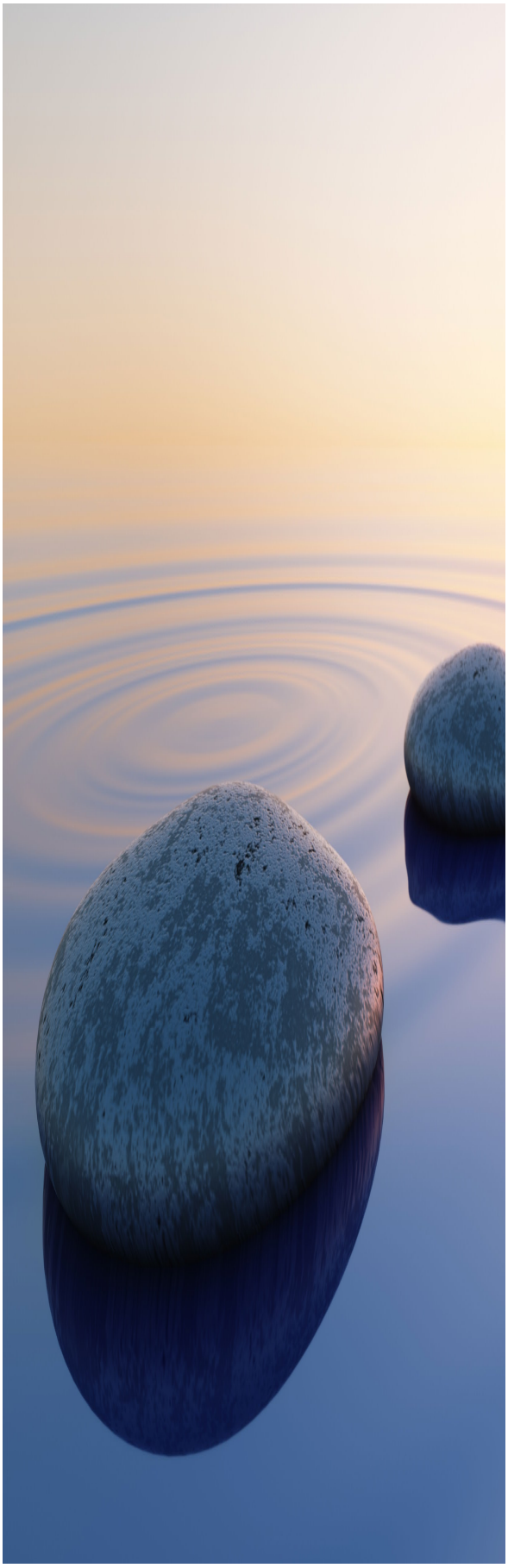
10. **What are prime brokers?**
    Answer reference: Section 6.5.1

Chapter Two

Underlying Markets

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2. **Money Market Instruments** 51
3. **Foreign Exchange (FX)** 55
4. **Bonds** 61
5. **Equities Markets** 68
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This syllabus area will provide approximately 16 of the 100 examination questions



1. Introduction

This chapter outlines the underlying (often referred to as 'cash') markets and details the nature and type of the derivative products that are available. These include both financial and commodity-based markets, upon which wide ranges of derivative products are traded. While commodity-based contracts are where the derivative market first developed, trading in financial derivatives has become significantly greater in recent years.

2. Money Market Instruments

Learning Objective

2.1.1 Know the uses and requirements of inter-bank deposits: characteristics of inter-bank deposits; their purpose; determination and role of benchmark rates; major benchmark rates

In the bond markets, issuers (borrowers) and investors are seeking to raise and invest capital over the medium to long term. In contrast, the money markets are geared towards short-term liquidity and providing a temporary safe haven for investment funds. Money markets generally signify cash, short-term deposits and other instruments that mature within one year of issue.

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.

2.1 Sterling Overnight Index Average (SONIA)

SONIA is the effective overnight interest rate paid by banks for unsecured transactions in the London sterling market. It is used for overnight funding for trades that occur after market hours and represents the depth of overnight business in this marketplace.

One of the key uses for traders and financial institutions is that it offers a benchmark interest rate for financial transactions. As of April 2018, the Bank of England (BoE) took over the calculation and publication of SONIA. This is seen as key to the promotion of making SONIA the standard sterling interest rate benchmark for loans, derivatives and bonds.

The BoE calculates SONIA through the following process:

- Major financial institutions trading short-term-sterling rates send details of all their transactions from the previous day by 7am GMT.
- The BoE checks the data is in the right format and runs plausibility checks to make sure the data they have is sensible, within their discretion.

The rate is then published by the BoE at 9am GMT.

2.2 Euro Short-Term Rate (€STR)

The European equivalent of SONIA is the euro short-term rate (€STR). €STR indicates the wholesale euro unsecured overnight borrowing costs of banks in the eurozone and is published on each TARGET2 business day based on transactions conducted and settled on the previous TARGET2 business day. A TARGET2 business day is defined as any day on which the Trans-European Automated Real-Time Gross Settlement Express Transfer System (TARGET2) – a payments clearing system used by eurozone nations – is operating. €STR is calculated on all transactions over €1 million that are based on borrowing transactions in euros.

2.3 Secured Overnight Finance Rate (SOFR)

The **secured overnight finance rate (SOFR)** is a benchmark interest rate for dollar-denominated derivatives and loans. First published by the Federal Reserve Bank of New York in 2018, the secured overnight financing rate (SOFR) is a benchmark interest rate for dollar-denominated derivatives and loans. It is a broad measure of the cost of borrowing cash overnight which is based on the single day repo rate for US Treasuries and is published each business day. It is used by banks to price US-dollar denominated derivatives and loans, and is also used as a way to manage interest rate risk and to speculate on changes in borrowing costs. SOFR uses reported trades in the general collateral (GC) repo market and is volume weighted, so rather than a survey, it is based on actual market data.

2.4 Risk Implications

Learning Objective

2.1.2 Understand the risk implications of trading in money market contracts: as a depositor; as a source of funding

One of the key aspects that allows the interbank money market to operate efficiently is confidence. Banks and other investors who lend their funds in the short-term market do so with little or no guarantee that the borrower to whom they are lending is creditworthy (ie, is financially strong enough to ensure that they will return their funds back at maturity).

Most banks and other participants use internal guidelines or credit limits to determine how much they are willing to lend to another market counterparty. If the market loses confidence in a borrower or in the market structure overall, that funding will simply dry up. Should this occur, those in need of short-term funding must be willing to pay a higher rate to attract funding or seek funding from their respective central bank.

For borrowers who use the money market as a key source of funding, the lack of confidence which causes funding to dry up is a major risk. This can be demonstrated with the case of Northern Rock, a UK bank that used this market in August 2007 for up to 75% of its funding immediately prior to the global financial crisis. Even though Northern Rock was willing to pay a premium over the prevailing interbank rate, once investors and lenders lost confidence, it faced a major funding crisis, which eventually led to its nationalisation by the UK government.

Another example of the sensitivity of the interbank money market can be seen in the more active role that the ECB played during the 2010–12 euro government bond crisis. The ECB has become an active source of funding of euros to many European banks.

For depositors, the main risk is counterparty risk (which you will recall is the risk that the borrower will not be able to repay the funds at maturity). Again, given the nature of these contracts, it is the lender's internal guidelines and credit ratings that help the lender assess and evaluate a borrower's financial situation and ability to repay.

2.5 Treasury Bills (T-bills)

Learning Objective

2.1.3 Know the basic characteristics of Treasury bills: term; issuance/redemption; promissory note

Treasury bills (or T-bills for short) describes the short-term debt that is issued by several governments. In the UK, the Debt Management Office (DMO) makes new issues on a weekly basis on behalf of the UK government to cover its liquidity needs.

T-bills are typically issued with a maturity of 91 days (approximately three months), although some are issued with 182-day maturity (approximately six months). In the US, the Department of the Treasury also offers a weekly issue of new debt, with maturities of 28 days (one month), as well as three and six months like its UK counterpart. Several other governments issue similar short-term debt instruments, with the same characteristics.

Since T-bills are backed by the promise of their respective government, they are often referred to as promissory notes. The yield they offer provides a benchmark level of theoretically risk-free returns available on other short-term money market instruments in their respective markets. T-bills pay no coupon; rather, they are issued at a discount to their nominal (also called par or face) value, then redeemed at their **nominal value**. The discount provides the return to the investor.

2.6 Certificate of Deposit (CD) and Commercial Paper (CP)

Learning Objective

2.1.4 Know the basic characteristics of certificates of deposit and commercial paper: term; how and when issued; issued/redemption; differences in terminology between UK and USA

Certificate of Deposit (CD)

A certificate of deposit (CD) is a promissory note issued by banks and other financial institutions. It is a savings-type deposit offered to investors that pays a fixed interest rate if the investor redeems the certificate after a set amount of time. The cost is that a bank will restrict holders from withdrawing funds on demand. Redeeming a CD before its maturity is possible, but the investor will incur a penalty that is linked to a pre-agreed interest rate.

The most common maturities for CDs are three and six months. They are purchased at their nominal value and pay a specified interest rate at maturity. Therefore, at maturity or redemption, the investor receives their full nominal value, plus the specified interest rate. In some cases, CDs usually pay a yield higher than that of T-bills, reflecting their slightly higher credit risk. They can be issued in any denomination. For example, some Asian banks offer RMB CDs denominated in RMB 200,000 each, coined 'large-denomination' certificates, which can be redeemed individually at the bank at or before maturity (including penalties).

Commercial Paper (CP)

Commercial paper (CP) is issued by large financial and non-financial institutions, as a short-term borrowing facility. The debt is unsecured, but is normally backed by unused bank-based credit lines. Maturities normally range from two to nine months and are denominated in minimums of US$500,000 or similar amounts in other currencies. The interest rate paid on CP depends on the market conditions, as well as the issuing company's credit rating.

While the US domestic CP market is the largest, similar markets also exist globally. The key differences between the US and UK CP markets are:

- The UK market is significantly smaller and less liquid compared to its US counterpart, with orders of magnitude larger given the number and size of the corporations issuing.
- The process of issuance is more standardized in the USA, as it is a more liquid and evolved market, whereas the UK does have more flexibility in real terms; for example issuance currency is more diversified between GBP, EUR and USD than in the USA where it is overwhelmingly in USD.
- The major ratings agencies (S&P, Moody's and Fitch) are more active in providing assessments of US issuers, which can give the lender a more detailed understanding of the issuer and hence of their risk profile as a borrower, whereas there will be less availability of ratings for some UK issuers.

The key terminology differences:

- In the US, CD often refers to a retail savings product — in the UK, CD is almost exclusively an institutional, wholesale funding instrument.
- Commercial Paper in the UK is often referred to under the broader umbrella of Euro-Commercial Paper (ECP) if issued internationally, even if denominated in GBP.
- Maturity conventions differ — US CP is capped at 270 days for certain exemptions; UK/ECP markets typically use ≤ 364 days.
- Investor perception — In the US, retail savers know CP as a consumer bank product; in the UK, the term is largely unknown to retail investors.

3. Foreign Exchange (FX)

The FX market is a worldwide decentralised OTC financial market for the trading of currencies. It has worldwide financial centres that provide access to trading between a wide range of different types of buyers and sellers around the clock, except on weekends when the major banks are closed (ie, trading from 7pm GMT on Mondays to 9pm GMT on Fridays). For this reason, the FX market is usually classified by three major trading sessions: Tokyo, London and New York. The FX market determines the relative values of all free-floating currencies.

The FX market is unique because of:

- its huge trading volume, leading to high liquidity
- its geographical dispersion
- its continuous operation (24 hours a day except weekends), and
- the variety of factors that affect exchange rates.

The FX market is used by a wide range of participants, from companies and investors who need to exchange one currency for another as part of a trade or investment transaction, to the market makers and speculators who look to profit from providing liquidity and betting on one currency against another.

3.1 Spot FX Market

Learning Objective

2.2.1 Understand the nature of the spot market and the trading and settlement of spot transactions: purpose of the market; contract value dates; settlement periods and timescales

The spot FX market involves the exchange of one currency for another at an agreed rate, with spot settlement very soon after the date of transaction. For most currency transactions in the wholesale spot market this is T+2, which denotes that evidence of a currency transfer must be submitted by each counterparty within two trading days of the transaction being confirmed. For all FX trades, settlement requires that both domestic markets must be open; therefore, in order for a EUR/JPY trade to settle, its value date must be when the banks in both the EU and Japan are open.

Many commercial and investment banks provide spot FX quotes, in their role as market makers. This provides the FX market with liquidity, as they quote to other market participants and to their clients.

Remember that, in foreign exchange, one currency is quoted in terms of another currency. Therefore, in the quote GBP/USD = 1.3010/15, sterling (GBP) is the base currency while the dollar is being quoted in terms of sterling:

- **1.3010 is the bid for GBP** – this means that the quoting bank will buy sterling and sell dollars at this rate, since it is cheaper. The bank pays $1,301,000 in return for receiving £1,000,000.
- **1.3015 is the offer for GBP** – here the quoting bank will sell sterling and buy dollars. At this rate, sterling is more expensive. The bank required $1,301,500 in return for paying £1,000,000.

Note that in most cases the amounts traded are also based on set amounts of the base currency.

Example

An American company must pay an invoice issued by its German supplier. The German company has charged its American customer €15 million, which needs to be paid in two days. In order to pay this, the American company calls one of its banks and gets the following quote:

EUR/USD = 1.1805/10

The American company agrees to the rate and buys €15 million at 1.1810. It therefore instructs its bank to debit $17,715,000 (€15 million x 1.1810) from its USD account in two days. At the same time, its bank will credit the American company's EUR account with €15 million, also in two days. The American company will then be able to pay its invoice to its German supplier.

3.2 Forward FX Market

Learning Objective

2.2.2 Understand the nature, characteristics, markets and uses of FX forward contracts: FX forward contracts, including non-deliverable forwards; commercial, speculative and hedging

2.2.3 Understand the factors that determine forward rates and how forward rates are quoted: effect of interest rate differentials; the relationship between the spot market and the forward market; using forward points; how prices are quoted (may be tested by the use of simple calculations)

2.2.4 Be able to calculate forward foreign exchange rates using interest rate differentials

Often, the payment to settle a contract is not needed until much later – say, several months into the future. In these cases, the company may wish to lock in an exchange rate in advance. This is called the forward rate. The forward rate is calculated based on the spot rate, and the interest rate differentials between the two currencies for the length of the forward.

As is the case with spot FX, forward FX contracts are used for a wide range of reasons. Since their prices are mainly based on the change in the relative difference between the two currencies' interest rates, those taking a speculative position are mainly betting on interest rate and not exchange rate movements. The latter is done using the spot FX market.

Other uses of forward FX contracts are for hedging, for commercial contracts, such as future trade-related payments, or future receipts from international operations to fund managers who use these contracts to hedge the FX risk associated with holding international assets within their fund.

Example

Continuing with our earlier example, what could the same American company do if it gets an invoice in yen from a Japanese supplier, that is not due for two months?

In such situations, the American firm might consider entering into a forward contract. A forward contract is simply a deal between two participants to agree now the rate at which a certain amount of foreign currency will be exchanged at some pre-agreed date in the future.

These forward FX contract rates are quoted OTC by banks. The quotation for the forward rate is arrived at by applying a margin to the spot quotes (eg, the two-month forward outright rate).

For example:

USD/JPY	Bid	Offer
Spot	110.00	110.05
2 month forward points	0.65	0.60
2 month outright rate	109.35	109.45

In this second example, the margin applied to the spot rate is a discount, since the base currency (in this case, the US dollar) is becoming cheaper (ie, worth fewer JPY in two months' time than it is today). As a result, the forward points are deducted from the spot rate, so that in the forward deal, the US dollar will buy fewer yen (the bid column), and the yen will buy more US dollars (the offer column). It follows that when the base currency is at a discount, the traded currency must be at a premium. Therefore, in this example, the US dollar is at a discount in the forward market, putting the yen at a premium.

When quoting forward points, the market convention is that:

- When the forward points decrease, the bid decrease is greater than the offer decrease, as shown in the example above (ie, 0.65/0.60) and they would be subtracted from the spot rate to give the outright rate. This is described as a discount for forward delivery.
- When the forward points quote increases, the base currency is more expensive (ie, it is worth more of the counter currency) in the future than today, and the points would then be added to the spot rate. This is described as a premium for forward delivery.

The banks will calculate the necessary premium or discount considering the relevant short-term interest rates (STIRs) of the two currencies. The general principle that determines forward points is that of arbitrage, in that, the forward points tend towards a level that makes participants indifferent between:

a. holding either currency in the spot market and earning interest until funds are due to change hands, compared to
b. exchanging forward FX contracts now.

The deep liquidity in FX markets, compared to say commodity markets, ensures that FX forward points rarely allow for opportunities to arbitrage geographic interest-rate differentials for a prolonged period of time.

The key advantage of forward contracts is certainty. The American firm could use the forward contract to lock into a rate of 109.35 today, rather than worry that the yen might strengthen over the next two months.

As well as commercial users, the forward market is used extensively by speculators (eg, hedge funds and proprietary trading desks at investment banks) to speculate on expected changes in the difference between these two interest rates. Since forward rates are based on the interest rate differential between the two currencies, speculators mainly take spot or forward outright positions.

One final use of FX forwards is in portfolio management. For example, a GBP-denominated asset manager could hedge the transaction risk on USD dividends through GBP/USD forward outrights, while using GBP/USD forward swaps (ie, selling USD spot and simultaneously buying GBP forward) to manage the translation risk on the capital value in GBP of the US assets themselves.

Translation risk is the possibility that foreign-currency denominated assets on a company's balance sheets (or portfolios in this case) will decline in value purely due to FX translation back to the domestic currency. Translation risk is often in contrast to transaction risk, which is incurred at the point of a transaction, for example, where a food manufacturer in India is due to purchase US-dollar-denominated machinery in three months, and is therefore carrying an FX transaction risk of a depreciation in the Indian Rupee versus the US Dollar.

3.2.1 Premiums and Discounts

As discussed, the forward rates are closely related to the spot rates and interest rates of the two countries. A result of the interest-rate parity theory is that, for the country with the higher interest rate, its currency is weaker in the forward market than in the spot market.

Example

The spot FX rate for GBP/EUR is 1.1636, while 12-month sterling interest rates are 5.2% compared to 3.5% for the euro.

Suppose the one-year forward FX rate for GBP/EUR is 1.1600. An arbitrageur could borrow €11.636 million at 3.5% and convert the euros into sterling in the spot market. This would give them £10 million to invest at 5.2% for one year. At the same time, the arbitrageur could enter into a one-year forward contract to sell the principal and interest from the deposit of £10.052 million at 1.160. The net result would be:

Borrowing €11.636 million at 3.5% produces interest of €407,260 resulting in a repayment of €12,043,260. The deposit of £10 million at 5.2% produces interest of £520,000 at maturity resulting in a total of £10,520,000.

The one-year forward FX contract of £10,520,000 sold at an exchange rate of 1.160 produces €12,203,200.

The net result is an arbitrage profit of €159,400. The €12,203,200 that is received from converting the sterling deposit back into euros less the €12,043,260 that is the required repayment for the euro borrowing.

In order to avoid such arbitrage opportunities arising, the one-year forward rate must be based on the interest rate differential between the euro and sterling. In other words, the one-year GBP/EUR forward rate should be 1.1448. The arbitrage-free one-year GBP/EUR forward rate is based on the current interest rate differential; therefore, from the above information, it is equal to €12,043,260/£10,520,000 or 1.448.

The link between relative interest rates and the forward foreign exchange rate can be summarised as follows:

Higher interest rate currency = Discount in the forward foreign exchange market Lower interest rate currency = Premium in the forward foreign exchange market

When calculating forward foreign exchange rates for periods of less than one year, we have to consider the different day count conventions of the different currencies' money markets. For example, both the euro and dollar use an Actual/360-day count, while sterling uses Actual/365. The following shows how to calculate a forward foreign exchange rate using the two currencies' interest rates.

Forward rate = Spot rate x $[1 + (n \times r_1)] / [1 + (n \times r_2)]$

where:

r_1 = relevant interest rate for the traded or international currency.
r_2 = relevant interest rate for the base or domestic currency.
n = period in question.

Given the following spot FX, spot and money market rates, what should be the theoretical six-month forward FX rate?

Spot EUR/USD rate = 1.0950 USD 6-month SOFR (r1) = 0.45%
Euro 6-month EURIBOR (r_2) = 0.57%
6mth EUR/USD Forward Rate = 1.0950 x [1 + ((180/360) x 0.0045)] = 1.0943
[1 + ((180/360) x 0.0057)]

	Description	Sample Data
Spot FX rate	Spot price of underlying currency (domestic per 1 unit of foreign)	1.0950
Traded currency interest rate (r_1)	Traded currency's interest rate (for term of forward)	0.0045
Base currency interest rate (r_2)	Base currency's interest rate (for term of forward)	0.0057
$Date_{t0}$	Trade date	1 Sept 15
$Date_{t1}$	Forward delivery date	1 March 16
$Accrual_{dom}$	Accrual method for domestic rate	actual/360
$Accrual_{for}$	Accrual method for foreign rate	actual/360

Result

The six-month forward EUR/USD rate is 1.0943.

The FX rate adjustment or 'fair basis', based on the interest rate differential, is $0.0001, ie, 1 **pip** (a pip is the smallest change that a given exchange rate can make). The euro is at a slight discount versus the US dollar since its interest rate is higher than the dollar's.

The terms 'premium' and 'discount' refer to whether the forward rates are higher or lower than the spot rates. A premium means the forward price of the base currency is higher than the spot price, and a discount means it is lower.

In order to apply forward points to a spot rate to come up with an outright quote for the forward price, one needs to know whether the forward points are premiums or discounts. For premiums, bid forward points are added to bid spot prices, and ask forward points are added to ask spot prices. For discounts, bid forward points are subtracted from ask spot prices, and ask forward points are subtracted from bid spot prices.

If all this seems confusing, just remember the rule that the bid/ask spreads of the forward price should always be greater than the spot price, and that the sum of the bid/offer spreads of the spot price and forward points should equal the spread of the forward price. The bigger spread in the forward market can be viewed as compensation for the increased risk the market maker takes in the forward market relative to the spot market.

3.2.2 Non-Deliverable Forwards (NDFs)

A non-deliverable forward (NDF) is a cash-settled, short-term forward FX contract on a thinly traded or non-convertible international currency. The profit or loss at the time of the settlement date is calculated by taking the difference between the agreed-upon exchange rate and the spot rate at the time of settlement, for an agreed-upon notional amount of funds.

All NDFs have a:

- **fixing date** – which is the date at which the difference between the prevailing market exchange rate and the agreed-upon exchange rate is calculated, and
- **settlement date** – which is the date by which the payment of the difference is due to the party receiving payment.

NDFs are commonly quoted for time periods of between one month and one year, and are normally quoted and settled in USD (although EUR and GBP are also fairly common). They have become a popular instrument for corporations seeking to gain exposure to or hedge positions in foreign currencies that are not fully convertible or countries with currency controls. There are large NDF markets in the Chinese yuan, for example.

4. Bonds

4.1 Government Bonds

Learning Objective

2.3.1 Know the main bonds: coupon (fixed, floating, zero); redemption; accrued interest; quoted price vs traded price

2.3.2 Understand the reasons for government bond issuance: public section finance requirements; finance long-term debt; role of national debt in government finances

2.3.3 Know the main government bond markets and their main features: UK government bonds (gilts); US treasury notes and bonds; Japanese government bonds (JGBs); German government bonds; French government bonds; settlement; spreads between different government bonds

A bond is a debt instrument in which the authorised issuer (borrower) is obliged to pay interest (coupon) at predetermined dates and repay the principal at a later date (maturity) to the holder (lender). Thus, a bond is simply a loan, but in the form of a security, although as we can see, the terminology used is rather different. Bonds enable the issuer to finance long-term investments with external funds.

A government bond is a bond issued by a national government, to finance the shortfall between their revenues and their spending that has been approved as part of its budget. Bonds fund or finance the national debt (the cumulative difference between government spending and income). In the UK, the annual difference is formally known as the public sector net cash requirement (PSNCR).

Most governments worldwide issue bonds. The following is a list of some government bonds and their main features:

Country	Name	Coupon Frequency	Maturity	Trade Settled
UK	Gilts	semi-annual	up to 50 years	T+1
US	Treasury bills (T-bills) and Treasury bonds (T-bonds)	semi-annual	T-bills (up to one year); T-notes (2,3,5,7 and 10 years); T-bonds (20 or 30 years)	T+1
France	Obligations Assimilables du Trésor (OATs)	annual	up to 50 years	T+2
Germany	Schatz, Bobl and Bund	annual	Schatz (1.75–2.25 years); Bobl (4.5–5.5 years); Bund (8.5–10.5 years)	T+2
Italy	Buoni del Tesoro Poliennali (BTPs)	semi-annual	from three to 30 years	T+2
Japan	Japan Government Bond (JGB)	semi-annual	long (ten years, most common), super-long (20 years)	Domestic: T+1, cross-border/ offshore: T+3

In addition to national governments, there is a wide variety of bond issuers. In many countries, regional, state and city governments also use the bond market to finance their budgets. International organisations, such as the World Bank, also issue bonds, to finance their projects. Interestingly, the UK government issued its first Green Gilts in 2021, with a mandate to spend the capital on public projects with an explicit environmental benefit.

4.1.1 Coupons

Like most bonds, each of the above international government bonds specifies a nominal amount (eg, £100, $1,000, 100 yuan), a coupon (which is an interest rate, eg, 2% pa) and a maturity (or redemption) date (eg, 2025). Bonds usually pay a fixed rate of interest that remains unchanged throughout the life of the bond.

The coupon for most government bonds is paid in half-yearly intervals, so the 2% on a £100 nominal amount is paid in two instalments each year of £1.00, six months apart. This will take place throughout the life of the instrument. The final interest payment will be paid together with the redemption amount (the nominal) at maturity.

4.1.2 Maturity

Bonds mature on the maturity date, and the issuer pays the holder the nominal value of the bond.

Government bonds (among other types of bond) are classified by the time remaining until they reach maturity and the government repays the debt. For example, in some markets:

- **short** – less than seven years remaining
- **medium** – seven to 15 years remaining
- **long** – greater than 15 years remaining.

As long bonds age after issuance, they transition from long to medium and finally short maturity bonds. The exact market conventions will vary by country and region. Some bonds are issued with 100-year maturities (called 'century' bonds), and others even have no fixed maturity date, known as undated bonds (also known as perpetual bonds or irredeemable bonds).

4.1.3 Floating Rate and Index-Linked

Bonds usually pay a fixed rate of interest that remains unchanged throughout the life of the bond. That said, some countries issue bonds that are index-linked, whereby both the coupons and the maturity proceeds are linked to increases in an inflation measurement index, such as the retail price index (RPI) or the consumer price index (CPI) – these types of bonds are referred to as 'inflation-linked bonds', 'index-linked bonds' or 'index linkers'. Alternatively, the coupons may be tied to a short-term benchmark rate (eg, SONIA or SOFR) – such bonds are called 'floating rate notes', or 'floaters' for short.

Index-linked bonds that are linked to inflation typically have an indexation lag. This is the amount of time between the period over which inflation is measured and its use in calculating the coupon payment. This occurs because time is needed to publish official inflation data.

Depending on the date of issue, index-linked gilts have different indexation lags. In the UK, all index-linked gilts first issued before 2005 have an eight-month indexation lag, while those issued from 2005 have a three-month indexation lag.

The indexation lag is important because it protects against inflation for the last interest period of its life cycle. For gilts, it's the last six months. During the final stages of the interest period, inflation will not be reflected in the bond's returns.

When you buy a bond between coupon payment dates, the seller has already earned part of the next coupon. Accrued interest is that portion of the interest the seller is entitled to, from the last coupon date up to (but not including) the settlement date.

Quoted Price vs Traded Price

Quoted price, also known as the clean price, is the price you see in most bond market listings. It excludes accrued interest, expressed as a percentage of face/par value.

Example: Quoted at 98.50 › means 98.50% of par ($985 for a $1,000 bond).

Traded Price, also known Dirty Price or Full Price, is the actual amount of money you pay (or receive) on settlement day.

The formula for this is:

$$\text{Dirty Price} = \text{Clean Price} + \text{Accrued Interest}$$

In the earlier example, Clean Price = $985.00 + Accrued Interest = $8.33 = Dirty Price = $993.33 (actual settlement amount).

4.1.4 Currencies

Governments most often issue bonds whereby the coupons and nominal value are denominated in the country's own (ie, home) currency. Sometimes, though, governments will attempt to take advantage of lower rates available by issuing debt in other currencies. For example, an emerging market country may have fairly high domestic borrowing rates in the local currency, but issue bonds offshore in USD or EUR at significantly lower rates. Bonds issued by governments in currencies other than their home currency are called sovereign eurobonds and, despite the name, these are not exclusively issued in euros but, rather, any currency other than the domestic.

With eurobonds, however, the issuer incurs FX risk in the event that the foreign currency strengthens versus the local currency (in which most of the government's revenues are denominated). To give an example: in May 2019, Kenya issued 7- and 12-year USD eurobonds at 7% and 8% respectively, at a time when equivalent maturities in the local currency were yielding 11–12%. Eurobonds could be well-suited to countries which are large exporters and which earn revenue in the same currency as the internationally-issued debt (eg, countries with sizable natural resources which are priced globally in 'hard' currencies such as USD). Countries which are large importers, on the other hand, may benefit in the short term from lower rates at the time of issue, but face greater risks with sustainably repaying the debt over the life of the bond.

4.1.5 Credit Ratings

The major credit rating agencies – Moody's, Fitch and Standard & Poor's – give each government and all other issuers a rating. The higher the credit rating, the lower the independently-assessed credit risk of the issuer, and hence the lower the yield required by investors to hold a specific bond/security. Investors see high credit ratings as having a lower risk of default, and vice versa. The higher ratings are what the market considers investment grade, while the lower ratings are referred to as non-investment grade, high yield, speculative or junk bonds.

Issuer:	Moody's		S&P		Fitch	
	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term
Investment grade:	Aaa to Baa3	P–1 to P–3	AAA to BBB–	A–1 to A–3	AAA to BBB–	F1+ to F3
Speculative grade:	Ba1 to Ca	-	BB+ to C	B to C	BB+ to C	B to C
Default:	C	-	SD/D	D	RD/D	RD/D

A good example of how this works is the significant rise in yields/fall in the prices of Greek, Portuguese, Irish, Spanish and Italian government bonds in 2011 during the eurozone debt crisis. The downgrades reflected investors' increased concerns that these governments would not be able to fully repay their existing debt in the agreed period of time.

4.1.6 Yield Spreads

The **yield spread** (or credit spread) is a way of comparing any two financial products. In bond markets, the yield spread is the difference between the quoted rates of return on two different bonds that have the same or very similar maturities. It is calculated by subtracting the yield of one bond from another with the same or very similar maturity.

Thus, in simple terms, the yield spread reflects the market's view of the level of risk for investing in one bond over another. The wider the yield spread between two bonds, the greater the perceived risk that the bond with the higher market yield will default on its financial obligations.

When the yield spread widens between two bonds which have different quality or credit ratings, it implies that the market is factoring in more risk of default on lower-grade bonds, ie, the bonds that have the higher yield.

An example of how this works is the European government bond market. Since most investors view Germany (with its high credit rating and strong economy) as the safest of the euro government borrowers, it is usually the benchmark against which all other euro government bond yields are compared. As investors lost confidence in the Greek government's ability to repay its debt, the yield spread on Greek government bonds over German government bonds of the same maturity increased. In 2011, before investors became concerned, the yield spread between ten-year Greek government bonds and ten-year bunds was only 29 basis points (bps or bips, where 1 bp is equivalent to 0.01%) – this widened to 4696 bps in the first quarter of 2012. The increased risk premium demanded by investors to buy Greek government debt saw ten-year yields rise to a high of 48.6%, while bunds of the same maturity were trading at around 1.85%.

4.1.7 Separate Trading of Registered Interest and Principal of Securities (STRIPS)

Certain government bonds have been designated as strippable by their issuer. 'Strippable' means that the individual coupons and the principal amount can be separately traded. By enabling investors to purchase an individual coupon, or principal cash flow, the strippable bonds can produce financial instruments that

more precisely meet the investor's needs. For example, an investor might want to guarantee the receipt of £500,000 in 15 years to cover the repayment of a mortgage, and buying an individual strip could precisely meet this need.

4.1.8 Zero Coupon Bonds (ZCBs)

As their name suggests, zero coupon bonds (ZCBs) are bonds which do not pay coupons. Instead, ZCBs are purchased at a discount from their value at maturity, and then mature at their full nominal value. Thus, the holder of a ZCB is entitled to receive a single payment at a specified time in the future. The majority of ZCBs pay a set amount of money (nominal value) upon maturity, although some are inflation-indexed, so the amount of money that will be paid to the holder is calculated to have a set amount of purchasing power.

4.2 Yield Curves

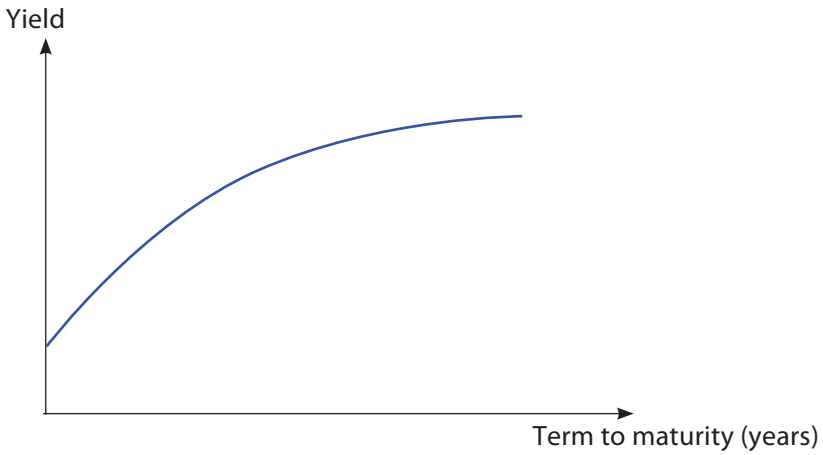
Learning Objective

2.3.4 Understand the relationship between return and maturity shown by yield curves: normal yield curves; inverted yield curves; flat yield curves

In most bond markets, there is a range of bonds available with various periods until maturity. The yield of a bond is the effective rate of interest (coupon) it provides based on the current market price, usually expressed as a percentage. A yield curve is a graph that shows the relationship between yields (Y-axis) and maturities (X-axis) for a set of similar securities or deposits. In doing so, a pattern emerges, and the line of best fit across these points is the yield curve. It shows the yields available to investors in bonds over different time horizons.

The Normal Yield Curve

Typically, the shape of the yield curve is upward sloping to the right, as shown here:

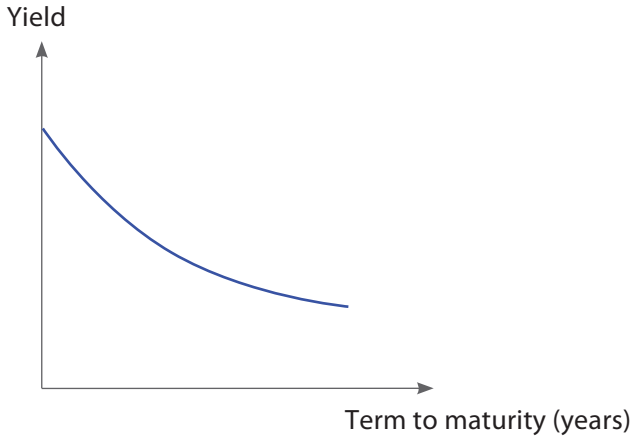


This is known as the normal yield curve, and its shape captures the fact that investors have a liquidity preference – they prefer more liquidity to less. As a result, they are willing to accept a lower yield on more liquid, short-dated bonds, and demand a higher yield on less liquid, longer-dated bonds. Investors are rewarded for lending their money for long periods by receiving a higher yield on instruments with longer maturities. In other words, a normal yield curve represents investors' requirements to be paid a higher yield for longer maturities as compensation for the increased price risk associated with longer-dated securities.

Higher yields for longer maturities can also reflect other risks which increase over greater periods of time, such as inflation (which erodes the value of the bond) and the possibility of default.

The Inverted Yield Curve

Occasionally, the yield curve may not exhibit its normal upward slope. Instead, it might be downward-sloping – known as the inverted yield curve:



In an inverted yield curve, yields available on short-dated bonds exceed those available on longer-dated bonds. This occurs when there is an expectation of a significant reduction in interest rates at some stage in the future.

The existence of an inverted yield curve does not remove any liquidity preference; rather, the impact of the anticipated interest rate fall outweighs the effect of the liquidity preference. An inverted yield curve is often seen as an expectation of slowing economic conditions, which would lead to central banks lowering interest rates and weaker borrowing demand.

Horizontal Yield Curve

If short-term rates are the same as long-term ones, the curve is said to be flat or horizontal. This might happen if the government temporarily raises short-term rates while the market does not reflect this in higher long-term yields.

4.3 Other Bond Issuers

Learning Objective

2.3.5 Know the main features of the corporate bond market

2.3.6 Understand the relationship between government and corporate bonds: yield spread over government bonds; high-grade and high-yield bonds; bond ratings, transition and default

As the name suggests, a corporate bond is issued by a corporation. The term is usually applied to longer-term debt instruments, generally with a maturity date falling at least 12 months later. These instruments share many of the same features as government bonds, including the existence of credit ratings for corporate issuers, to support investors' decision making.

Corporate bonds can be issued in any currency, and are often listed on major exchanges (such bonds being described as listed bonds) and **electronic communication networks (ECNs)**. However, despite being listed on exchanges, the vast majority of trading volume in corporate bonds in most developed markets takes place in decentralised, dealer-based, OTC markets, with the same being true for emerging market corporate debt.

Corporate bonds generally pay a higher yield than government bonds of equivalent tenor. This is related to the higher risk of default (although this risk depends upon the particular corporations, the current market conditions and the company's credit rating, the latter of which plays a particularly important role – see chapter 2, section 4.1.5). This is why government bonds are the benchmark yield in most markets.

5. Equities Markets

Companies raise their initial capital – the money to carry on their activities – in two ways:

- through share capital, and
- through loan stock (eg, corporate borrowing).

One important contrast to keep in mind is that investors who hold loan stock are creditors of the company. The company owes them a debt, which they have to repay – but they have no ownership interest in the company. On the other hand, investors who own shares in a company are its owners. An individual may only have a few shares out of many thousands (or even millions) issued by the company – nevertheless, that individual still owns a part of the company and has the rights that go with that ownership. This means that shareholders bear a fair amount of risk compared to investors in bonds issued by companies.

Bondholders expect to receive a certain sum in interest – no more, no less, no matter how well the company is doing (the exception, as you should remember, is where the bond pays a variable rate of interest – but, even then, the interest is determined by a set formula, such as a benchmark rate plus a spread).

In addition, bondholders normally expect to receive a set amount of capital back on maturity; there is generally no additional profit or gain if the company is doing very well. The only real risk is that of the company running into difficulties that are so serious that it cannot repay its creditors – thankfully, not a very regular occurrence, although it can happen.

Shareholders, on the other hand, generally have a much greater exposure to the financial fortunes of the company they have invested in. If the company does well, shareholders may receive a rising income stream from increasing dividends, and the value of their shares can also increase substantially (giving them capital growth). However, if the company does badly, it may reduce its regular dividend payments, or even pay no dividend at all. Its share price may also fall, potentially becoming worthless if the company gets into real trouble.

We will examine this concept in more depth as we progress through the chapter. For now, though, it is enough to remember that shares are generally characterised by relative insecurity of both income and capital over the short term (some types more so than others), but they offer a much higher probability of producing real growth over time than, for example, cash and bonds.

There are different types of shares in a company, with different rights and investment risks attached to them. These risks are the main factors that determine the equity's valuation.

5.1 Ordinary Shares

Learning Objective

2.4.1 Know the principal features and characteristics of ordinary shares and non-voting shares

As we have said, when investors buy a share in a company, they become a part-owner of that company. Under company law, this brings an entitlement to certain rights. Some of these rights relate to the financial aspects of owning shares, and some relate to the communications between the company and the shareholder, including the actions that shareholders can take to make their views known on the company's performance and actions.

Ordinary shares, also known as common stock or common shares, are the most common form of share in the global equity markets. Often referred to as equity, ordinary shares are usually issued in registered form – this is where the ownership is recorded in a register, typically maintained by a registrar on behalf of the company.

This contrasts with bearer shares, where the issuer does not maintain a register (so the owners are not listed or registered) and the physical possession of the share certificate is the sole evidence of ownership. Dividends are paid by clipping a coupon from the share certificate and submitting it to the paying agent. Bearer shares are negotiable (traded) without endorsement and are transferred on delivery.

5.1.1 Shareholders' Rights

A shareholder acquires a collection of rights and entitlements, and companies may issue different classes of share capital offering different rights. These rights are established when issuing the shares and are set out in the company's Articles of Association. An ordinary shareholder's principal rights are:

- **Dividends** – discretionary cash distributions paid out of profits earned by the company.
- **Capital repayment** – this occurs if and when the business is legally wound up, although ordinary shareholders are the last category to be repaid, and only when all other creditors have been repaid in full.
- **Voting rights** – the extent to which the shareholder can influence the conduct of the business (eg, appointment/removal of directors, the level of dividend payments and approval of a takeover bid).
- To receive **advance notice** of all company meetings and to attend, speak and vote at such meetings.
- To be given the opportunity to **subscribe for a rights issue** on a pro rata basis (if this were not so, it would be easy for new shares to be issued to certain shareholders only, thus giving them effective control of the company). These are called **pre-emption rights**.
- To **sell** their shares or **transfer** them without restriction. The London Stock Exchange (LSE), for example, insists on free transferability for listed company shares, although the Articles of Association of some unlisted companies may restrict the transfer of shares.

5.1.2 Voting and Non-Voting Shares

Normally, shares are voting shares, which confer the right to vote on company resolutions at annual and extraordinary general meetings. Non-voting shares do not confer such formal voting rights but do provide their holders with the same rights to receive dividends and capital return. They are sometimes called A or B shares (in some cases, B shares can have either no or fewer voting rights than A shares) or participation certificates. These non-voting shares exist to raise equity financing without diluting voting control from the remaining ordinary shareholders. They typically trade at a discount to voting shares, to compensate the owner of the non-voting shares for the lack of participation, and in some cases may even include a guaranteed dividend as an additional draw for investors.

5.2 Corporate Actions

Learning Objective

2.4.2 Know corporate actions; rights issues; bonus issues; stock splits; mergers and acquisitions; share buybacks

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There are a number of actions that a company can undertake that have both short-term and long-term influences on its share price. Here are the most common:

- **Rights issues** – when a company offers an invitation to its existing shareholders to purchase additional new shares in that company. This type of issue gives existing shareholders the 'rights'. With the rights, the shareholder can purchase new shares at a discounted price to its current market price on a stated future date. Rights are typically transferrable, allowing the holders to sell them onto third parties. Given that most investors view this as an action by a company that is 'cash

strapped' and has limited sources of funding, more often than not, its effect before the actual issue on the company's valuation is that its share price falls on perception of weaker future business performance. The other reason for a potential share price fall is that the rights issue may lead to a dilution effect, whereby the overall value of the company does not change, or indeed declines, while the overall number of shares outstanding rises depending on the uptake of the issue, reducing the unit value of each share.

- **Bonus issue** – also known as a capitalisation or scrip issue, a bonus issue is an issue of new company shares to its shareholders in the same proportion as their existing holding. Instead of paying out the company's profit as dividends, the money is used to pay for additional shares given to each shareholder. While the market's initial reaction is for the share's price to fall, since there are now more shares in issue, the additional liquidity in the share's trading results in a longer-term rise in the company's valuation.
- **Stock split** – this is when a company decides to increase the number of its shares on the market, by increasing the number by a specific ratio – eg, a 2-for-1 split results in the total number of shares on the market doubling, giving every shareholder twice the number of shares that they held before, without any cost to the shareholders; thus, the share price halves. This is called a 'positive share split', since its aim is to increase the attractiveness of the shares; by lowering the price, the shares become more attractive to a wider range of investors. The usually long-term effect on a company's valuation is that its share price rises.

  If the company's share price is low, it may conduct a 'reverse split' – this converts a certain number of shares to a smaller number at a certain ratio. For example, a 1:3 reverse split would mean each shareholder would hold one share for every three they previously held. Where shareholders are left with fractional shares after the split, the issuer typically rounds up to the nearest whole number, which benefits shareholders as it increases their equity share. Companies which are in distress will sometimes do this to avoid delisting.
- **Mergers and acquisitions**
  - A merger occurs when two companies combine to create a new, joint organisation.
  - An acquisition refers to the takeover of one entity by another, meaning that one company has taken the action to buy the other company, usually by buying the other company's shares.
  - A takeover can be either 'friendly' (ie, management of the company that is being purchased agrees with the transaction and recommends that its shareholders approve it) or 'hostile' (ie, the target company's management does not approve or recommend that its shareholders sell their existing share). The latter type of takeover is usually more expensive, as the acquiror may raise their acquisition price, in an attempt to attract shareholders away from the management's advice.

    Mergers and acquisitions are completed to expand a company's reach or gain market share in an attempt to create shareholder value. However, given all of the factors involved and the wide range of mergers/acquisitions that there are, there is no set rule as to what effect this type of corporate action will have on the company's valuation or share price.
- **Share buybacks** – a company uses spare cash or, in some cases, takes on additional borrowing in order to purchase shares, either in an announced tender process or on the open market. If shares are purchased via a tender, the price is often set higher than the recent market price to encourage investor participation. This reduces the number of outstanding shares so it intends to lift the stock price, as well as return cash to shareholders.

6. Commodities

A commodity is a raw, or primary, product. They are often split into three broad categories:

- **Agriculturals and softs** – staple sources of calories such as wheat, corn and livestock, and also cash crops, called softs, which are not necessarily required for sustenance, namely sugar, coffee, cotton and cocoa.
- **Energy** – crude oil and refined products, but also power and natural gas, as well as renewable energy sources.
- **Minerals** – refined metals such as copper and lithium, as well as precious metals such as gold and platinum.

As we saw in section 9.7 of chapter 1, commodity derivatives are based on commodities, as distinct from financial derivatives based on financial instruments or financial data.

The commodity derivatives markets provide market participants with similar instruments to those available in the financial markets (eg, futures and options), and many commodity products pre-date the financial derivatives market. The Chicago Board of Trade (CBOT), which was established in 1848, lays claim to being the oldest futures exchange in the world, but although it is where the modern form of the futures market originates, the trading of commodities contracts has been going on for many centuries.

The concepts covered in chapter 1 apply equally to both financial and commodity derivatives markets. However, further factors may need to be taken into account when dealing in the commodity derivatives markets; for example, agricultural markets are heavily affected by the growing cycle of the crop and by the weather.

Some of the main global commodity derivatives markets, with examples of some of their contracts, are as follows:

- **CME Group** – the CBOT for agricultural commodities, such as soybeans and wheat; COMEX for gold and base metals such as copper, aluminium and iron ore; NYMEX for crude oil and natural gas. All groups are part of the Chicago Mercantile Exchange (CME) and the electronic trading platform is Globex.
- **Euronext Derivatives** – agricultural commodities (eg, milling wheat, corn and rapeseed).
- **Dubai Mercantile Exchange** – crude oil, jet kerosene and fuel oil.
- **ICE (Intercontinental Exchange)** – crude oil, iron ore, refined energy products, natural gas, and soft commodities (eg, cotton, cocoa, coffee, sugar).
- **LME** – base metals, steel rebar, some precious metals, minor metals (cobalt and molybdenum) and electric vehicle (EV)-related metals.
- **Tokyo Commodity Exchange (TOCOM)** – base metals, oil and rubber.
- **Dalian Commodity Exchange (DCE)** – coking coal, coke, iron ore and plastics.
- **Multi Commodity Exchange of India ltd (MCX)** – soft and agricultural commodities, gold, ferrous and base metals, and energy.
- **Shanghai Futures Exchange (SHFE)** – non-ferrous metals (eg, copper and aluminium), ferrous metals (eg, zinc and nickel), precious metals (eg, gold and silver), other industrial inputs (eg, rubber and woodpulp) and energy products (eg, crude oil and fuel oil).
- **Jakarta Futures Exchange (Indonesia)** – gold, olein (palm oil), coffee, cocoa.
- **European Climate Exchange (ECX – part of Intercontinental Exchange)** – environmental contracts.

6.1 Softs and Agriculturals

Learning Objective

2.5.1 Know the main softs and agriculturals and the influences on price: coffee, cocoa, white sugar, soya bean, frozen concentrated orange juice (FCOJ), grains, livestock; change in demand; change in production, weather; holding and delivery costs; political or strategic

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'Softs' is a term for a particular set of commodities that includes cocoa, sugar, coffee and frozen concentrated orange juice. Agricultural commodities include grains, such as wheat and soya beans, as well as livestock and seed oils.

The price influences on soft commodities can be summarised as supply and demand factors:

- **Demand** will be driven by whether nations have a deficit of a particular commodity, rather than a surplus. Moreover, the wealth of the population, economic and industrial growth, consumer tastes and habits, as well as tax incentives, are also important factors.
- **Supply** is the amount of a particular commodity that is being provided to the market. This will be driven by factors such as the amount of land that is given over to producing a crop, weather conditions over the growing season, the impact of other factors, such as disease or insect activity, the application of better technology, and the availability of transport and warehouse facilities. For example, the Russian-Ukraine war that escalated in February 2022 has had a significant effect on global markets by disrupting the supply of wheat which sparked drastically higher prices. The impact of the war has been a key factor behind food inflation around the world.

Furthermore, the greater the number and diversity of sources for a particular soft or agricultural commodity, the more stable the supply. For example, if cocoa is grown in multiple locations, harmful weather in any one location will have less impact.

Sometimes political factors can also influence the price of soft commodities. For example, government subsidies or tariffs will impact the supply and demand in the market and prices will adjust accordingly.

Import tariffs are taxes on goods entering the country or market, whereas export tariffs are taxes on goods leaving the country. Tariffs usually raise the domestic price of imported goods, which means consumers experience higher prices and less choice. Tariffs are generally seen as protectionist policies that generate income for the government.

Example

ICE trades a variety of commodity products, including cocoa, robusta coffee and white sugar. Some examples of contract details that are relevant to the examination are contained in the table below:

Product	Contract Size (tonnes)	Tick Size (per tonne)	Tick Value (per contract)
Cocoa	10	$1.00	$10.00
Robusta coffee	10	$1.00	$10.00
White sugar	50	$0.10	$5.00

These commodity products can be traded on ICE Connect.

There are options available on the futures. The options are American-style (see chapter 1, section 5.2). The option premiums are not paid upfront, but are paid futures-style, in that only a portion of the premium value is posted as initial margin, and variation margin will be settled against the premium's daily mark-to-market. These soft commodity futures are all physically delivered and use LCH SA as central counterparty (CCP).

For those futures contracts that reach delivery, the **exchange delivery settlement price (EDSP)** (see chapter 7, section 1.4) is broadly the price at which the future traded at the end of the trading period on the **last trading day**. The sellers choose where to deliver, based on the exchange's specified delivery points (eg, for Euronext Paris' corn futures, delivery is made to a listed European port; for Euronext's corn futures, a listed international port; and for futures, an approved grain store). The delivered commodities are matched to buyers by LCH SA. For options on the futures, the options expire in the month before the delivery month (eg, March corn options that enable the buyer to enter into a March cocoa future expire on the last business day of February).

Similar to financial assets, commodities also have their own version of a carrying cost; however, in the case of commodities, it is referred to as their holding cost. This refers to the costs associated with keeping any commodity inventory, which may include warehousing, spoilage, obsolescence, interest and taxes. For soft and agricultural commodities, spoilage is a key concern, since many of the commodities in the category may have a limited product life. When calculating the profits and losses from a commodities trade, holding costs must be taken into account.

6.2 Base and Precious Metals

Learning Objective

2.5.2 Know the main base and precious metals and the influences on price: copper, nickel, aluminium, zinc, tin, lead, gold, silver, platinum and palladium; change in demand; change in production; marginal costs of mining; political or strategic; holding and delivery costs

There are numerous metals produced worldwide and subsequently refined for use in a wide variety of products and processes. Derivatives products have been introduced for most of the major metals. Trading is concentrated on three exchanges: the LME, the CME Group exchanges and the Shanghai Futures Exchange (SHFE). These exchanges compete on an increasing number of metals, with the LME introducing precious metal and hot-rolled coil steel futures in 2017 and 2019 respectively – derivatives which have previously been dominated by the CME Group, and the SHFE introducing copper cathode, expanding their range of metals contracts.

As with soft commodities, metal prices are influenced by supply and demand.

- Factors influencing supply include the availability of raw materials and the costs of extraction and production. A producer will measure the cost of extraction against a metal's price. If the marginal cost of mining rises above a metal's current price for a prolonged period of time, mining companies may lower or temporarily cease production.
  This follows the basic economic principle that marginal cost must equal the price in order to clear the market for good. The cost of the marginal tonne of metal produced is usually equal to the operating costs of higher cost miners; those miners producing at lower costs than the marginal cost will accrue profits. Non-extraction costs include royalties and taxes, which may be affected by political stability and environmental legislation, as well as sustaining capital expenditure on replacement mining equipment.
- Demand comes from underlying users of the commodity, which is affected by the global economic cycle and regional trade dynamics. For example, the growing demand for metals in rapidly industrialising economies, including China and India. Aside from industrialisation, the green transition has emerged as a separate source of demand, with electricity-based transportation radically changing the demand profile for copper, cobalt, lithium and nickel. It also originates from investors, such as hedge funds, who might buy metal futures in anticipation of excess demand or incorporate commodities into specific funds.
  Producers use the market for hedging their production. Traditionally, the price of precious metals such as gold will rise in times of crisis or in countries where there is concern about inflation – gold is seen as a safe haven and a store of value. The specific timing of inflation and gold price correlation can vary in the run up to CPI releases, particularly from the United States, but with record prices witnessed on CME's Gold futures contract through the inflationary period from 2021 to 2023, the overall link remains consistent.

Similarly to softs, all metal commodities have holding or warehousing costs associated with taking delivery and holding the commodity. As with all other costs of carry, the longer one holds the commodity, the higher the holding cost.

Finally, metals used in packaging, such as aluminium (called aluminum in some countries) and tin, are influenced by the price of alternatives, such as glass and plastic, and by consumer/government concerns about sustainable resources and recycling.

The major metals can be subdivided into ferrous and non-ferrous metals, and are summarised in the following table.

Metal	Major Uses
Ferrous	
Iron ore	Steelmaking
Steel (hot-rolled coil)	Construction and car manufacture
Steel (rebar)	Construction
Non-ferrous	
Aluminium	Aerospace, packaging, kitchen equipment, windows, car manufacture, construction, canning
Cobalt	Lithium-ion batteries used increasingly in electric transport
Copper	Electrics, electronics, building
Gold	Jewellery, dentistry, computers, electronics, investments
Lead	Batteries, petrol additive, buildings
Molybdenum	Steelmaking
Nickel	Production of stainless steel and other alloys
Palladium	Catalytic converters, jewellery, dentistry
Platinum	Car manufacture, catalytic converters, jewellery, medical equipment, dentistry
Silver	Jewellery, ornaments, photography, dentistry, electronics
Tin	Packaging, power
Zinc	Galvanising, production of brass

6.3 Energy Products

Learning Objective

2.5.3 Know the main energy products and the influences on price (crude oil, electricity and natural gas): change in demand; change in production; marginal costs of production; holding and delivery costs; political or strategic

6.3.1 Oil and Gas

The energy market includes the market for both crude oil and various fractions produced as a result of the refining process (eg, naphtha, butane, kerosene, petrol and heating/gas oil), and natural gas products. Like the market for any other product, the price influences can be summarised as supply factors and demand factors.

Supply is finite, and countries with surplus oil and gas reserves are able to export to those countries with insufficient oil and gas to meet their requirements. Prices could be raised by producers restricting supply – for example, by the activities of the major oil producers in the Organisation of the Petroleum Exporting Countries (OPEC).

Demand for oil and gas is ultimately driven by levels of consumption, which in turn is driven by energy needs (for example, from manufacturing industry and transport). Intercontinental Exchange (ICE) is Europe's largest energy exchange, listing a wide range of crude and refined oil and natural gas contracts.

Prices can react sharply to political crises, particularly in major oil-producing regions of the world, such as Russia and the Middle East. Furthermore, since the level of demand is directly determined by the consuming economies' growth, economic forecasts and economic data also have an impact on energy prices. Prices also react quickly to changes in supply resulting from bad weather and accidents or other unexpected shocks, such as oil spills from offshore sources. Hurricanes (called typhoons in Asia) often 'shut in' (ie, temporarily disrupt) oil production in the Gulf of Mexico and along the Southern US coast.

Crude oil is defined by three primary factors:

- **Field of origin** – for example, Brent, West Texas, Dubai, or Oman.
- **Density** – ie, low density or 'light', high density or 'heavy'.
- **Sulphur content** – ie, low sulphur or 'sweet' (ie, sulphur content below 0.5%), high sulphur or 'sour' (ie, sulphur content above 0.5%).

It is prudent to mention that the physical delivery aspect of oil contracts is important, given that some fund managers were unaware and were left with the prospect of taking delivery of barrels of oil against the West Texas Intermediate (WTI) settlement in April 2020. It should be recognised that WTI, being a stored-oil contract, is distinct from Brent, which is a shipped contract – in other words, when a participant takes delivery of a WTI future, they must nominate a storage facility in the US, rather than a port. WTI briefly went negative in April 2020 because financial participants had not rolled out of the contract in time, and physical storage facilities were extremely scarce or completely unavailable. Therefore, some traders were forced to sell their futures contracts prior to expiration to avoid a larger

loss from astronomical storage costs or defaulting on their trades. Therefore, it is integral to remain mindful of the physical implications of derivative contracts.

A strategic factor that influences an agricultural commodity's price is whether the producer countries have formed a 'producer organisation' or cartel. As mentioned earlier in this section, an example here is OPEC. Since a large majority of exporting countries are a member of that organisation, the fact that the commodity is available from multiple locations will have less of an impact, since the member producers often agree to maintain a minimum price. This is made possible by the fact that each member adheres to a maximum production level that they sell on the global market. This is known as an oligopoly.

The success of these producer organisations depends on their members abiding by the production level agreement. Politics also plays a similar role due to the fact that one government, due to its foreign policy, may refuse to sell a particular commodity to certain importing countries. An interesting aspect here is the relationship between Iran/Iraq and Saudi Arabia, within the OPEC cartel, with the prior known not to strictly adhere to its production agreements in the past, as a rebuke to Saudi Arabia, which is perceived to be the leading exporting nation.

This can also work in reverse, where a large buyer/importer of a commodity has a policy of refusing to trade with a specific producer. If this importer is a large buyer, its action will also have a strong influence on that commodity's market price. China often plays this role, as it is the largest importer in many commodity markets, although the most famous example of this is the United States embargo on Russian oil, beginning last year.

Natural gas has emerged as a key commodity, as many coal-fired power stations in Europe, the United States and Japan have been replaced by gas-fired stations. Gas produces far less carbon dioxide than coal when burned, and is therefore considered an advantageous interim fuel, in the journey towards more renewable energy production.

The main natural gas futures contracts are the CME Henry Hub, ICE Dutch TTF and ICE UK NBP. Although the price of these contracts has historically been minimally volatile, the fact that the world's second and third largest gas producers, Russia and Iran, are now under Western sanctions, mean that there has been quite spectacular volatility in gas futures prices, which has drawn in speculative investment through 2021 and into the present.

Moreover, environmental legislation can affect the market share of different types of crude oil. For example, the International Maritime Organization (IMO) lowered its global limit on the sulphur contained in shipping fuel oil (known as bunker fuel) from 3.5% to 0.5% with effect from 2020 in order to reduce sulphur oxide emissions, thus introducing 'a new era of clearer air in ports and coastal areas by using less polluting fuels'.

Well in advance of formal regulatory requirements, and given already tightened standards in many other petroleum products worldwide, refineries have substituted away from consuming sour crude towards more sweet crudes as the additional costs of refining processes in order to lower sulphur content become prohibitive. This typically widens the discount paid for sour crudes, which can trade at several dollars lower per barrel than for sweet crudes.

6.3.2 Electricity

Electricity futures are traded on several exchanges including ICE and CME Group. While these are usually grouped with energy futures, they differ in that electricity futures are a form of manufactured product that can be produced from a wide range of inputs. They are also different with respect to their many variations, such as pricing according to region, time of day and time of year.

6.4 Other Markets

Learning Objective

2.6.1 Know the principal features and characteristics of cryptocurrencies and digital assets: currencies, coins, non-fungible tokens; central control; use of distributed ledger technologies; risks (regulatory risks, volatility risks, ESG risks)

Recent developments have seen the expansion of derivatives trading into a wide range of other types of underlying assets, including cryptoassets. A subset of digital assets (which is any asset that exists only in digital form), 'cryptoassets' is a broad term encompassing cryptocurrencies as well as non-currency assets, such as **non-fungible tokens (NFTs)**.

A **cryptocurrency** is a digital asset or 'virtual currency' that is designed to work as a medium of exchange. As its name suggests, it uses strong cryptography and record-keeping technology in order to secure all financial transactions using the individual cryptocurrency, control the creation of all additional units, and verify the transfer of any assets.

Unlike physical currencies (such as sterling and the euro), each cryptocurrency does not have any central 'control' or issuer such as a central bank – eg, the BoE, the European Central Bank (ECB), Bank of Japan (BoJ) or the People's Bank of China (PBC, PBoC or PBOC). Instead, they use decentralised controls, operating through a distribution ledger – this is typically a blockchain where these transactions are verified/audited by what is referred to as 'mining'.

Cryptocurrency exchanges are usually online, while some do have a physical operation. Both act in a similar way to the brokers that are found in the cash FX markets, since their main function is to match buyers and sellers of their specific cryptocurrency at an agreed price and amount. In most cases, they do not hold either party's funds; however, some do have a system that allows them to be digital currency providers (DCPs) which enables them to hold an investor's holdings of a cryptocurrency in their online account or 'wallet.'

Starting in 2016, regulation of cryptocurrency exchanges has increased, beginning in the EU. In 2018, the Securities and Exchange Commission (SEC) and the Commodities Futures Trading Commission (CFTC) also started to require some type of registration of exchanges operating in the US. Regulation of cryptocurrency markets is still developing. In early 2019, European regulators asked EU authorities to revisit the legislative framework around digital assets, including cryptocurrencies. ESMA, particularly, felt that some transferable digital assets should be treated as securities under the Markets in Financial Instruments Directive (MiFID). The CME launched Bitcoin futures in 2017, followed by the introduction of options on futures and as of 2020 year end, it had the most active BTC futures market. The CME also began trading Ether futures in February 2021.

While there are thousands of different types of cryptocurrency, the following five are among some of the more well-known:

- Bitcoin (BTC)
- Litecoin (LTC)
- Ethereum (ETH)
- Ripple (XRP)
- Solana (SOL).

Two main categories of cryptocurrencies are coins and tokens. Coins reside on their own blockchain (the distributed ledger for verifying transactions). Other instruments are created according to some algorithm or other methodology and sit on top of an existing blockchain – these are tokens.

In addition to coins and tokens, a more recent development in new type of digital asset which is correlated to cryptocurrencies and uses blockchain to ensure validity is non-fungible tokens (NFTs). Unlike cryptocurrencies, these represent a unique instance of a digital asset, such as a work of art, the first version of a game or any other instrument which is designed to be rare and, therefore, non-fungible (as opposed to one unit of cryptocurrency, which is identical to any other unit in that cryptocurrency).

The regulatory risks associated with cryptocurrencies are complex and significant. Given this is an emerging asset class, the regulatory landscape is evolving, and changes could range from bans in owning and trading, as have been implemented in some countries, to limitations on participation. Therefore there is also a jurisdictional risk to take into account when dealing in cryptocurrencies. Additionally, given concerns about money-laundering, terrorism financing and dealing in illicit goods, there are risks associated with increasing compliance burdens and KYC requirements that exchanges and wallet providers will be required to implement, which could affect the attractiveness of cryptocurrencies as a straightforward investment product.

Volatility risk is also a significant concern. As the driving forces of cryptocurrency prices evolve, particularly less liquid coins and tokens, significant changes in volumes associated with retail and institutional allocations contribute to a relatively changeable volatility spectrum. The risk appetite of the investor must be clearly taken into account when offering cryptocurrencies as a product.

The ESG risks of cryptocurrencies, aside from the social (illicit activities) and governance (regulatory) previously mentioned, are about energy consumption and emissions. As an example, Bitcoin mining requires an exponentially increasing power to discover the marginal coin, and in places such as China, where coal is a large share of the power generation mix, there an increase in carbon emissions.

6.5 Other Commodities

Learning Objective

2.6.2 Know features of markets in: freight, emissions, weather, volatilty

Over recent years, developments have seen the expansion of derivatives trading into a wide range of exotic contracts. These include weather, emissions and property, to name a select few.

6.5.1 Weather

A weather derivative is a contract that can enable businesses, such as insurance companies, to protect themselves against losses caused by unexpected shifts in weather conditions. They obligate the buyer to purchase the value of the underlying weather index – measured in heating degree days (HDDs) or cooling degree days (CDDs), which are measures of how hot/cold the temperature is on a given day or during a period of days – at a future date. The settlement price of the underlying weather index is equal to the value of the relevant month's HDD or CDD, multiplied by $20.

As expected, one of the main influences on price is the short- and long-term weather forecast. Contract prices are also subject to shock when unexpected weather events happen, such as hurricanes and snowstorms. This is an aspect that they have in common with many agricultural contracts.

The first weather derivative contracts were traded OTC in 1997, but due to demand, several exchanges (such as the CME, LIFFE and CBOT) started trading weather-related futures and options in 1999.

6.5.2 Emissions

Growing environmental concerns have prompted exchanges to start trading different types of emissions contracts. Most notably, exchanges in Europe, Asia and North America have listed futures contracts for carbon dioxide, sulphur dioxide, methane and nitrogen dioxide emissions. These contracts set a price for a set amount of emissions allotment, with the goal of getting emissions to a predetermined level, such as those set by the Kyoto Protocol, which was signed in 1997 and bound 84 signatory states to reduce greenhouse gas emissions in accordance with individually agreed targets.

One of the most popular emissions contracts is one in which the underlying asset is the carbon dioxide (CO2) emission allowances, called the carbon credit or carbon emission certificates. For example, the European Union Allowance (EUA) gives the holder the right to emit one tonne of CO_2, or the equivalent amount of another greenhouse gas. These allowances can be traded as needed, so governments and businesses with more allowance units than they need can sell their excess in the market or bank them, while those that exceed their allocation can buy additional carbon allowances or face penalties for the shortfall.

The market for EUAs includes spot contracts and forwards/futures. Emission allowances allow governments and corporations to comply with pre-set emission targets. ICE offers trading in EUA futures as well as physically-deliverable California (US) Carbon Offset futures.

The CME also has a range of emissions products, including a Global Emissions Offset Futures contract. As regulations get stricter and pollution targets are reduced, the prices of these contracts are expected to rise.

6.5.3 Freight

Freight derivatives (including forward freight agreements (FFAs), container freight swap agreements and options) are financial contracts that are based on the future levels of freight rates, for dry bulk carriers, tankers and container ships. These instruments are settled against various freight rate indices, which are published by the Baltic Exchange (for dry and most wet contracts) and Platts (Asian wet contracts).

FFAs are often traded OTC, through broker members of the Forward Freight Agreement Brokers' Association (FFABA), but screen-based trading has become more popular. Trades can be given up for clearing by the broker to one of the clearing houses that support such trades. Currently, there are four clearing houses for freight: NOS Clearing, ICE Futures Europe, NYMEX and SGX.

Freight derivatives are primarily used by ship-owners and -operators, oil companies, trading companies and grain houses as tools for managing freight rate risk – in other words, the variability in the earnings of a shipping company due to changes in freight rates.

6.5.4 Volatility

The volatility (or price movements) of assets has, unto itself, become a major underlying asset. The Chicago Board Options Exchange (CBOE) introduced the Volatility Index (VIX) as a market indicator in the early 1990s; and at that time, it was based on the implied volatility (essentially market consensus for the magnitude of price moves prior to expiry) of S&P 100 index options.

In 2003, the underlying index was changed to the S&P 500; and in 2004, the CBOE launched a futures contract on VIX, which quickly became popular. VIX options were introduced in 2006, and since then numerous other volatility-based futures and options contracts have been developed. Eurex (part of Deutche Börse) later launched a DAX volatility index (VDAX) and, although it was discontinued, the exchange does trade futures based on the volatility index of the STOXX 50 equity index (VSTOXX).

Volatility-based OTC derivatives have also grown in use. Variance swaps on many different markets (including non-equity) began trading actively in 2000, with variance simply a different measure of the volatility of the underlying. There are also exchange-traded products (ETPs) which are based on VIX futures. While the shares of these are cash instruments traded like stocks on various exchanges, there are also options traded on these ETPs.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **Why does the interbank money market exist?**
   Answer reference: Section 2

2. **What is commercial paper (CP)?**
   Answer reference: Section 2.6

3. **Why is the foreign exchange (FX) market unique?**
   Answer reference: Section 3

4. **What is a non-deliverable forward (NDF)?**
   Answer reference: Section 3.2.2

5. **What is a bond?**
   Answer reference: Section 4.1

6. **Why do corporate bonds pay a higher yield than government bonds?**
   Answer reference: Section 4.3

7. **How do bearer shares differ from registered shares?**
   Answer reference: Section 5.1

8. **What are 'softs'?**
   Answer reference: Section 6.1

9. **How are weather derivatives used?**
   Answer reference: Section 6.5.1

10. **A variance swap would be a derivative with what type of underlying?**
    Answer reference: Section 6.5.4

Chapter Three

Market Structure

1. **Derivatives Exchanges** 91
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This syllabus area will provide approximately 9 of the 100 examination questions



1. Derivative Exchanges

1.1 Introduction to Exchanges and OTC Trading

Learning Objective

3.1.1 Know the main products of the main derivatives exchanges

A derivatives exchange provides a marketplace where someone can buy and sell futures, options and other contracts of specific quantities of a commodity or financial instrument at a specified price with delivery set at a specified time in the future. In providing the marketplace, the exchange will have established a trading mechanism or platform (ie, trading can take place using the traditional pits or floor trading, or electronically via computer screens using a trading platform). Some exchanges, for some contracts, use both.

Euronext is Europe's largest exchange, spanning Amsterdam, Brussels, Lisbon, Paris and London, referred to respectively as the Amsterdam, Brussels, Lisbon, Paris and London ICE markets. The Euronext's trading platform, Optiq, allows trading on multiple markets and utilises Secure Financial Transaction Infrastructure (SFTI). Trades are then cleared by LCH SA or EuroCCP.

ICE Clearing consists of six entities, based on geography or product. ICE Clear Europe, ICE Clear US, ICE Clear Singapore, and ICE Clear Netherlands trade a variety of derivatives, including agriculture, energy, interest rates and equity products and metals. ICE Clear Credit clears credit derivatives, and ICE NGX clears natural gas and electricity markets for North America.

Nasdaq Group is a US-based company that owns and operates the Nasdaq stock market and seven European stock exchanges in the Nordic and Baltic regions. Given the wide range of exchanges, the group has several different trading systems to fit

each market and product traded; these include the Genium INET trading platform, CONDICO (which is used for commodities trading and clearing) and CLICK XT. The group trades a wide variety of futures and options on a range of underlying assets that include shares, indices, interest rates and commodities. The group's two main clearing systems include Genium INET Clearing and SECUR.

Nasdaq Options Market (NOM) is one of Nasdaq's two electronic options markets. All trading is run on Nasdaq's INET technology. The NOM is a US-based options market that trades a wide range of Nasdaq and PHLX options. NOM uses the same clearing systems as its parent.

The following tables highlight the key characteristics of some of the major international exchanges in each region, as well as some of their most heavily-traded products:

UK	
ICE Futures Europe	All trading is done electronically. Trades futures and options on a wide range of energy products, such as Brent Crude, West Texas Intermediate (WTI), gas oil, electricity, coal, natural gas and emissions/carbon credits. It also trades a range of equity index and **single stock futures (SSFs)**, as well as short-term interest rates and bond futures and currencies (eg, GBP/USD and EUR/USD). Trades are cleared via ICE Clear Europe.
LSE Derivatives	All trading is done electronically. Trades standardised and flexible futures and options of the shares and indices on the FTSE 100, FTSE Super Liquid (largest 35 shares) and the Norwegian OBX index. Trades are processed, cleared and guaranteed by CCP Clearing with LCH.
London Metal Exchange	Trading of derivatives is done both electronically (via LMESelect), telephone and through open outcry (via the Ring). The primary products are futures and options on aluminium, copper, zinc, tin, lead, nickel and these form the benchmark prices globally for the physical markets of these metals. There are also futures offered for platinum group, electric-vehicle battery and ferrous markets. Trades are cleared via LME Clear.

US	
Chicago Mercantile Exchange (CME)	Part of the CME Group. CME Globex electronic trading platform. Trades futures on a wide range of commodities, short-term interest rates, FX, US economic data, **equity indices**, weather and real estate. All trades processed via CME Direct.
Chicago Board of Trade (CBOT)	Part of the CME Group. Electronic trading via EOS Trader and CME Direct (linked to CME Globex and CME Clearport) and open outcry for certain options markets. Trades futures on a wide range of agricultural products, gold, silver, interest rates (US notes, bonds, swaps), the Dow Jones indices, and has a joint trading agreement with SGX to trade several of its contracts. All trades processed under the JADE agreement, by the Front-End Clearing (FEC) System and Front End Clearing Plus (FEC+), which are based on CME Direct.

US	
Chicago Board Options Exchange (CBOE)	The CBOE is the largest US options exchange, established by the CBOT in 1973. It was the first exchange to list standardised, exchange-traded stock options and its contracts are cleared by the Options Clearing Corporation (OCC). It was the first exchange to introduce FLEX options and LEAPS (Long-Term Equity Anticipation Securities, which are options with an expiration date greater than one year). A subsidary, the CBOE Futures Exchange (CFE), trades VIX futures and corporate bond index futures.
New York Mercantile Exchange (NYMEX) – part of the CME Group	Part of the CME Group. Electronic trading via CME Globex and NYMEX ClearPort, for OTC transactions. Also, after-hours trading on CME Global electronic trading platform for futures only. Trades futures and options on a wide range of metals, energy products and options on spreads between different grades of oil such as the Brent/WTI spread. All trades are processed via the exchange's clearing house.
NASDAQ (PHLX)	Combination of floor trading and PHLX XL, the exchange's electronic trading platform. Trades stock, index, equity sector and currency options. Both offer standardised and FLEX options. All trades are processed via the exchange's clearing house.
ICE Futures US	ICE Group is also the owner of the New York Stock Exchange (NYSE), and operates other securities and derivatives exchanges in the US and Canada. Electronic trading of financial, agricultural, metals and softs contracts. Trades are cleared via ICE Clear US, part of the ICE Global Clearing House Network.

Europe	
Eurex	An electronically-traded market and the world's largest derivatives exchange. Trades a wide range of futures and options on short-term interest rates (STIRs), equities, index and single stock futures, volatility index, credit derivatives and ETFs. Also FLEX options. All trades processed via Eurex Clearing AG.
Euronext exchanges (Amsterdam, Brussels, Lisbon, Paris, Oslo, Dublin and London)	Electronic trading can be carried out via its multi-market Optiq platform. Trades futures and options on currencies, swaps, equities and commodities. Exchanges use Euronext Clearing to process their trades.
MEFF	The official Spanish exchange for financial futures and options, and a subsidiary of BME Group. All trading is done via the MEFF Derivative Trading Platform. Trades futures and options on interest rates, bonds, the IBEX 35 index and leading Spanish shares. Trades are processed directly from the MEFF Derivatives Trading Platform by the exchange's clearing house.

Europe	
Nasdaq Nordic	A subsidiary of Nasdaq that provides a range of financial services and operates all eight electronic securities markets in the Nordic, Baltic and Caucasian regions.

Asia	
Singapore Exchange (SGX)	All trading is done electronically via the SGX QUEST system. Trades futures and options on interest rates, bonds and regional equity indices. Main contracts include Japanese government bonds (JGBs), Eurodollar and Euroyen, and Nikkei 225 contracts. All trades are processed and cleared via SGX Derivatives Clearing (SGX-DC).
Osaka Securities Exchange (OSE)	Part of the Japan Exchange Group (JPX). A physical and electronic market. Trades futures and options on the Nikkei 225 index, as well as individual Japanese shares. Trades processed via the exchange's clearing house.
Tokyo Stock Exchange (TSE)	Part of the Japan Exchange Group (JPX). An electronic market that trades futures and options on several TOPIX and TSE indices, as well as individual shares and JGBs. Trading is done via the Tdex+ system.
Korea Exchange (KRX) Futures Market Division	All orders are processed via the exchange's automatic trading system. Trades futures and options of single stocks, equity options, several Korean and US indices, as well as gold and certificates of deposit (CD) interest rate futures. All trades are processed via the KRX's clearing house.

Emerging Markets	
B3	Formerly the Brazilian Mercantile & Futures Exchange (BM&F). Trades futures on a range of agricultural commodities, foreign exchange, interest rate and equity products. Futures trades are cleared through the primary B3 clearing house, while foreign exchange trades are cleared through a separate FX clearing house. All other contracts are traded electronically via the PUMA trading system.
Dubai Mercantile Exchange (DME)	A fully electronic exchange. The DME trades an Oman crude oil future, Singapore fuel oil and numerous spread contracts including Brent/Oman crude and WTI/Oman crude. Trading can be accessed via either the Globex screen system or via third-party independent software vendor (ISV) systems. Clearing is performed by CME Clearing.
National Commodities & Derivatives Exchange (NCDEX) ltd (India)	Futures on a wide variety of agricultural products. Options on physical assets are also available on a number of products which correspond to the more active futures contracts. Trading is electronic, but exact interface can be customised by members. Trades are processed via the exchange's clearing house, with physical delivery through its depository clearing system. Margin payments and **cash settlements** are processed via a network of approved clearing banks.

Emerging Markets	
South African Futures Exchange (Safex)	Part of the JSE (formerly the Johannesburg Stock Exchange). Trading is carried out electronically using the JSE trading system which allows some customisation on the front end. Trades a wide range of futures and options contracts on agricultural products, gold, interest rates, FX, the JSE/FTSE index, various other equity indices and single stock futures.
Shanghai Futures Exchange (SHFE)	Trading takes place on its trading floor and via its electronic trading system. Trades futures contracts on a number of metals, rubber and fuel oil. Trades are processed via the exchange's clearing system, with physical delivery using any of its approved warehouses.
China Financial Futures Exchange (CFFEX)	All trading is carried out electronically, using the CFFEX's system, which is also linked to the exchange's clearing house. CSI 200 index futures are currently the only contract traded.
National Stock Exchange (NSE) (India)	Trading in NIFTY stock index futures and options, contracts on various sub-indices and single stocks, as well as government bonds, T-bills and INR currency pair derivatives, but the exact trading takes place via the exchange's screen-based system, National Exchange Automated Trading (NEAT).
Bombay Stock Exchange (BSE) (India)	A fully screen-based exchange, using the exchange's derivatives trading and settlement system (DTSS), as well as internet-based trading. Trades a range of individual equity, equity index and currency-based derivatives. Uses its internal system for clearing and delivery.
Multi Commodity Exchange of India ltd (MCX)	A fully electronic exchange, and India's largest commodities futures exchange. Trades futures in a wide range of commodities, including bullion, energy, ferrous and non-ferrous metals, and a number of agricultural contracts. Trades are cleared and delivered via the exchange's Demat system.
Bursa Malaysia	Electronic trading of futures contracts on the Kuala Lampur Composite Index (KLCI), crude palm oil and gold.
Saudi Stock Exchange (Tadawul)	Electronic trading of MSCI Tadawul 30 Index futures.
Nairobi Securities Exchange (Kenya)	Electronic trading of NSE25 index and selected single stock futures on some of the largest equity listings. Contracts are cleared via the exchange's clearing house – NSE Clear.
FMDQ Nigeria	Central platform for quotations, clearing and reporting of OTC trades in money market instruments, government bonds and FX forwards. One of the most active segments is that of Naira-settled FX non-deliverable forwards (NDFs). Clearing performed through FMDQ Clear and the exchange also offers a depository service.

1.1.1 OTC Structure and Trading

An OTC market is a decentralised market in which market participants trade stocks, commodities, currencies or other instruments directly between two parties and without a central exchange or broker. OTC markets do not have physical locations; instead, trading is conducted electronically or via telephone.

In an OTC market, dealers act as market-makers by quoting prices at which they will buy and sell a security, currency, or other financial product. A trade can be executed between two participants in an OTC market without others being aware of the price at which the transaction was completed. In general, OTC markets are typically less transparent than exchanges and are also subject to fewer regulations. As a result, liquidity in the OTC market may come at a premium.

An important, but often overlooked, aspect of OTC markets is the utility that hedgers garner from its existence. Non-financial corporations often avoid exchange-traded derivatives (ETDs), due to the daily margining requirements and risks associated with unwanted delivery of underlying assets, which can be cumbersome for regular accounting teams and increase operational risk. OTC products typically eliminate the margining process, with settlement on a much less frequent basis. Additionally, OTC banking teams simplify the process of hedging and tailor the products to match the corporations specific hedging requirements.

This is usually associated with 'high touch' trading services, where trading and sales desks provide direct trading advice to clients often on a 24/7 basis, as a part of their higher cost OTC service, while exchange-traded products are usually more automated and provide less human contact and liquidity advice, also known as 'low touch'. This usually justifies the substantially higher trading charges that come with OTC products, in comparison to similar products on exchanges.

1.2 Order Types

Learning Objective

3.2.1 Understand the range of types of orders, their uses and effects: market order; limit order; market if touched order; opening and closing orders; good 'til cancelled; immediate or cancel/fill or kill order; stop order; stop limit order; day order

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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.

- **Limit orders** – such an order stipulates a required price level. If the trade can be executed at a better price than stated, it will be filled at the improved price. The broker is not allowed to take the difference. Execution is not guaranteed, as the market may not reach the required price.
- **Market orders** – an order to buy or 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 used when certainty of execution is a priority over price of execution.

- **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 cannot be filled during that period, it is cancelled.
- **Closing order** – as above, but executed towards the end of the day.

Some order types can be given certain periods of validity, or given certain quantity requirements, such as:

- **Good 'til cancelled (GTC)** – this is really 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, if not otherwise specified, will be cancelled if the order remains unfilled at the close of trading.
- **Immediate or cancel** – this means execute the order, in whole or in part, if market conditions permit; any unexecuted portion is cancelled.
- **Fill or kill (FOK)** – similar to Immediate or Cancel but the order must be executed in its entirety, or cancelled.
- **Stop (or 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, which is above or below the current price when the order is entered. However, there is no guarantee that the order will be filled at the stop price. In volatile markets, it may 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. Once the stop price is reached, a stop limit order becomes a limit order that will be executed at a specified price (or better).
- **Day order** – an order to buy or sell a security that automatically expires if not executed on the day the order was placed. A day order is an order that is good for that trading day only. Since standard orders are only good for the day when they are entered, day orders could be used to enter an order for the next day, for example.

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.

Where permitted by the exchange rules, 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 by most exchanges are many and varied. Among the acceptable strategies are all the strategies covered in the syllabus (ie, spreads, **straddles**, **strangles** and synthetics – more detail on derivatives strategies can be found in chapter 8).

2. Wholesale Trading Facilities

Learning Objective

3.3.1 Know the essential details of wholesale trading facilities: block trades; basis trades

3.3.2 Understand the significance, implications and uses of wholesale trading facilities

Most exchanges recognise two types of wholesale trades:

Block Trades	Basis Trades
Block trades are large transactions made between an exchange member and a wholesale client. This facility allows 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 the central markets, which continue to be the primary method for trading. Each exchange determines which products can be block traded, and also specifies the size of the transaction that is required before it becomes a block trade; hence, the transaction size required to be classified as a block trade varies. For example, ICE Futures London has set a minimum of 100 contracts for short sterling and gilt futures, while for FTSE futures it is 500 contracts.	Basis trades are 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; and basis trades are reported into the exchange once they are agreed. The FLEX facility combines the flexibility of the OTC market with the clearing and other advantages of exchange trading; for example, the one offered by ICE Futures London for FTSE 100 index options. A concept originally introduced by the CBOE, the FLEX facility gives any exchange member the freedom to customise trades with respect to the strike/exercise price and expiration date.
Depending on the contract and the exchange, block trades must be reported within a specified time period (generally between five minutes to an hour). Block trades are allowed to be negotiated away from the central order book, provided they are reported into the exchange once they are agreed. For example, the Hong Kong Exchanges and Clearing (HKEX) defines the minimum number of contracts in a block trade for its stock index futures and options as 100 contracts, while for individual stock options it is 500 contracts. Once reported, these trades are denoted by INT on the HKEX in the ticker window to differentiate them.	Some FLEX facilities offered by exchanges are another way to increase trading volumes based on advances in risk management and systems. On most exchanges, wholesale trading facilities enable participants to enter off-order-book trades into the exchange's system. Thus, the participants can benefit from the flexibility of customised trading and the advantages of standardised clearing and settlement. Most facilities are pure OTC trade entry facilities, with bilateral agreement of price and quantities.

3. Over-the-Counter (OTC) Markets

Learning Objective

3.4.1 Understand the reasons for using OTC markets

There are several reasons for trading OTC:

- Products/contracts can be unique or made to fit one of the counterparty's requirements.
- A degree of confidentiality exists for counterparties, as trades can be negotiated bilaterally between client and broker/dealer. Since orders are not shown on exchange, counterparties can mitigate price slippage on large transactions by requesting a quote for the whole order from an OTC counterparty, usually a financial institution. This is called 'risk pricing'.

Example

A food manufacturer wishes to hedge a physical wheat purchase of 100,000 tonnes. Given the manufacturer is long the physical product, they wish to sell May-23 futures in order to hedge, or 'offset' this exposure. The physical deal was done at £200/tonne.

The relevant futures price used in the procurement negotiation is May–23 ICE Feed Wheat UK futures, and the current price is £200/tonne. The open interest is 2,500 lots (250,000 tonnes), and the previous day's traded volume was 160 lots (16,000 tonnes) (see section 3.4.1. of this chapter for definitions of Open Interest and Volume).

Clearly, selling 1,000 lots as a futures market order is likely to pressure the price downward significantly, given the order would be more than six times the previous day's volume, and 40% of the open interest. This is not desirable, as the lower the hedge price, the more of the value of the physical product is being eroded. This concept is known as 'hedge efficiency'.

In order to minimize this price impact, the procurement department contacts their corporate bank, and asks for an OTC bid (since the manufacturer is selling or 'offering') for a commodity swap referencing May-23 ICE Feed Wheat UK futures. The corporate bank's OTC desk bids £195/tonne as a 'risk' price, and the food manufacturer accepts, given their belief that they are unlikely to achieve a higher price by using futures.

The benefit of this deal for the Bank, is that the £5/tonne discount-to-futures provides them some insurance against slippage when they go to hedge the OTC transaction in the exchange-traded market. In some instances, a financial institution will just take on the market risk without hedging, and therefore speculate.

- Counterparty risk has been somewhat mitigated by the fact that OTC trades have to be reported to a facility, which allows some surveillance of positions by a regulator or other nominated authority. Indeed, OTC derivatives no longer provide complete anonymity, as they did prior to the 2007–08 global financial crisis, following regulatory change introduced to bring transparency to non-exchange traded positions. Increasingly, even previously off-exchange trades must be done on an

alternative trading system (ATS), and reported to regulators. An ATS is a trading facility usually set up by financial institutions, where client orders are netted either across each other or against the institution's own book. These are called multilateral trading facility (MTF). Central clearing for OTC trades is also becoming a common requirement. For a full list of all of the details of OTC trading, as well as a comparison with exchange trading, see chapter 1, section 8.

- OTC products tend to be lighter on back-office teams, as there is no daily margining, and require less onerous controls, which is useful for non-financial corporations.

The main disadvantages are:

- Typically have lower liquidity, and can be difficult or expensive to exit or offset, particularly as they are less fungible compared to ETDs.
- Cost is proportional to the degree of tailoring of the OTC structure, and the subsequent potential for illiquidity. This is compounded by higher credit risk, due to the lack of daily margining, which adds to the overall cost of trading OTC products.

4. Market Conventions

Learning Objective

3.5.1 Know the principles of order flow: how clients, brokers and exchange members are linked; electronic and open outcry markets; audit trail

3.5.2 Know the definition, significance and differences between principal and agency orders (ie, of dual capacity versus agency orders): dealing as a principal; cross trading; advantages to the client

3.5.3 Know the processes involved in trade registration, trade input and trade matching and differing requirements of electronic and open outcry markets

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Every exchange uses a clearing house, which clears all trades and supervises the processing and delivery of all trades executed on that exchange. The process by which the clearing house becomes counterparty to all trades is novation.

Each contract, as part of its specification, has details of its settlement procedure. While most contracts are closed out before maturity, each has a settlement/delivery process that the clearing house supervises to ensure that both sellers and buyers receive proper payment or delivery of the underlying asset.

One final settlement mechanism is cash settlement. Often known as a **contract for difference (CFD)**, cash settlement is straightforward, since it requires the net cash payment of the difference between the value at the final position's closing price and the value based on the previous day's closing price. This is because all contracts are marked to market at the end of each trading day and the clearing house either receives or pays that day's variation margin.

Physical settlement requires the delivery of the underlying asset as set out in the contract; hence this type of final settlement mechanism is also called physical delivery. The specifications of each contract clearly define the details of what is an acceptable asset that can be delivered. Since exchange-traded contracts have standard amounts, they also have specific standards of what can be delivered. This is particularly the case for commodity contracts.

With futures, the seller initiates the delivery process. Once advised, the clearing house will assign a buyer at random and advise them that delivery will take place. For most financial futures, the delivery process is straightforward, since, with the exception of long-dated government bond contracts, most have a single underlying asset that can be delivered.

For government bond contracts, the exchange will have a list of bonds that are eligible for delivery and each bond will have a price factor, on which the final invoice payment is based.

For options, it is the buyer who initiates delivery by exercising the option. In the case of options on futures, upon exercise, the exchange will automatically replace the exercised option position with the corresponding future at the option's strike price.

With commodities, the delivery process can be more involved, depending on the contract as there might be a choice of acceptable grades of the commodity that can be delivered. Also, the exchange will have a list of authorised warehouses or agents where the seller can deposit/deliver the commodity. In some cases, such as with the LME, the exchange will have a network of authorised warehouses that can issue warrants (as warehouse receipts), which are recorded and held within their **LMEsword** delivery system.

4.1 Principal and Agent Functions

Exchange members can execute a trade in one of two capacities: as principal or as agent.

- **Acting as principal –** means that the member is carrying out the trade, also known as a principal order, on their own behalf and will be subject to profits and losses on those trades. In other words, when dealing as a principal, the member firm is dealing for its own account and, therefore, it will benefit from, and incur, any profits or losses from that position itself.
- **Acting as agent –** means that the firm is carrying out the trade on behalf of clients (ie, acting as broker), also known as an agency order. Thus, 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, 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 agent in any transaction is known as dual capacity. In other words, a member is allowed to trade for both its own account and execute its clients' orders. It is argued that clients benefit from this, since it allows the member firm to obtain better prices when executing market orders for clients, in addition to the extra insight that members can pass along as advice to clients. However, some would argue that it also increases the possibility of a conflict of interest, when both client and member are looking to trade the same instrument at the same time.

4.2 Cross Trading

Cross trading is when a brokerage firm matches a buy order of one customer against the sell order of another, when one is non-competitive (that is, the customer has not specified a specific price). On US exchanges, this practice is permissible only when executed in accordance with the Commodity Exchange Act, Commodity Futures Trading Commission (CFTC) regulations and the rules of the exchange.

A member of an exchange is said to have dual capacity if they are 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.

4.3 Trade Execution and the Nature of Orders

- **Opening trades** – create a position in the market and so incur rights or obligations. They are subject to profits/losses arising from subsequent price movements. They can be opening purchases or sales.
- **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.

4.3.1 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. The contract with the highest open interest is generally the nearest to expiration and is called the 'front month' contract.

Note that open interest is the sum of all open long positions or the sum of all open short positions, not the sum of both.

4.3.2 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.

As a result of the increase in screen-based and electronic trading/orders since the late 1990s, most exchanges require that their members have an Order Audit Trail System (OATS) in place that is able to track all orders and ensure a clear resolution of any disputes.

4.4 Trade Registration and Clearing Mechanisms

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 CME Direct for the CME Group or, in the case of the Dubai Mercantile Exchange (DME), its DME Direct system. These systems 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 uses open outcry, where there is scope for more human error than in an electronic order matching system.

5. Account Types

5.1 Client Accounts

Learning Objective

3.6.1 Understand the use of different types of accounts: use of house accounts; customer accounts – segregated and non-segregated

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. These will be the trades that are purely for the benefit (or loss) of the member firm, and will not include any client positions.
2. **Segregated** – for trades that the member firm is registering on behalf of a segregated client. Note that most exchanges and major market regulators require their member firms to ensure that all client assets are placed in segregated accounts. Should the member firm have financial problems, their funds will be protected against having to meet the defaulting firm's liability. Member firms cannot use funds from segregated accounts to meet any of their own (or other) client margin or other financial commitments.

3. **Non-segregated** – client trades that are not segregated and, therefore, are not protected in the event of the firm's default. These can be considered commingled and are typically numbered accounts within an omnibus account from another institution or at the broker itself. When permitted by the exchange or market regulators to use a non-segregated account, the decision to do so is the client's and not the member firm's.

5.2 Pre-Registration/Allocations/Give-Ups

Learning Objective

3.6.2 Understand the purpose and importance of give-ups/allocations: reasons to allocate a trade to an account; use of give-up agreements; risk implications

Pre-registration involves a member firm indicating that a deal it is 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 of the parties to an allocated transaction run the risk that the other will not fulfil its obligations. This is mitigated to some extent by Master Give-Up Agreements, which set the legally-binding framework that governs the relationship between members involved in give ups. This includes compensation clauses that cover the party 'giving in' trades, in the event that the other member does not fulfil. A give-up trade is allocated to the give-in on Euronext, which is done by the Euronext Clearing. At the CME, this is done via the GPS (Give-Up Payment System, part of CME Clearing).

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. In addition, give-ups are sometimes 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

Member firm ABC executes, confirms and matches a trade which it pre-registers, notifying the system that the trade should be allocated to firm DEF (another member).

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.

6. Trade Reporting

Learning Objective

3.7.1 Know the purpose and requirements of trade reporting in markets: information to be reported; process and timeliness of reporting; responsibility for 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 compile trade reports detailing the transactions they have been involved in. The exchanges specify the time limits within which these trade reports must be submitted, typically same day, and the member firms could be subject to disciplinary action if they fail to adhere to these limits. The information reported must include the counterparty's details, the clearing member involved, the instrument, direction and size of the transaction, and the price.

While OTC trades are not subject to such exchange trade reporting timing regulations, all OTC derivatives trades are subject to internal timing reports. This means that once an OTC deal has been agreed, it must be input into the participant's internal trade reporting/position system, ensuring that it is now recorded by the internal risk management system. This starts the process of the trade's confirmation, and the application of it to the participant's risk and position limits management system. As is the case for all ETD contracts, all financial institutions have their own time reporting requirements. These time guidelines are usually set by the participant's risk management department to ensure that they meet the guidelines set by their financial regulators and auditors.

The electronic nature of trading systems provided by exchanges such as ICE Futures means that trade reporting is largely performed automatically by the electronic system. It is only block and basis trades that need to be reported separately to the exchange. On ICE Futures, for example, block trades must be reported to the exchange within five minutes of verbal agreement being reached, under normal market conditions. Those block trades that are dependent on the execution of a transaction in another instrument or when market conditions are considered exceptional, must be reported within 15 minutes. All basis trades must be reported within 15 minutes of the time the trade was organised.

6.1 Price Transparency

Learning Objective

3.7.2 Know the advantages and main sources for Exchange Price Feeds: price transparency; current bids and offers; trade prices; high/low prices; last night closing price; traded volume

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.

6.1.1 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 also made available to quote vendors (eg, Reuters and Bloomberg) and directly to its members (eg, Euronext's Exchange Data Publisher) 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 offer price (selling price – often shown by the letter **A** for ask) will constitute the bid/offer (also called the bid/ask) spread in the market.

The screens are designed to report all data that 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, and the day's high and low prices, all shown by delivery month. This data is made available both via real-time price feeds and on a delayed basis.

Delivery Month Codes

Each futures expiry month has its own unique identifier.

January	F	April	J	July	N	October	V
February	G	May	K	August	Q	November	X
March	H	June	M	September	U	December	Z

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

6.2 Monitoring Volume and Open Interest

Learning Objective

3.7.3 Understand the importance of monitoring volume and open interest: purpose of monitoring open interest; breach of credit limit; guarantee in the event of settlement failure

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, derivatives markets 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, this is effected by the use of ICE Connect, through which all members report their holdings in respect of their ongoing client positions. 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 fails to manage the open interest on their account properly, it may lead to unwanted delivery situations. If the client's position were to become excessive, there is a danger of the client breaching their credit limit with the broker when prices move against them. However, the clearing system provides a mutual guarantee structure, whereby the clearing house should carry enough capital to cover either party in the event of default.

Example

Firm A has a credit limit of $100m with a broker B. This credit limit can be summarised as the maximum allowable credit risk that the broker is willing to be exposed to on the totality of Firm A's positions with them.

The current utilisation of the credit limit is $99m, and a trader from Firm A fills a new trade, which adds $5m to the utilisation. The credit limit is in material breach at this stage, because the utilisation is 104%. The broker is within their rights to force Firm A to close enough positions to bring the utilisation back within limit.

In practice, in order to avoid this situation, the broker will check the credit limit before allowing the client to enter a new trade. In the example, the broker is likely to request that Firm A be given further credit, if they were to post more collateral, or the broker's risk department deemed it prudent. The forced closure of positions is usually a last resort as it can lead to a substantial deterioration in client-broker relations, and therefore the likelihood of further business, but it is necessary to keep counterparty risk in check.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **Describe a market-if-touched (MIT) order.**
   Answer reference: Section 1.2

2. **What is the difference between a 'fill or kill' and an 'immediate or cancel' order type?**
   Answer reference: Section 1.2

3. **What is a block trade?**
   Answer reference: Section 2

4. **What is a benefit of the flexible exchange (FLEX) facility?**
   Answer reference: Section 2

5. **Describe the disadvantages of using OTC markets.**
   Answer reference: Section 3

6. **What happens when novation occurs?**
   Answer reference: Section 4

7. **With options, who initiates delivery?**
   Answer reference: Section 4

8. **Name the three types of client accounts.**
   Answer reference: Section 5.1

9. **What are give ups?**
   Answer reference: Section 5.2

Chapter Four

Principles of Pricing and Valuation

1. **Approaches to Valuation** 113
2. **Calculating Forward Prices** 115
3. **Futures Pricing** 119
4. **Options Pricing** 130

This syllabus area will provide approximately 11 of the 100 examination questions



1. Approaches to Valuation

1.1 Arbitrage Free Pricing

Learning Objective

4.1.1 Understand the concept of arbitrage free pricing

The term arbitrage refers to a trader's attempt to profit by exploiting price differentials between identical, or similar, financial instruments that are trading on different markets, or in different forms. A true instance of arbitrage is when there is a riskless profit, meaning all positions have been exactly offset at a net gain. Instead, the mispricings which usually occur are situations where risk cannot be completely eliminated, but where the expected profit from the trade is fairly certain. The examples considered below, of buying or selling the spread, could be described as arbitrage trades because they attempt to exploit pricing differentials between futures on the same underlying asset with different maturities.

However, there is also the potential for arbitrage mispricings between the underlying instrument and the futures available on that instrument. Such arbitrage opportunities exist when the future is not trading at its fair value. In sections 3.7.1 and 3.7.2 below, we will consider how to arbitrage when a future is above its fair value, and how to arbitrage when a future is trading below its fair value.

The concept of arbitrage-free pricing in finance comes from the wider economic efficient market hypothesis, put forward by a number of early 20th century economists who posited that difference in prices could not be sustained as profit makers would exploit the differences and cause convergence to an equilibrium 'fair value' price. The reason why this is called a 'hypothesis' rather than an 'axiom' is that financial markets will not immediately converge to

a fair value, and in some cases may take months or years to do so, and indeed never. The two primary reasons for the ongoing existence of arbitrage in markets are the lack of perfect (or 'identical and complete' information across all market participants and the existence of differentiated transactions costs across markets, which makes a hypothetical arbitrage unworkable. This has led to the term 'workable arbitrage', where some arbitrage is considered profitable and others that work in theory but not in practice or 'unworkable'.

1.2 Cash-Flow Pricing

Learning Objective

4.1.2 Understand the concept of cash-flow pricing

A similar concept related to arbitrage is that of cash-flow pricing, which is most readily demonstrated through equity valuation.

Many retail investors will see a publicly-traded company's value as its share price. However, since a share price is determined in the open market, it has many determinants, aside from the company's business performance – the two main being the share's participation in an equity index (eg, the FTSE 100) and goodwill or 'brand value'. The latter is particularly interesting since the company's share price may rise substantially, for years, before the company has generated any profit. Finally, from a mergers and acquisitions point of view, a traditional method for valuing a company when attempting to acquire it is its market capitalisation or, its share price multiplied by the numbers of shares outstanding.

The principle of arbitrage comes into play for an investor when the share price, or market capitalisation, comes well out of line from its actual business performance. All businesses ultimately must generate cash, for dividends to its shareholders, otherwise it is not a yielding asset, but rather depends purely on the whims of the open markets 'perceptions' of future cash flows. Therefore, the beginning of an equity investment for an investor should be calculating a business' free cash flow – a widely used approximation of which is the company's earnings before interest, tax and depreciation/amortisation (EBITDA).

EBITDA is calculated using the financial statements of a business, and gives an approximation of how much dividend potential a business has. Dividing the free cash flow of a business by the number of outstanding share gives you the free cash flow per share, which can be readily compared to the share price. If the free cash flow per share is low or negative, relative to a positive and growing share price, there is clearly a mismatch between potential returns and the market's valuation, and this may be considered a selling opportunity. Vice versa, if the business is generating more free cash flow per share versus its share price, then the market may be mispricing its value, and this may be considered a buying opportunity.

In the practice within investment banking, a process called 'comparable company analysis' aims to calculate the above free-cash-flow per share to share price metrics for a number of similar companies, and find opportunities for investors to capitalise on mispricing that may yield 'alpha' or when invested better than equity index returns.

2. Calculating Forward Prices

2.1 OTC Derivative Pricing

Learning Objective

4.2.1 Understand the mechanisms for OTC derivative pricing and the relationship with the underlying cash prices together with the significance of contributing factors: forward and forward/forward rates; cash flow analysis and the zero curve; the role of interest rates and yields; other factors affecting pricing

A forward contract is an OTC transaction in which the delivery of the commodity/asset is deferred until a date in the future that is specified in the contract. Although the delivery is made in the future, the price is determined on the initial trade date.

Forward contracts are traded on a wide variety of assets such as currencies, commodities and equities.

The forward price that is agreed by the buyer and seller is determined by a number of factors, such as the interest rate differential between the two currencies, in the case of a foreign exchange (FX) forward. For commodities, these factors will include the current interest rate, the cost of financing should the commodity be purchased today and any storage costs. Equity forward prices take into account the differential between the current interest rate and the equity's dividend yield.

These factors are key to reducing arbitrage opportunities, in the same way as in futures prices.

Example 1

A French company has a series of future yen payments over the next 12 months and is concerned that the euro will weaken against the yen, thus making its materials more expensive. In order to lock in its cost now, the company can enter into a series of EUR/JPY forward contracts that will allow it to set the exchange rate today for its future payments. This is done through FX forwards contracts where the company buys yen against the euro, for specific future dates at rates that are agreed today.

Since this is an OTC transaction, the company can arrange the amounts and dates to match exactly the payments it has to make to its Japanese supplier. The forward contracts' rates will be based on the current FX spot rate and the interest rate differential between euros and yen. Since euro interest rates are slightly lower than yen rates over the period, the euro will be at a slight premium to the yen, thereby making it less expensive at that forward date.

Example 2

A food company is concerned that the forecasts of a drought will result in a significant reduction in this year's cocoa harvest. Since the company has several key production dates, exchange-traded cocoa futures are not an option. Therefore, it calls its broker and arranges a series of cocoa forward contracts, where it agrees to buy set amounts at set dates at prices agreed upon today. The cocoa forward's price will be determined by today's market price of a tonne of cocoa, plus any adjustment for storage costs and the current interest rate for the forward's duration.

Forwards are similar to futures contracts as they are 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 are usually traded off-exchange (OTC), but can also be traded on-exchange, eg, the London Metal Exchange (LME) lists forward contracts. They may not be marked to market daily or, if they are, the resulting profits are not paid out until maturity, and any losses must be paid to the exchange clearing house and if they are cleared by an exchange's clearing house any losses must be paid to that clearing house. Forwards are, therefore, settled only on the delivery date.

Most forwards, however, are OTC contracts, usually with banks. Outright forwards are a common product traded in the FX market. Corporations, institutional investors and banks themselves use forwards to manage their FX transaction risks. If an organisation is importing or exporting goods (or investing) in another currency, it 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 and foodstuffs (see Example 2 above).

In the physical markets, an airline might use forward prices on jet fuel to lock in one of its major costs. They will 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 will be adjusted for the interest rates in the relevant currencies.

2.2 Forward Foreign Exchange Rate Calculations

Learning Objective

2.2.4 Be able to calculate forward foreign exchange rates using interest rate differentials

The FX spot market involves the exchange of two currencies very soon after the date of transaction. For most currency transactions in the wholesale market this is T+2. The market is used by customers with a need to exchange one currency for another, often because of an underlying transaction – for example, the import or export of goods or services, or the purchase or sale of investments.

Suppose that the GBP/USD spot rate is 1.3000/10. The size of the spread between the bid price ($1.3000) and the offer price ($1.3010) will depend on the size of the transaction and the importance of the customer relationship.

Small clients might face a spread wider than two cents. On deals with large corporates or in interbank transactions, the spread might be as low as five pips or 0.0005 of a dollar. Pips are the smallest price increment in a currency, and are similar to ticks in the futures markets.

In GBP/USD, a move from 1.3000 to1.3001 is one pip. Thus, for interbank deals, the GBP/USD spot prices might be quoted as 1.3000/05. Recall that, in currency pairs, the first currency (in this case, sterling) is the base currency; thus, the dollar is being quoted in terms of sterling.

Remember that in FX, one currency is quoted in terms of another currency. Therefore, in the quote shown above, sterling is the base currency – the first currency quoted, by FX market convention is the base or action currency – while the dollar is being quoted in terms of sterling.

- 1.3000 is the bid for GBP – this means that the quoting bank will buy sterling and sell dollars at this rate, since it is cheaper: £1,000,000 yields $1,300,000.
- 1.3005 is the offer for GBP – here the quoting bank will sell sterling and buy dollars. At this rate, sterling is more expensive: £1,000,000 yields $1,300,500.

Note that in most cases, the amounts traded are also based on set amounts of the base currency.

Take the case of a UK consultancy firm that has a contract in Europe and will be receiving payments in euros over the next six months. It might want to lock in the exchange rate for these payments now by entering into a forward contract. The quotation is based on applying a margin to the spot quotes to arrive at a forward rate. Any FX contract that matures one day beyond the normal spot date (T+2) is considered a forward deal. For the major currencies, forwards/outright forwards can have maturities of five or ten years. However, the longer the maturity, the less liquid the market.

Example

Spot GBP/EUR is	1.2050 / 1.2055
One month is	1.1990 / 1.2000
Three months is	1.1930 / 1.1945
Six months is	1.1905 / 1.1925

To understand why forward rates differ, there is a need to explain interest rate parity. Interest rate parity is a no-arbitrage condition that links interest rates and forward exchange rates, ie, the difference between interest rates in two countries should equal the difference between the forward exchange rate and the spot exchange rate.

$$\text{Formula} = F = S \times ((1 + id)/1 + if))$$

where:
F = Forward exchange rate (domestic currency per foreign currency)
S = Spot exchange rate (domestic per foreign)
id = Domestic interest rate
if = Foreign interest rate

If F does not match that ratio, arbitrageurs could make a risk-free profit by shifting funds between currencies.

In the above example, the margin applied to the spot rate is a premium to the traded currency (ie, euros). A premium indicates that the base currency (sterling, in the above example) is becoming less expensive relative to the euro. As a result, the forward points are subtracted from the spot rate, so that in the forward deal the pound will buy less euros (the bid column), and the euro holder will have to pay less to get the same number of pounds (the ask column). Again, the reason for this is because sterling interest rates are higher than the corresponding euro interest rates in this example.

When quoting forward points and adding these to the spot rate, there are two important points to remember. First, if forward points are positive, these will increase as the time period increases and if they are negative (subtracting from spot), they will become more negative for a forward of longer maturity. The difference in the interest rate differential will grow over time due to compounding.

Second, the quoted spread will always widen for contracts further out. Thus, the bid/offer points in this example are 60–55 (subtracting) for one month, but 145–130 for six months. Contracts which are further out carry more risk for the dealer, therefore, the bid/offer spread will widen. In this case, the base currency, sterling, is at a discount and the traded currency, the euro, is at a premium, based on their interest rates.

When the forward points quote increases, the base currency is at a premium in the forward market and the points will then be deducted from the spot rate. This is described as a forward delivery premium.

The banks will calculate the necessary premium or discount considering the relevant short-term interest rates (STIRs) of the two currencies.

As well as commercial users, the forward market is used extensively by speculators (eg, hedge funds and the proprietary trading desks at investment banks). Since forward rates are based on the interest rate differential between the two currencies, the FX forward market is used to speculate on expected changes in the difference between these two interest rates. This is done using FX swaps, which entail buying one currency spot and selling it at a future/forward date at the same time. Therefore, any movements in the forward points which are based on the interest rate differential between the two currencies, will be the basis for any profits or losses on such a trade. However, it is important to note that capital inflows and outflows, particularly in major currencies during times of stress, can break these relationships; the Swiss franc or USD as perceived safe havens are examples.

Speculators on the movements in spot rates mainly take spot or outright forward positions.

3. Futures Pricing

Learning Objective

4.3.1 Understand the mechanisms for futures pricing and the relationship with the underlying cash prices together with the significance of contributing factors: contango and backwardation; price convergence at maturity; the concept of fair value

4.3.2 Understand the implications of the cost or benefit of carry and what may be included in these: what is cost of carry; storage costs, insurance and interest costs; asset yields

3.1 Futures Pricing Relationships

The price of a future will be derived from the price of the underlying asset in the cash market, plus the net cost of holding the position over the term of the contract, such as any financing associated with owning the underlying asset.

However, it is normal to find that the cash price is different from the price for various deliveries in the future. It is tempting to think that the future's 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. While there is a connection, the price is only in part the market's perception. In reality, the price of a future is affected by a number of factors that take into account the costs involved in holding the physical asset to the expiry date – this is called the **cost of carry**.

3.2 Cost of Carry

In order to understand the cost of carry, let us first consider an example.

Example

An investor wants a particular asset in March, which is in two months' time. They have 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 forgoing the interest which could be earned on the funds until March. Furthermore, there may be costs associated with storing the asset until it is needed (in the case of a commodity). 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, in the meantime, 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 expense) over the period
- security costs (such as the case for precious metals)
- storage costs, and
- insurance.

As mentioned above, cost of carry can be significant for all commodity futures, and therefore will cause a difference between the current cash and futures price. As would be the case with the three-month LME lead futures contract, given the contract's size of 25 tonnes, the combination of storage and insurance costs for this amount of lead, in addition to any financing costs (which also apply to financial futures) is a major factor in determining that contract's fair value.

For financial futures, the cost of carry very much depends on the specific share, based on its dividend yield compared to the level of current interest rates (for equity derivatives) or the shape of the yield curve (for fixed-income derivatives).

As will be seen in section 3.3.1 below, there may also be benefits of carry, such as dividend yields when equity derivatives are considered.

3.3 Fair Value (Arbitrage-Free Value)

Learning Objective

4.3.3 Be able to calculate the fair value of a future from relevant cash market prices, yields and interest rates

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Knowing what the cash price of an asset is, and 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 is 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 is 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 cost of carry that the buyer is indifferent as to whether to buy in the cash market or the futures market.

Therefore:

$$\text{Fair value of the future} = \text{cash price} + \text{cost of carry}$$

Example

The cash price of a commodity is £1,250, the interest rate is 6% pa, and the storage costs are 1% pa.

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

Cash price	£1,250.00	
Finance	£1,250 x 6% x (90 / 365)	= £18.49
Storage	£1,250 x 1% x (90 / 365)	= £3.08
Fair value	£1,271.57	

Note that 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.

3.3.1 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.

$$\text{Net finance costs} = \text{interest} - \text{present value of dividends}$$

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.

The pricing of all stock futures takes this into account, such as the Cathay Pacific futures traded on the Hong Kong exchange, the pricing of which will be based on the net difference between the net cost of financing to buy the shares less the share's current dividend.

Example

The S&P 500 index is currently 2100, the one-year US interest rate is 0.55% and the index's dividend yield is 2.25% pa. The fair value of a future with 182 days to delivery is:

Cash index	= 2100
Interest rate	= 0.55%
Index dividend yield	= 2.25%

The next carrying cost for an equity index future will be the interest cost less the dividend yield. Unlike physical commodities, which almost always have a positive carrying cost, this net cost can be positive or negative for an equity index future, depending on economic conditions.

Net carrying cost = (0.55% – 2.25%) x (182 / 360) = –0.0086

Therefore, the fair value of the future will be:

2100 x (1 – 0.0086) = 2100 x 0.9914 = 2081.95

Exercise 2

The FTSE 100 cash index is 7200, interest rates are 0.8% pa and the dividend yield on the index is 3.6% 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.

3.3.2 International Accounting Standards Board (IASB) Definition of Fair Value

The International Accounting Standards Board (IASB) defines the fair value of a future or any other derivative instrument as the amount or price at which the future/instrument can be exchanged/traded between two market participants at a given time, as an arm's length market transaction.

In other words, the IASB's definition of a future's fair value is its current market price. For market participants, the IASB requires at least a daily **mark to market (MTM)** valuation of all futures positions.

3.4 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. Then the market is said to be in **contango** (ie, a contango market).

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

Backwardation is most common in both the bond and short-term interest rate (STIR) markets when long-term interest rates are higher than short-term rates. Backwardation can also occur within commodities markets when there is a very steep premium for material available for immediate delivery, indicating expectations of a near-term shortage in the underlying commodity.

Example

The cash price of a bond is £110.50. The interest rate available on 30-day deposits is 0.25% pa and the bond yields 1.6% pa.

The fair value of a one-month future is:

Cash price	=	£110.500
Finance costs £110.50 x (0.0025 – 0.016) x (1/12)	=	–0.00124
Fair value	=	£110.376

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

Exercise 3

The approximate cash price of the notional long gilt is £104.30. The interest rate available on two-month deposits is 0.25% pa and the bond yields 1.5% pa. What is the fair value of the long gilt future with two months to expiry?

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

3.5 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.

3.6 Basis

Learning Objective

4.3.4 Understand the importance of basis risk

Basis (sometimes also referred to as crude basis) is a measure of the difference between cash and futures prices.

$$\text{Basis} = \text{cash price} - \text{futures price}$$

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

In contango markets, the futures price is greater than the cash price, so the basis will be a negative number. Conversely, in backwardation markets, the futures price is less than the cash price, so the basis will be a positive number. Due to 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. Different market participants may also have different borrowing costs, leading to a slightly varying breakeven price for arbitrage. 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), or
- different market participants having different cost bases, making fair value somewhat relative, or
- changes in time remaining to expiry (convergence).

Movements in basis can adversely impact hedging strategies, and correctly anticipating the changes in basis can provide trading opportunities.

3.6.1 Changes in Basis – Terminology

Strengthening of Basis

When basis moves in a positive direction (cash prices increase relative to futures prices), 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 prices converge, the basis becomes 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:

	March futures price	June futures price	Basis
Today	417	433	–16
Tomorrow	410	420	–10

In contrast, a strengthening of basis in a backwardation market results in a widening gap between the two prices. This is because the 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:

	March futures price	June futures price	Basis
Today	110.15	110.02	+0.13
Tomorrow	111.00	110.75	+0.25

Weakening of Basis

When basis moves in a negative direction (cash prices decline relative to futures prices), 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:

	March futures price	June futures price	Basis
Today	417	433	–16
Tomorrow	410	429	–19

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:

	March futures price	June futures price	Basis
Today	110.15	110.02	+0.13
Tomorrow	111.00	110.92	+0.08

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), the basis **strengthens** (ie, becomes less negative) towards expiry.
- In **backwardation** markets (eg, STIR and bond futures), the basis **weakens** (ie, shrinking positive number) towards expiry.

3.6.2 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 the March future and sell the June future.

This is shown in the following example:

Example

Assume that a trader is anticipating a strengthening of basis between the March and June FTSE 100 futures. At present, March is trading at 7250 and June is trading at 7260 – a basis of minus 10. The trader buys the spread by buying 500 March FTSE 100 futures and simultaneously selling 500 June FTSE 100 futures. Two days later, the basis has strengthened, with the March FTSE 100 still trading at 7250 and the June contract trading at 7258. The trader closes out their positions.

The outcome is as follows:

March FTSE 100 contracts	bought 500 at	7250
	sold 500 at	7250
	result = no gain/loss	
June FTSE 100 contracts	sold 500 at	7260
	bought 500 at	7258
	result = gain of 2 index points	

Overall gain = 2 points x £10 per point x 500 contracts = £10,000

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 (eg, sell the March future and buy the June future). Selling the spread is illustrated in the example that follows.

Example

Currently, the March futures price is 417 and the June futures price is 433, representing a basis of –16. A trader expects a weakening of basis over the next week, so they sell the spread today. The following week, the March future is still trading at 417, while the June future is trading at 439, for a basis of –22. The price difference has widened, so the trader's anticipated weakening of basis was correct.

The outcome is as follows:

March futures	sold at	417
a week later	purchased at	417
	result = no gain/loss	
June futures	bought at	433
a week later	sold at	439
	result = gain of 6 index points	

Overall gain = 6 points per contract = the amount of the change in basis

3.6.3 Summary of Basis Changes and Trades

Market	Gap	Basis	Action
Contango	Narrowing	Strengthening	Buy the spread
Contango	Widening	Weakening	Sell the spread
Backwardation	Narrowing	Weakening	Sell the spread
Backwardation	Widening	Strengthening	Buy the spread

3.6.4 Basis Risk

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

There are several reasons why a futures price differs from that of its underlying asset. However, there is a relationship between the two, which means that a futures price should broadly follow the price movements of its underlying asset. Further, as we have seen, the difference between the two should become less as the future approaches its expiration (convergence). 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 fool-proof method of eliminating basis risk would be to hold a futures contract to its expiration, when the futures price and the cash price converge to zero.

3.7 Arbitrage Trades

Learning Objective

4.3.5 Understand the principles of cash/futures arbitrage: what should be included in arbitrage calculations; when arbitrage opportunities exist; cash and carry arbitrage; arbitrage risk

3.7.1 Cash and Carry Arbitrage

If a future is currently trading above its fair value, 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

Current cash price	Fair value for future	Current futures price
1450	1485	1497

The trader buys the underlying for 1450. They incur a 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.

3.7.2 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, known as a reverse cash and carry trade. This is illustrated in the example that follows.

Example

Current cash price	Fair value for future	Current futures price
1450	1485	1477

The trader sells the underlying for 1450, releases funds which can be placed on interest and saves storage costs 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.

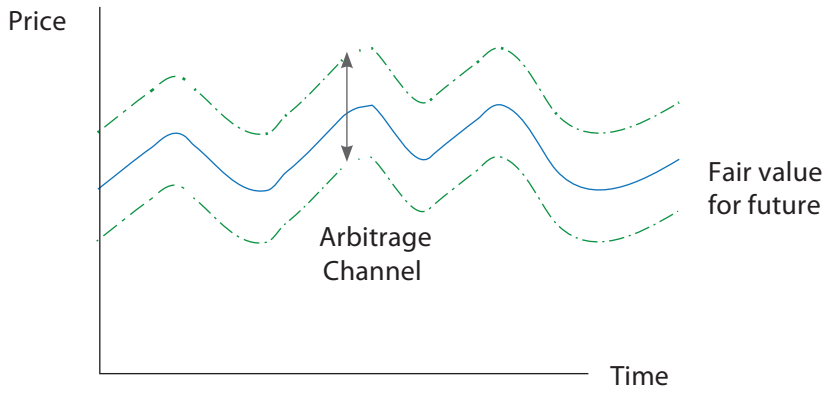
3.7.3 The Arbitrage Channel

In the above examples, 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 achievable arbitrage profits.

Therefore, the futures price can move away from its fair value without there being any arbitrage activity, provided 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 owing to transaction costs outweighing any potential benefits.

However, if 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.

The Arbitrage Channel



3.8 Hedging and Basis Risk

An unhedged position is at risk from changes in the price of the asset held. 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, as we have seen, there is 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. In time, this will 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.

4. Options Pricing

Learning Objective

4.4.1 Understand basic option pricing concepts: option premium; intrinsic and time value; in-the-money, out-of-the-money and at-the-money

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Recall from chapter 1, section 5 that an options contract gives the buyer (holder) the right to exercise the option, but not the obligation. The seller (writer) is obliged to meet the delivery obligations if the option is exercised.

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.

4.1 The Premium

The premium is a non-refundable fee that the holder pays to the seller in order to buy the option. The level of the premium is determined by buyers and sellers trading in the market.

There are several factors that determine the level of the premium, the two most obvious of which are the distance of the strike (or exercise) price from the current price of the underlying asset and the time to run until the option expires. This is illustrated in the example that follows.

Example

ABC plc shares are currently trading at 550, and the following call options are available, conferring the right to buy at the various strike prices:

Strike price	Premium for March expiry	Premium for April expiry
500 call	70	85
525 call	49	61
550 call	37	46
575 call	25	39
600 call	19	28

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

The premium is made up of two broad elements: intrinsic value(IV) and **time value (TV)**:

$$\text{Premium (PM)} = \text{intrinsic value (IV)} + \text{time value (TV)}$$

4.1.1 Intrinsic Value (IV)

The IV of an option is the difference between the strike price and the underlying asset's price. It can also be thought of as the minimum value that an option can have.

- Call options have IV if the strike is lower than the underlying asset price.
- Put options have IV if the strike is greater than the underlying's cash price.

IV can never be negative; it is either positive or zero (ie, an option either has or does not have IV). This is because there must be some IV for an option to be worth exercising. An option with zero IV is not worth exercising at expiry.

In the above example, for ABC plc, the 500 calls have an IV of 50p. In other words, they must be worth at least 50p because they enable 550p shares to be purchased at 500p. Thus, both the 500 and 525 strikes have IV. 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.

Strike price	Premium for March expiry	Premium for April expiry	Intrinsic value
500 call	70	85	50
525 call	49	61	25

Strike price	Premium for March expiry	Premium for April expiry	Intrinsic value
550 call	37	46	0
575 call	25	39	0
600 call	19	28	0

All options that have IV 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 IV that will then be used to offset the cost of the premium. If the IV is greater than the premium paid, the holder will make a net profit and the writer will make a net loss.

- An option with IV is described as being **in-the-money (ITM)**.
- An option with no IV is described as being **out-of-the-money (OTM)**.
- An option with an exercise price that equals, or is close to, the underlying asset price is described as being **at-the-money (ATM)**.

Sometimes, options that are significantly ITM are described as 'deep ITM' or 'far ITM' options. Similarly, options that are significantly OTM are described as 'deep OTM' or 'far OTM' options.

Exercise 4

Here is a summary of the terms for a call option:

Status of a call option	Definition
In-the-money	Market price > exercise price
At-the-money	Market price = exercise price
Out-of-the-money	Market price < exercise price
Break-even point	Market price = exercise price + premium

Try to complete the same table for a put option:

Status of a put option	Definition
In-the-money	
At-the-money	
Out-of-the-money	
Break-even point	

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

4.1.2 Time Value (TV)

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

The TV is simply the excess above the option's IV – ie, the difference between the premium (PM) and IV:

$$TV = PM - IV$$

Why should the holder pay more than its IV? The answer is simply that the price of the underlying asset 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 for traders (although it can also move against the holder, resulting in potential losses). The TV 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 IV and TV of ABC plc options.

Example

ABC plc's current share price is 550p. The premium for March options, and their IV and TV, are as follows:

Strike	Call PM	Call IV	Call TV	Put PM	Put IV	Put TV
500	70	50	20	18	0	18
525	49	25	24	23	0	23
550	37	0	37	35	0	35
575	25	0	25	47	25	22
600	19	0	19	67	50	17

The call IV is the premium minus the strike, and the balance is the TV. For example, for the 500 call:

TV = 70 – 50 = 20

The put IV is the strike minus the premium, and the balance is the TV. For example, for the 575 put:

TV = 47 – 25 = 22

Exercise 5

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 IV and, thus, the TV of the option.

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

4.1.3 Main Determinants of an Option's Premium

Learning Objective

4.4.2 Understand the basic mechanisms of option pricing and the relationship with the underlying cash prices together with the significance of contributing factors: volatility; interest rates; strike or exercise price; time to expiry; the underlying price; dividends/coupons (where relevant); structure; valuation inputs

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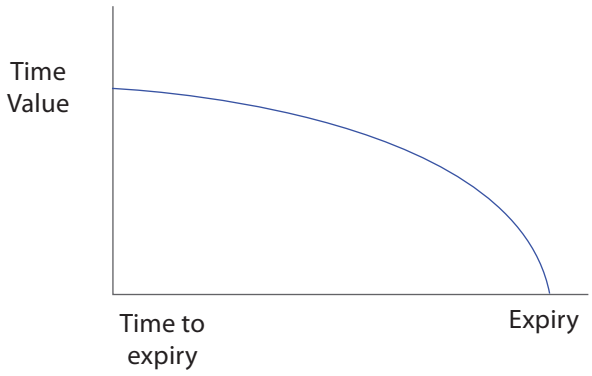
There are three major factors that determine the amount of TV, all of which are to do with uncertainty. The greater the uncertainty, the greater the TV.

1. Time to Expiry

A longer-dated option will have more TV 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 TV will be greater. Looked at another way, the holder has more time for the option to work in their favour (so will be prepared to pay more), while the writer is at risk for a longer time (so would need to be paid more for that risk).

If an option with one year to expiry must have more TV than an option with one week to expiry, it stands to reason that the TV 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 the option is OTM at expiry, IV = 0 and TV = 0, then it will not be exercised. If it is ITM, the holder will exercise to realise the IV, and there is no possibility of making any more, so TV = 0. If the option is ATM at expiry, IV = 0, TV = 0, then it will not be exercised.

The rate at which the TV erodes over the life of the option is not linear; rather, the erosion speeds up as expiry approaches:



Erosion of TV works against the holder. If an investor buys an option today, and other factors (such as the underlying price and volatility) remain constant, it will be worth less next week. If the investor closed next week, they would crystallise a loss. Erosion must, therefore, work in favour of the writer. Providing that other factors remain constant, an option writer could sell an option today and close out next week at a lower price, thus crystallising a profit.

2. The Distance Between the Strike and the Underlying

Remember that the TV reflects the uncertainty about whether an option is likely to be exercised on expiry.

- **ITM options** (especially deep ITM options) have a high probability of exercise. There is less uncertainty about the outcome, so there is less TV.
- **OTM options** (especially deep OTM options) have a high probability of being abandoned. There is less uncertainty about the outcome, so there is less TV.
- **ATM options** have the highest amount of TV of all the options because it is near the strike (when the option could easily go ITM or OTM) where most of the uncertainty exists.

3. Volatility

The more volatile the price of an asset, the greater the uncertainty, so the higher the TV 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 TV and the price of an option.

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

1. **Historic ('realised') 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.
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 option's 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). Robert Merton was another economist whose work on continuous-time finance was instrumental in the derivation of the Black-Scholes model – hence, the model is often referred to as the Black-Scholes-Merton (BSM) Model.

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, as it does not take into account the fact that American options could be exercised before the expiration date. Other methods, such as the binomial pricing model and finite difference, are more appropriate for pricing American-style options, as they are not constrained by a specific expiration date.

A third type of pricing model is the Stochastic Alpha, Beta, **Rho** (SABR) pricing model, which is based upon a different premise: it uses different levels of implied volatility to price options on the same underlying asset. Its pricing basis is the volatility smile, which states that the implied volatility (the one that is used to price an option) is greater for options with strike prices that are deep ITM and deep OTM. That is when the option's strike price is very different from the underlying asset's cash price.

Adjustments to models will also need to be made to consider the differences between options on futures and options based upon actual underlying assets, as well as other factors (eg, dividends when addressing equity-based assets). Other option models are better suited for certain types of underlying assets (eg, STIR or fixed income where the interest rate represents two inputs into the model).

4.1.4 Interest Rates, Dividends and Coupons

For some types of options, the prices of calls and puts are affected by interest rates and dividend yields. This is because buyers and sellers, usually of equity options, will include the cost of financing/ opportunity cost of capital, as well as other sources of value in the underlying asset (aside from the price), to value the option.

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 their money in the bank, earns more interest. The call writer, who has their 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 an underlying share's 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 dividends relative to interest rates mean they need to charge slightly higher premiums. For the holders of puts, this situation is acceptable given they will be receiving the higher dividends while holding the underlying equity.

4.1.5 Summary – The Impact on Option Prices as 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 option premium vary:

Factor	Call premiums	Put premiums
Price of underlying rises	Rise	Fall
Time to expiry rises	Rise	Rise
Volatility rises	Rise	Rise
Exercise price rises	Fall	Rise
Interest rate rises	Rise	Fall

Factor	Call premiums	Put premiums
Options on physicals	Rise	Fall
Options on futures*	Generally unchanged	Generally unchanged

* If interest rates rise, the cost of carry rises, impacting the futures price as well as the incentive to hold cash. It follows that the opposite reaction applies to decreases.

4.2 The Put/Call Parity Theorem

Learning Objective

4.4.3 Be able to calculate the put/call parity theorem: what is the put/call parity theorem; identifying arbitrage opportunities; risk-free interest rate

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While there is no absolute fair value for an option's premium (as no one can have perfect foresight regarding future volatility), 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 one another (for any given price of the underlying), otherwise arbitrage opportunities present themselves.

The **put/call parity** theorem defines the relationship between put and call 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

Example

The futures price is 100.95, the strike price is 100 and the call option on the future's premium is 1.07. Calculate the price of the put option on the future.

C – P = S – K

1.07 – P = 100.95 – 100 = 0.95

P = 1.07 – 0.95 = 0.12

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

Exercise 6

If the futures price is 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). The cost of carry does not need to be taken into consideration 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 when it is not a future or forward and, therefore, has a possible income flow (such as a share dividend or bond coupon payment) that is paid before the option expires.

The formula becomes:

$$C - P = S - \frac{K}{(1+r)^t}$$

where:

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

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

Example

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

From this information, P = 7, S = 600, K = 500, r = 6% (or 0.06), and t = 0.25 (since the option expires in three months).

The call premium for the 500 strike should therefore be:

$$C - 7 = 600 - \frac{500}{(1+0.06)^{0.25}} = 107.23$$

$$C = 107.23 + 7 = 114.23$$

Note that at expiry t = 0, so the formula becomes C – P = S – K.

Exercise 7

If shares in XYZ plc are currently trading at 410p, and the premium for the 400p call option that expires in two months is 25p, what is the premium for the 400p put that expires at the same time? The interest rate is currently 3% pa.

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

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 mispriced and arbitrage is possible. The key arbitrage trades are (assuming that the options are options on futures):

- **If the call is relatively cheap, 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**.
- **If the put is relatively cheap, 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**.

4.3 Delta (Δ)

Learning Objective

4.4.4 Be able to calculate the approximate change in option price due to a change in the underlying price: what is delta; uses of delta

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 does not 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:

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

The delta lies somewhere between 0 and ±1:

- 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 call/put options that are deep OTM.
- A **delta of +1** (long positions) and **–1** (short positions) means that the premium will change by exactly the same monetary amount as the underlying asset. This will be the case for call (+1) and

put (–1) options that are deep ITM. Further, the underlying asset and long futures will always have a delta of +1, and short futures of –1.

For example, if the change in price of the underlying was 20p, and the option increased by 12p, this would give a delta of 12 / 20 = 0.6. This means the option has moderate delta, typically occurring when the option is OTM and close to expiry, meaning traders are discounting the IV because there is a substantial possibility that the option will expire OTM.

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.

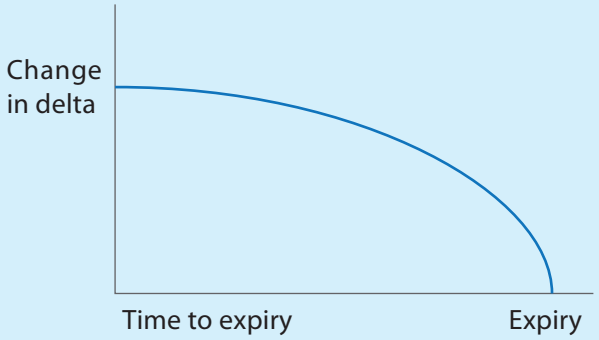
Example

ABC plc's share price is 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 (ie, by 10), we can use delta approximate the new call and put premiums:

- The delta of the call is 0.30, so the change in premium will be 3 (ie, 10 x 0.30). This means that the call premium will rise from 26 to 29.
- The delta of the put is –0.30, so the change in premium will be –3 (ie, 10 x –0.30). This means that the put premium will fall from 24 to 21.

As an OTM option approaches its expiration, its delta will approach zero. The longer to expiration, the slower the decline but, as an option's expiry date gets closer, the change in delta will increase.



Summary of Deltas

Instrument	Delta
Deep ITM calls Long futures Physical underlying asset	+1
ATM calls	+0.5
Far OTM call Far OTM put	0
ATM puts	–0.5
Deep ITM puts Short futures	–1

4.3.1 Delta Value of Cumulative Positions

Deltas can also be used to measure the sensitivity of a portfolio containing futures/underlyings, 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 gives the overall sensitivity and directional bias of a portfolio. The directional bias is obtained by taking account of long and short positions (recall that they are + for long and – for short). This is best illustrated by looking the following examples:

Example

Investor A is short an ATM put. The net delta position is (–1) x (–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 ATM put of –0.5, to give a net delta position of +0.5. The result is that if the price of the underlying rises by 10, Investor A's position improves by 5 (ie, 10 x 0.5). The price of the put will have decreased, thus showing a profit on the trade. Conversely, a decrease in the underlying price will show a loss.

Example

Investor B is long five ITM calls with a delta of 0.7.

Investor B's net delta is (+5) x (+0.7) = +3.5

If the price of the underlying rises by 1, the price of each of the calls will have gone up by 0.7 and they hold five of them; therefore, Investor B's position improves by 3.5.

Example

Investor C has the following portfolio on the same underlying:

Position	Delta	Comments
Long 10 futures	+1.00	
Short 3 calls	+0.30	OTM call
Long 4 puts	–0.65	ITM put
Short 5 puts	–0.15	OTM put
Long 8 calls	0	Far OTM call

The cumulative delta is:

+10	x	+1.00	=	+10.00
–3	x	+0.30	=	–0.90
+4	x	–0.65	=	–2.60
–5	x	–0.15	=	+0.75
+8	x	0	=	0.00
				+7.25

This is equivalent to being long over seven futures, so is a very bullish position.

Cumulative deltas can be useful to gauge what is required to hedge a portfolio. Since a portfolio with a cumulative delta of 0 is insensitive to price movements in the underlying asset, it is a hedged position – this is often referred to as 'delta neutral' or 'delta hedged'.

Taking the example 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 0.250).

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 four futures
Short three ATM calls
Long six deep ITM puts

What is your cumulative delta?

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

4.4 Other Greek Measures

Learning Objective

4.4.5 Understand the qualitative characteristics of the following Greeks and their uses: delta; gamma; theta; vega; rho

In addition to delta, there are several other Greeks measuring the relationship between an option's price and changes in the price of the underlying asset, as well as over time.

4.4.1 Gamma

Gamma is the measure of how delta changes (ie, 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 ITM or deep OTM. It is at its greatest when the option is ATM, 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.

As stated in section 2.3.1, a portfolio can be delta neutral. The delta will have to be monitored and perhaps rebalanced because of the impact of gamma on the portfolio delta.

Since gamma is the measure of changes in delta, it represents the required adjustments to any hedges associated with a single option's position or a portfolio of options. Gamma represents the size of these adjustments. For option holders, the changes in gamma usually correspond to profitable trades (ie, the required adjustments to the delta hedge of the underlying asset will result in a profit).

For example, if an investor has a long position on a call option on an individual share, the option's delta (as measured by gamma) will increase as the share price rises, and the investor will sell the adjustment or change to delta at a higher price. Therefore, when someone has a long position in an option or a net long position in an option portfolio, they are said to have a positive gamma indicator (or simply 'positive gamma'). The opposite is true for an option writer or someone who holds a net short option portfolio.

4.4.2 Vega

Vega is a measure of how a 1% change in implied volatility affects an option's price. Vega is always positive for long options positions (both calls and puts). It is greatest for ATM options. The further an option goes ITM or OTM, the smaller the vega will become.

Time increases the effect of changes in volatility upon an option's value. Therefore, vega is higher for long-dated options than short-dated options, and falls as an option approaches its expiration date. Vega can change even if there is no dramatic change in the movements of the underlying asset's price; it is affected by any change in expected volatility.

Vega is useful since it measures an option's or option portfolio's sensitivity to both market sentiment (expected volatility) and current market conditions. Many traders/investors use vega as the key measure of profitability of their options positions, since if they are delta neutral they are trading on an asset's volatility and not on a specific direction. Therefore, vega tells them how well their positions are performing relative to current market conditions.

4.4.3 Theta

Theta is the measure of the rate of decline of an option's value due to the passage of time. Theta represents how much an option's value will change as one day passes and the underlying asset price remains steady. Theta can also represent the time decay on the value of an option. If all other factors are held constant, an option will lose value as time moves closer to its maturity.

The measure of theta quantifies the risk that time imposes on options, since they have an expiration date and in most cases are only exercisable for a certain period of time. Time has importance for option traders on a conceptual level more than a practical one.

Theta and Option Positions

- **Long calls** and long puts always have negative theta.
- **Short calls** and short puts always have positive theta.

Theta is highest for ATM options and gradually decreases as an option moves further ITM or OTM.

Theta increases sharply as an option approaches its expiration and can severely undermine a long option holder's position, particularly if volatility is also decreasing at the same time. This is because theta is greater (in absolute terms) when either volatility is lower or there are fewer days to expiration.

Theta is used as a factor in combination with gamma and vega in determining trading strategies, since it represents the change in an option's fair value per day. For an option whose expiration is getting closer (thus its theta is increasing), if vega is falling then a trader is likely to sell an option – more so if the option is a few days from expiration, rather than one that is six months away.

4.4.4 Rho

Rho is the measure of changes in an option's value due to a change in interest rates. It measures how much an option's value will change from a 1% change in market interest rates.

Rho is the least used of the Greek measures, since the relationship between an option's price and interest rates is fairly stable. Also, the chances that an option's value will change dramatically, due to a rise or fall in interest rates, are very low.

The impact of interest rates on an option's price is based on the cost of carry associated with holding the underlying asset relative to the option. The interest cost of buying the underlying asset is priced into the option's premium. While delta fluctuates within a range of 0 and ±1, rho is normally in the range of 0.04–0.02 for the same option.

An increase in interest rates will increase the value of calls and decrease the value of puts, while a drop in interest rates will have the opposite effect. The longer the time to expiration, the higher an option's rho. ATM and ITM options have relatively higher rho than those which are OTM.

4.5 Premium Payment

Learning Objective

4.4.6 Know the requirements of, and process for, premium payment: when paid, immediately or marking to market; the roles of the clearing house and broker; what the seller receives

For many options contracts, the buyer of the option is requested to pay the premium immediately. The seller of the option will receive the premium into their broker's account on the morning of the next business day. Considering the risk involved with being short options, the writer will usually need to post initial margin for their position.

At the point of trading, the writer's broker becomes liable for any margin required by the clearing house. This is collected when the market value of the underlying instrument moves against the writer (known as marking to market (MTM)). Both the broker and the clearing house make the margin collection, with respect to the writer and broker respectively. For example, if the MTM shows the option to be further ITM, the seller will need to deliver margin to their broker and on to the clearing house to represent the worsening of their position.

However, the margining of options' positions is made more complex because some option premiums are payable futures style – examples include bond and interest rate options on the ICE Futures and Euronext exchanges. Such premiums are not payable immediately but are paid during the life of the contract through margining.

The following table summarises the margin requirements for options positions:

Position	Initial margin	Variation margin
Equity Index and Single Stock Options		
Long positions	No	No
Short positions	Yes	No
Bond and STIR Options		
Long positions	No	Yes
Short positions	Yes	Yes

Appendix

Answers to Exercise 1

The fair value of a future with 45 days to delivery will be:

Cash price	=	£750.00
Finance £750 x 3% x (45 / 365)	=	2.77
Storage £750 x 0.5% x (45 / 365)	=	0.46
Fair value	=	£753.23

Answer to Exercise 2

The fair value of the FTSE 100 future with 91 days to delivery will be:

Cash index = 7200

Interest rate = 0.8%

Dividend yield = 3.6%

Fair value = cash price x interest rate – dividend yield

= 7200 x 1 + ((0.8% – 3.6%) x (91 / 365)) = 7200 x (1 – 0.007)

= 7149.60

Answer to Exercise 3

Cash price	=	£104.30
Finance costs £104.30 x (0.25 – 1.5) x (2 / 12)	=	(0.22)
Fair value	=	£104.08

Answer to Exercise 4

Status of a put option	Definition
In-the-money	Market price < exercise price
At-the-money	Market price = exercise price
Out-of-the-money	Market price > exercise price
Break-even point	Market price = exercise price – premium

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 IV.

Premium = IV + TV

Given the premium of 40p and the IV of 22p from above: 40p = 22p + TV

Rearranging this equation gives: TV = 40p – 22p = 18p

Answer to Exercise 6

Using C – P = S – K :

12 – P = 101.5 – 110

12 – P = –8.5

P = 12 + 8.5

P = 20.5

Answer to Exercise 7

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

$$C - P = S - \frac{K}{(1+r)^t}$$

where r = 0.03 and t = 2/12 or 0.16667 of a year

$$25 - P = 410 - \frac{400}{(1 + 0.03)^{(2/12)}}$$

$$25 - P = 410 - \frac{400}{1.004939}$$

25 – P = 410 – 398.03

25 – P = 11.97

25 – 11.97 = P

P = 13.03

Answer to Exercise 8

				Δ
Short 4 futures	–4	x	1	–4
Short 3 ATM calls	–3	x	0.5	–1.5
Long 6 deep ITM puts	+6	x	–1	–6
Cumulative delta				–11.5

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **Name the main components of cost of carry.**
   Answer reference: Section 3.2

2. **What is the fair value of a future?**
   Answer reference: Section 3.2

3. **How do you calculate the fair value of a future?**
   Answer reference: Section 3.3

4. **What is contango?**
   Answer reference: Section 3.4

5. **What is the arbitrage channel?**
   Answer reference: Section 3.7.3

6. **In the options market, what is the premium?**
   Answer reference: Section 4.1

7. **Describe the difference between realised and implied volatility.**
   Answer reference: Section 4.1.3

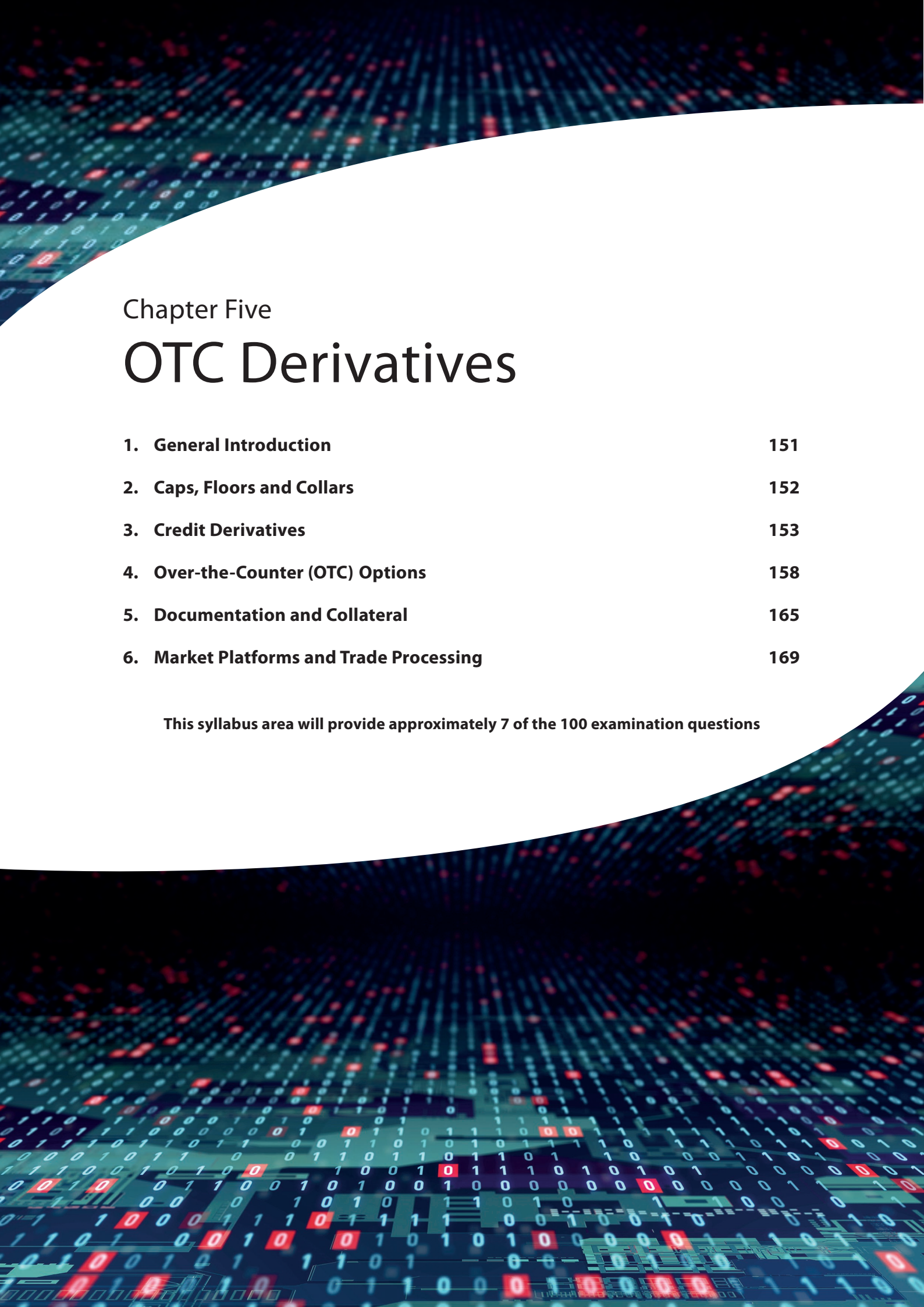
8. **Define the Vega of an option.**
   Answer reference: Section 4.4.2

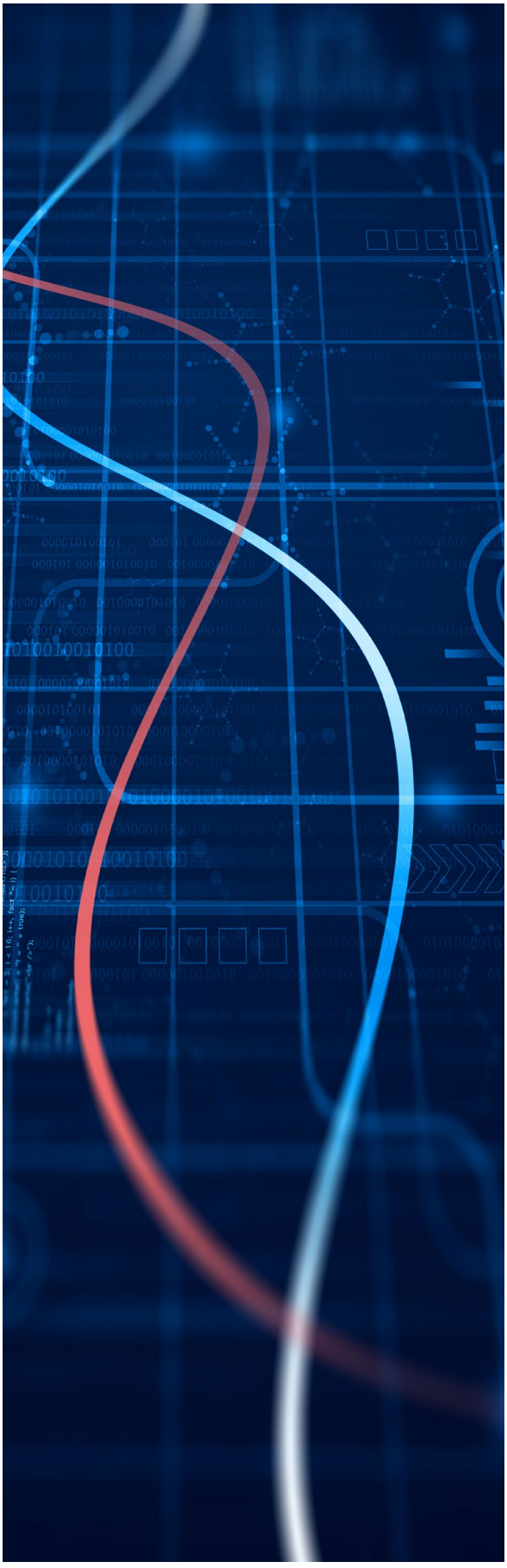
Chapter Five

OTC Derivatives

1. **General Introduction** 151
2. **Caps, Floors and Collars** 152
3. **Credit Derivatives** 153
4. **Over-the-Counter (OTC) Options** 158
5. **Documentation and Collateral** 165
6. **Market Platforms and Trade Processing** 169

This syllabus area will provide approximately 7 of the 100 examination questions





1. General Introduction

Over-the-counter (OTC) derivatives have been extremely popular for hedging, speculation and arbitrage, principally because their contracts are not standardised and therefore can be constructed around the unique needs of their users. This is despite the fact that a central counterparty (CCP) and trade reporting (TR) procedure have been established for these contracts. The European Market Infrastructure Regulation (EMIR) (see section 3.2 of chapter 9 for more details) was created to provide greater stability in the European Union (EU) derivatives market. A similar role was played by the 2010 Dodd-Frank Act which, among other major changes, repealed regulatory exemptions for swaps and mandatory clearing.

Exchange traded derivatives (ETDs) 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, plus anyone else they care to inform. By comparison, the ETD 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. Note that when large OTC trades take place, the impact often spills over onto exchanges, as subsequent counterparties use exchange-traded contracts to hedge the new exposure.

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.

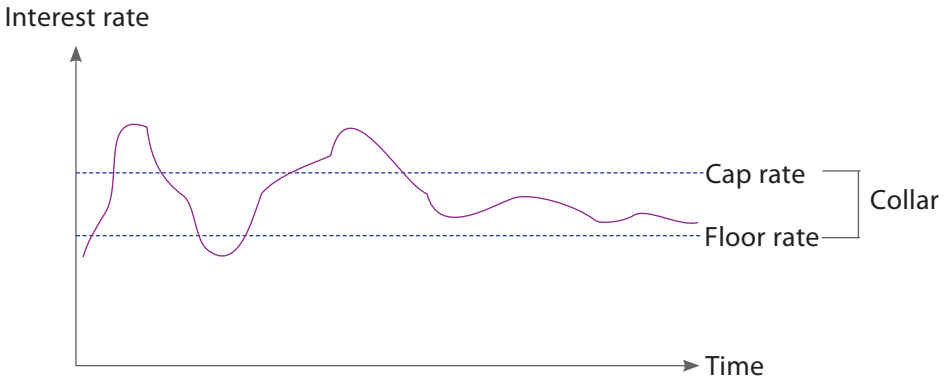
2. Caps, Floors and Collars

Learning Objective

5.1.1 Understand the basic concepts and fundamental characteristics of: forwards; caps; floors; collars; swaps; swaptions (options on swaps)

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 GBP loan which they roll over every three months at the three-month ICE SONIA (Sterling Overnight Index Average) then current. They 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, they receive the difference between the two rates.
  Suppose the strike rate on the cap is 1% and ICE SONIA is set at 1.2%, then, at the end of the three-month interest rate period, the purchaser of the cap will receive 0.2% 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 rate, the buyer receives the difference. Whenever the rollover rate is higher than the floor 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.



Collars can be constructed so that the two premiums: (the premium paid to buy the cap and the premium received when a floor is sold) net out to zero. This is referred to as a zero-cost or zero-premium collar.

Example

Suppose that City plc is a floating-rate borrower that fears rates rising.

It has borrowed £100 million for three years at ICE SONIA plus 0.25%. City plc can buy a cap (an OTC option) so that, if rates go above its specified rate (say 6%), the bank from whom it bought the cap (Cap Bank plc) will pay City plc compensation. If it had capped the whole £100 million and rates were 8% in year two, City plc would pay 8% + 0.25% (ie, £8.25 million) to its lending bankers but receive 8% – 6% (ie, £2 million) from Cap Bank.

During the term of the cap, the worst rate that City plc can pay is 6% + 0.25%.

If the premium City plc were quoted was too high, it might finance this by selling a floor to Cap Bank plc or to another bank.

Caps, floors and collars tend to be the preserve of wholesale market participants and are arranged by the large banks.

- A swap is a derivative contract in which two parties agree to exchange sets of cash flows over time based on a notional principal amount. The notional principal is not usually exchanged, rather it is a reference amount for calculating payments. Payments are typically netted (ie, only the difference is paid). Swaps are predominantly used to hedge risk or adjust exposure without the need to move the underlying investment.
- A swaption is an option to enter into a swap in the future on pre-agreed terms, hence it is essentially an option on a swap.

3. Credit Derivatives

Learning Objective

5.1.2 Understand the basic concepts and fundamental characteristics of credit derivatives and the main credit events for single entity and index contracts: default events; ratings transitions

An area of derivative products that has grown significantly in recent years is that of credit derivatives. These are instruments whose value depends on agreed credit events relating to a third-party company – for example, a credit rating downgrading of that company, or an increase in that company's cost of funds in the market, or a default, or bankruptcy. The purpose of such derivatives is to enable an organisation to protect against unwanted credit exposure, by passing that exposure on to someone else. Credit derivatives can also be used to increase credit exposure in return for income.

3.1 Credit Derivatives Instruments and their Relationships

Learning Objective

5.1.3 Know the common credit derivative instruments and their relationships to other markets and products: credit default swaps; credit-linked notes; collateralised debt obligations (CDOs)

5.1.4 Understand the mechanisms for pricing credit derivatives and the relationships with asset swap prices

3.1.1 Credit Default Swaps (CDSs)

In a credit default swap (CDS), the party buying the credit protection makes a periodic payment (or pays an upfront fee) to the other party. In return, it receives an agreed compensation if there is a credit event relating to some third party or parties.

The following are considered to be credit events:

- **Default** – failure by the reference asset(s) to make specific debt or other reference payments.
- **Bankruptcy** – the reference asset files for, or is forced into, bankruptcy.
- **Debt restructuring** – the reference asset or its creditors initiate debt restructuring that will change the status or priority of the default swap buyer's asset. The details of what constitutes a restructuring is defined by the legal documentation.
- **Merger or demerger** – any change in the owner status or independence of the asset or company.
- **Certain government actions** – eg, a nationalisation, in the case of a bailout during a financial crisis.

The definition of a credit event is determined in the agreement made between the counterparties to the transaction at the time of the trade. If a credit event occurs, the seller makes a predetermined payment to the buyer (either via a cash payment or physical delivery of the defaulted asset, as agreed) and the swap terminates.

The agreement, which is usually based on the International Swaps and Derivatives Association (ISDA)'s master agreement (see section 6 of this chapter), will also clearly define the responsibilities and process for notification of a credit event; this is normally done by the buyer or its agent. It also includes the details of the settlement procedures. This is, in effect, an option, and the periodic payments are effectively an option premium.

There are three types of CDS:

- **Single-name or basic** – based on a specific asset as reference to the credit event. The reference asset is usually the asset or, at least, is the pricing guide to the obligation that can be delivered, if that is part of the swap agreement.
- **Basket** – based on the default of a basket of securities, such as a portfolio of several airline debts. The terms of this type of CDS could be based on the first to default, or any number within the basket, to trigger the credit event. The greater the number in the basket, the higher the initial premium, given the wider insurance provided.

- **Index** – based on the movements of an index, either a debt-related or equity/market-based index, therefore, the buyer will most likely purchase protection if the underlying index falls below a certain level. This type of CDS is closely related to a total return swap.

Most CDSs are priced using the reduced-form pricing approach, in which the credit event process is modelled directly into the swap's price, based on the probability of the credit event occurring, called probability of default (PD). Popular models used for forecasting that a default will occur are similar in many ways to option pricing models. The most widely used measure of the probability is what is known as the default swap or asset swap spread, which is the premium being paid to investors over a reference rate to hold the asset (eg, SONIA). The advantage of this measure over model-driven forecasts are that it is directly observable. The ongoing premium payments made by the purchaser of the default swap are based on this spread and will most likely change on an ongoing basis over the duration of the swap.

Example

ABC Bank has a portfolio of airline leases and is concerned that higher fuel prices will hurt airline profits. It buys a basket CDS that is based on a portfolio of aircraft leases for five airlines from a hedge fund. The terms of the basket swap define a trigger credit event when the second of the airlines applies to restructure its leases. When this occurs, Bank ABC notifies the hedge fund of the trigger. ABC Bank receives the remaining payments due from all the leases; and the hedge fund now owns the leases and is directly exposed to the five airlines.

3.1.2 Credit Linked Notes (CLNs)

A credit-linked note (CLN) is a form of funded credit derivative. It is structured as a security with an embedded CDS, allowing the issuer to transfer a specific credit risk to credit investors. The issuer is not obligated to repay the debt if a specified event occurs – this eliminates the need for a third-party insurance provider. Under this structure, the coupon or price of the CLN is linked to the performance of a reference asset. It offers borrowers a hedge against credit risk and gives investors a higher yield on the note for accepting exposure to a specific credit event.

Example

A bank lends money to a company, and at the time it issues a CLN which is bought by investors. The interest rate on the CLN is determined by the credit risk of the company. The funds that the bank raises by issuing the CLN are invested in high-quality, low-risk bonds.

If the company remains solvent, the bank is obliged to pay the CLN in full. However, if the company goes bankrupt or is unable to repay the loan, the note holders/investors become the company's creditors and take on the original loan. The bank in turn gets compensated by the returns on less risky bond investments funded by issuing CLNs.

3.1.3 Credit Spread Options

In a credit spread option, a credit spread is first defined as the difference between the yield on a particular asset (eg, the yield on a particular bond issued by a company) and some agreed benchmark (eg, a swap rate or government Treasury bond yield for the same maturity as the bond).

A strike rate is then set for this spread. In the case of a put option, the option buyer then pays a premium upfront and receives any difference between the actual spread and the agreed strike if the spread rises above that strike.

The pay-off is based on whether the actual spot or market spread at the exercise date is over or under the spread on the reference security. The transaction may be either based on changes in a credit spread relative to a risk-free benchmark (eg, SONIA) or changes in the relative spread between two credit instruments.

Credit spread options may be structured as American or European options. They are designed to hedge against (for the buyer) or capitalise on (for the seller) changes in credit spreads (ie, differences in their respective yields). A reference security is selected and strike spread and maturity are set.

Example

Bank A lends cash to Company XYZ for five years and then wishes to protect against the credit risk of Company XYZ. Bank A purchases a credit spread put option, where the credit spread is defined as the difference between the yield on a particular bond issued by Company XYZ and the yield on a Treasury bond. If the spread rises above an agreed level (the strike), Bank A receives an agreed compensation from Bank B to offset the deterioration in its own asset (its loan to Company XYZ).

3.2 Credit Default Options and Collateralised Debt Obligations

A credit default option is an option to buy protection (payer option) or sell protection (receiver option) on a CDS based on a specific reference credit with a specific maturity. The option is usually a European-style option, meaning that it is exercisable only at one date in the future at a specific strike price defined as a coupon on the CDS.

Credit default options on single credits are extinguished upon default without any cash flows, other than the upfront premium paid by the buyer of the option. Therefore, buying a payer option does not provide protection against an actual default, but only against an increase in the credit spread (higher interest rate/lower price for that single credit). This may explain why these options are very illiquid and, therefore, less popular with investors. Another key feature is that their prices are usually based on very high implied volatilities. A put option that makes a pay-off if the issuer of a specified reference asset defaults is called a default option.

Collateralised debt obligations (CDOs) are a type of structured asset-backed security (ABS) whose value and payments are derived from a portfolio of fixed-income underlying assets. CDO securities are split into different risk classes, or tranches, where senior tranches are considered the safest securities. The interest and principal payments are made based on seniority; therefore, the junior tranches pay a higher

coupon payment (and interest rate) and are quoted at lower prices to compensate for their higher default risk.

CDOs vary in structure and underlying assets, but the basic principle is the same. A CDO is a type of ABS. To create a CDO, a corporate entity is constructed to hold assets as collateral and to sell the packages of cash flows to investors.

An example of a CDO is a special purpose entity (SPE, more commonly referred to as a special purpose vehicle or SPV in European markets), which acquires a portfolio of underlying assets. Common examples of the types of these underlying assets include mortgage-backed securities, commercial real estate bonds and/or corporate loans. The SPE then issues bonds (CDOs) with different tranches, and the proceeds are used to purchase the portfolio of underlying assets. The senior CDOs, since they pay a higher price, are paid from the cash flows from the underlying assets before the junior securities and equity securities. Losses are first borne by the equity securities, next by the junior securities, and finally by the senior securities.

The risk and return for a CDO investor depends directly on how the CDO and its tranches are defined, and only indirectly on the performance of the underlying assets. In particular, the investment depends on the assumptions and methods used to define the risk and return of the tranches. CDOs, like all other ABSs, allow the originators of the underlying assets to pass credit risk to another institution or to individual investors. Thus, investors must understand how the risk for CDOs is calculated. The issuer of the CDO, typically an investment bank, earns a commission at time of issue and earns management fees during the life of the CDO.

A few analysts and investors, such as Warren Buffett[1] and Raghuram Rajan[2], have expressed concern that CDOs, other ABSs and other derivatives spread risk and uncertainty about the value of the underlying assets more widely, rather than reducing risk through diversification. The onset of the global financial crisis gave substantial support to this point of view[3]. In fact, before the credit crunch, many large credit rating agencies failed to adequately account for these large risks (this can be seen in the case of the nationwide collapse of housing values) when rating CDOs and other ABSs.

A collateralised bond obligation (CBO) is a derivative security that creates an investment grade bond from a pool of junk bonds (high-risk). These junk bonds are typically not investment grade, but, because a CBO includes a pool of several types of credit-quality bonds together, they offer enough diversification to be considered investment grade.

In other words, a CBO is a type of ABS that is composed of the interest/payments from junk bonds. Issuers of CBOs package and sell their cash flow from bonds they own to investors in order to reduce their default risk. Returns on CBOs are considered to be a lower risk than the individual bonds backing them. This is based on the view that it is unlikely that all or even most of the junk bonds will default. They are similar in structure to a collateralised mortgage obligation (CMO), but different in that CBOs represent different levels of credit risk and underlying assets, not different maturities.

1 Warren Buffet on Derivatives: http://www.fintools.com/docs/Warren%20Buffet%20on%20Derivatives.pdf
2 Raghuram Rajan analyses subprime crisis: https://mostlyeconomics.wordpress.com/2008/01/22/raghu-rajan-analyses-subprime-crisis/
3 Aubin, Dena (2008-04-09). 'CDO deals resurface but down 90 pct in Q1-report'. Reuters

4. Over-the-Counter (OTC) Options

An option is defined as a contract whereby one party has the right to complete a transaction in the future (at a previously agreed amount, date and price) if they so choose, but not obliged to do so. This party is known as the buyer of the option, or option holder. The counterparty, the option seller or writer, has no choice; therefore, they must complete the transaction if the first party wishes, but they cannot do so otherwise.

For the buyer, an option is, therefore, similar to a forward deal, with the difference that they can subsequently decide whether or not to exercise or complete the transaction. For the seller, it is similar to a forward deal with the difference that they do not know whether or not they will be required to fulfil their obligations. Clearly, the contract will be delivered only if it is advantageous to the option buyer. In return for this flexibility awarded to the option buyer, the buyer must pay an upfront premium to compensate the option seller for the latter's additional risk. As with other derivative contracts, such as forwards, options can be used to hedge an existing position or future commitment, as well as for speculation.

4.1 OTC Options Products

Learning Objective

5.1.5 Know the common OTC option products and features: European, American, Asian; barrier products; lookbacks and variants

5.1.6 Know the basic requirements of, and process for, premium payment: when paid; credit exposure; collateral process

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The three most popular exercise styles of options available are:

- European
- American, and
- Bermudan.

A European option is one where the holder can exercise it only on its expiry date. In the case of a three-month option, the option holder can exercise it (whether it is a put or a call) only on its pre-determined expiration date.

An American option allows its holder to exercise it at any time between the purchase date and its expiration date. Given this flexibility, the premium is normally higher for American options than for European options, if all other specifications of the option are the same. European and American options are both available in all markets.

Bermudan options (also known as mid-Atlantic or pseudo-American style options) are in between European and American options since they can be exercised on any specified dates between the original purchase of the option and its expiry. With both American and Bermudan options, it is possible for the option to allow for partial exercise on a number of occasions within the total amount of the option.

Delivery for all three of these types of option is in the form of physical delivery, meaning that in the case of a put, for example, the holder delivers the agreed amount of the underlying asset and receives the pre-agreed price (the option's strike price) on the exercise date. The terms such as 'European', 'American' and 'Bermudan' are technical, not geographical.

Options can also be cash settled; the type of settlement being agreed on the trade date.

There are also several more exotic OTC option structures:

- An **Asian** option (or average rate or average price option) is a cash-settled OTC option that pays the difference between the average rate of the underlying asset's price (calculated on predetermined fixings of an agreed reference rate) and a predetermined strike rate. The volatility of an averaged rate is lower than the volatility of the rates from which the average is calculated, and so Asian options are cheaper than standard European options.
- An **average strike option** is one whose strike price is set at the expiration date to be the average rate of the underlying over the life of the option. This is compared with its final value at expiry. The option can be exercised for physical delivery, or cash settled against the underlying price at maturity.
- As with an average rate option, average strike options are cheaper than standard European options.
- A **cliquet** or **ratchet option** is a series of ATM options, with periodic settlement, resetting the strike value to the price level at that time. The option locks in the difference between the old and new strike and pays it out as profit. The profit can be accumulated until final maturity or paid out at each reset date.
- A **lookback option** is a call or put option whose strike price is not determined until the option is exercised. At the time of exercise, the holder can exercise the option at any underlying price that has occurred during the option's life. In the case of a call, the buyer will choose the lowest price, and, in the case of a put, the buyer will choose the highest price. The premium on such options tends to be high, since they give the buyer great flexibility, and the writer has to take on a lot of risk.
- A **barrier option** is one whose existence/pay out depends on whether or not the price of its underlying asset crosses a pre-determined level (known as the barrier price) during the option's life. There are two main types of barrier options:
  - **Knock-in options** are not activated when agreed, but come into existence when the underlying asset's price crosses the barrier price.
  - **Knock-out options** are ones that exist when agreed, but no longer exist when the underlying asset's price crosses the barrier price.

Barrier options are sold as both calls and puts, like other options, and they have specific expiration dates. One of the attractions of these types of option is that they are usually cheaper to buy, as the introduction of the barrier increases the risk that the option will no longer exist.

- **Down and in, is a knock-in type of option** that is activated when the asset's price falls to, or below, the pre-determined level.
- **Down and out, is a knock-out type of option** that is cancelled when the asset's price falls to, or below, the pre-determined level.
- **Up and in, is a knock-in type of option** that is activated when the asset's price rises to, or above, the pre-determined level.
- **Up and out, is a knock-out type of option** that is cancelled when the asset's price rises to, or above, the pre-determined level.

The two most widely used and accepted models for option pricing are the Black-Scholes and binomial models. The key factors that both use in calculating an option's premium are:

- strike price
- underlying asset's price
- time to expiration
- underlying asset's volatility or implied volatility, and
- risk-free interest rate.

An option's premium rises:

- as its time until expiration increases
- as the volatility of the underlying asset rises, or
- the greater its IV (ie, for calls: the lower the strike price versus the asset's current market price and for puts: the higher the strike price versus the asset's current market price).

The following, known as the Greeks, are measures of the changes in an option's premium over its life:

- **Delta** is the ratio comparing the change in the price of the underlying asset to the corresponding change in the option's price or value. It is sometimes referred to as the hedge ratio. The closer an option is to being ITM, the closer delta is to one. Delta has a range of zero to one and reflects the change in value of the option for a given change in the value of the underlying. Note that while delta for calls is positive, it is negative for puts.

> **Example**
>
> A call on BP shares has a delta of 0.6: if BP shares fall by 50p in a trading day, the corresponding call will lose 30p from its premium/value, owing to the fall in the underlying shares.

> **Example**
>
> A EUR put/USD call with a delta of –0.3 will see its value rise as the EUR falls. Therefore, if EUR/USD falls by 0.5% in a day, the put's value will rise by 0.15% due to the movement in the spot rate.

- **Gamma** is the rate of change for delta with respect to the underlying asset's price. Mathematically, gamma is the first derivative of delta and is used when trying to gauge the price of an option relative to the amount, by which it is ITM or OTM. When an option being measured is deep ITM or OTM, gamma is small. When the option is near-the-money, gamma is largest. Gamma is most extreme for short-dated (those close to expiration), near-the-money options. Gamma reflects the [change in delta of option position]/[change in the value of the underlying].
- **Vega** is the change in an option's value for a 1% change in implied volatility. It is positive for both long calls and put positions. It is also greatest for longer and ATM options.
- **Theta** is a measure of the rate of decline in the value of an option due to the passage of time. Theta can also be referred to as a measure of the time decay on the value of an option. If everything is held constant, the option will lose value as time moves closer to the maturity of the option. The measure

of theta quantifies the risk that time imposes on options, as options are only exercisable for a certain period of time.

- **Rho** is an estimate of the sensitivity of the option to changes in interest rates. It normally is the smallest of the 'Greek' measures.

For more on this subject, see chapter 4, sections 4.3 and 4.4.

A major drawback of the Black-Scholes model is that it is based on the assumption that the volatility of the underlying asset is a constant input into the option's price. But in times of high volatility, and for certain types of assets (particularly financial assets) and strike prices, those trading options observed that this assumption that implied volatility is constant does not hold true.

Those pricing options observed that there is a one-to-one relationship between its implied volatility and the option's price. In many cases options with strikes prices that are very far OTM or ITM appear to have higher implied volatilities, since their market prices were higher than expected, if the asset's implied volatility remained constant. The result is that an option's implied volatility is dependent on its strike price and is therefore not constant, but forms what is called the volatility smile or volatility skew.

The Stochastic Alpha, Beta, Rho (SABR) model is a volatility model which is based on the premise that the asset's price and volatility are correlated. The name refers to the parameters of the model. The SABR model is widely used by financial options traders, especially those in the interest rate derivative markets.

Volatility smiles are implied volatility patterns that arise in pricing financial options. In particular, for a given expiration, options whose strike price differs substantially from the underlying asset's price command higher prices (and thus implied volatilities) than what is suggested by standard option pricing models. These options are said to be either deep ITM or deep OTM and the SABR model is currently considered one of the best pricing models for markets where this pattern occurs.

While OTC options lack the central clearing house and settlement/payment process that exchange-traded options have, the market does have a standard procedure for premium payments. The general rule is that the buyer will pay the premium on either the next business day or T+2 at the latest (the latter being the general rule for OTC FX options).

Since the sole credit risk exists for the option holder/buyer, in certain cases, banks/brokers who have purchased options from clients may require collateral payments as the option moves closer ITM (ie, its value increases) as exercise becomes more likely. An accepted benchmark for these payments is related to the option's delta.

4.1.1 Flexible Exchange (FLEX) Options

Learning Objective

5.1.7 Understand the basic concepts and fundamental characteristics of flex options: how they differ from standard exchange-traded options; how they differ from OTC options

FLexible EXchange (FLEX) options combine the benefits of customisation of an OTC product with the advantages of being listed on an exchange.

FLEX options allow investors to customise key contract terms, including expiration date, exercise style, and exercise price, and to take advantage of expanded position limits.

FLEX options differ from standard ETD options since they offer a wide degree of flexibility. FLEX options, unlike ETD options, do not have standardised strike prices, expiration dates or contract sizes.

While they provide the same degree of choice, FLEX options do not have the same credit/counterparty risk associated with other OTC options. Since they are listed on an exchange, they have the same clearing house protection as any other ETD product.

4.2 Structured Products

Learning Objective

5.1.8 Understand how structured products utilise embedded derivatives to achieve a risk/return profile: convertible bonds; index-linked notes; capital protected products; callable/puttable bonds

Structured products are securities that have cash flows which are contingent on other securities, and frequently have embedded derivatives, that collectively determine the risk and return of the investment. The multi-faceted nature of structured products, typically including aspects of both primary securities (such as stocks and bonds) and derivatives, usually makes them more complex than plain 'vanilla' (meaning straightforward) products, such as futures and swaps. Major banks (often referred to as the 'sell side') will usually hire 'structurers', whose job it is to build these products, while consulting with clients (the 'buy side') as to their specific investment requirements. This will better tailor the final risk-reward profile with the investment mandates, and risk appetites, of customers.

4.2.1 Callable and Puttable Bonds

Options are often included in the structure of a product, or as part of a vast range of underlying instruments, including bonds. While a straightforward (or 'vanilla') bond option is a call or put on a particular bond, an embedded option is often included as part of a bond.

While a fund manager or bond dealer might use a call or a put to take a view on a bond, in the same way as they might by buying or selling a bond in the cash market, for example, the same manager or dealer might decide to buy a puttable bond – this is a bond with a put option embedded in it. The put can be exercised by the holder of the bond, under certain circumstances defined for that particular bond, on

certain dates, and at a certain strike price (often lower than par). This, in effect, allows the holder to insist on early redemption of the bond, which it might do if interest rates rise so that it can buy a new bond at a higher yield.

A callable bond is a bond with a call option embedded in it. The call can be exercised by the issuer of the bond. Certain circumstances defined for that particular bond – for example on certain dates (such as coupon dates) and at a certain strike price (often higher than par) – allow the issuer to buy back the bond. In effect, this allows the issuer to redeem the bond early, which it might do if interest rates fall so that it can issue a new bond instead, to finance itself more cheaply.

4.2.2 Convertible Bonds

A convertible bond is a bond with an option exercisable by the bondholder to convert the bond into something else, usually equity in the issuing company. Again, there will be conditions attached: certain dates on which this will be exercisable and a fixed number of shares for a given face value of the bond. The holder will exercise this right if the shares become sufficiently valuable. By issuing a convertible bond, a company can reduce the yield required by investors, since the bond will include an option or warrant that will allow the bondholders to convert the bond into the issuing company's shares at a predefined price. It also avoids having to issue new shares and diluting current shareholders' stake in the company.

Example

ABC plc requires £15m in ten-year funding for an expansion project. It has decided to raise this amount by issuing a convertible bond.

Today, ABC's shares are trading at 105p, and ten-year bond yields on corporate bonds of similar credit standing are 2.5% (which is 95 bps above the ten-year UK government bond).

ABC's convertible bond will have a 2.35% yield, along with a conversion clause that allows bondholders to convert this bond into the equivalent amount of ABC after five years.

The net result is that the company is able to save 15 bps on its interest payments, whilst bondholders are able to profit if the company is successful and its share price rises.

When valuing convertible callable and puttable bonds, you must remember that you must value both the bond itself and its embedded option or warrant. In most cases, a put feature allows the bondholder to exchange the bond for the company's shares or demand repayment before its maturity, while a call feature gives the borrower/issuer the optional right to redeem/repay the bond early, on a given date at a given price.

4.2.3 Index-Linked Notes

An index-linked note is an instrument whose return is determined by a specific index. This index could be an equity index (which can be based on the performance of a single share), a basket of shares, a market index (eg, the FTSE 100, S&P 500) or, for a bond/debt instrument, an inflation index (eg, CPI or RPI).

Example

A high-net worth individual would like to diversify their portfolio by investing $5m in a structured product, preferably with some capital protection and, upside participation if US equity markets rise over the next few years. The bank's structured products desk offers an equity-index-linked note.

The structure entails that the individual invest $4m in an AAA five-year government bond with an annual coupon payment of 5%. The remaining $1m is used to buy call options on the S&P 500.

Since the coupon rate of the bond ensures the $4m investment will become approximately $5m when the bond expires, the principal is 'guaranteed' their initial capital at the expiry of the structure. As with any bond, the strength of this guarantee will depend on the credit rating of the bond issuer, which in this case is the highest possible. The call option pay out is contingent on the S&P 500's performance, and the precise strike price and size. It will only be exercised at expiry if the S&P 500 rises, since it will have intrinsic value at that point. This potential additional cash flow will be added to the return from the bonds. Note, if the S&P 500 declines relative to the strike price, the call options will expire worthless and the client will only receive their initial capital back.

4.2.4 Capital Protected Products

A capital protected product is generally associated with the purchase and holding of shares or other financial securities, such as single warrants. This type of financial product allows an investor to borrow money or obtain credit to purchase shares or other types of financial securities. These shares and financial securities purchased then become security for the loan. Under the terms of the financial product, if the shares or financial securities fall in value below their purchase price, the purchaser can transfer the shares or securities back (a put option), or surrender them to the lender to meet all outstanding obligations under the loan (a limited recourse loan). Therefore, the purchaser/investor is guaranteed a minimum price/value for the shares/securities that are part of the capital protected product. In effect, it is a loan with an embedded put option for the financed securities. Note that investors are exposed to the creditworthiness of the issuer of the product, so if the issuer goes bankrupt the investor will lose their capital invested.

Capital protected loans, generally, have higher interest rates and/or additional fees. Capital protected borrowings include arrangements where an investor uses shares or other financial securities as security for borrowing money or obtaining credit, and those shares or other financial securities are protected from a fall in their value.

5. Documentation and Collateral

5.1 Master Agreements

Learning Objective

5.1.9 Know the main ISDA documents supporting OTC derivative activities: master agreements; credit support annex documentation; confirmations; ISDA protocols

The recognition by swap participants of the need for a means to reduce potential disagreements by developing standardised documentation was instrumental in the International Swaps and Derivatives Association (ISDA) becoming chartered in 1985.

Generally, the aims of the ISDA documentation are to:

- provide standard market terms to encourage growth and confidence in OTC products
- minimise the administration needed to support transactions, and
- help to facilitate cross-border trading.

A master agreement provides a single umbrella framework within which all relevant OTC deals between two parties can be transacted. A key advantage of this is that all individual transactions can be brought together to form part of the master agreement. This means that, in the event of a counterparty becoming insolvent or going into default, it is possible to close out all transactions covered by the master agreement rather than relying on cross-default or other provisions to close out transactions individually.

Once the master agreement is in place, each deal still needs to be confirmed in the usual way. It is not necessary to repeat the legal terms and conditions when confirming each transaction, as these have already been covered in the master agreement. Most importantly, the master agreement allows for all the deals to be netted in the event of a default, rather than considered separately. This is important to provide protection for the non-defaulting party against selective default and termination.

The master agreement is negotiated between the two parties on the basis of a standard printed contract and is legally binding once signed by both parties. It provides mutual protection for both parties. No specific references are made in the agreement to individual transaction terms. To enable a degree of flexibility, there is a schedule to the master agreement to allow for specific provisions to be determined by the counterparties.

The most important of the issues dealt with by the master agreement are:

- **Termination events** – generally external circumstances outside the control of the parties, eg, changes in tax law or illegality, which can allow deals to be terminated early by one of the parties affected
- **Events of default** – events which are generally the fault of one of the two parties, eg, failing to pay an amount due or bankruptcy, which can allow all outstanding deals to be terminated early by the other party

- **Netting** (important for credit risk and for capital adequacy purposes). The master agreement covers two types of netting:
  - **payment netting** (netting of amounts due in the same currency on the same day in the ordinary course of business), and
  - **close-out netting** (netting of all amounts due between the parties upon early termination by valuing all transactions and converting amounts due to a single termination currency for settlement). This is a key part of the documentation. When negotiating documentation with a counterparty, it is vital to ensure that close-out netting will, in fact, be supported by the courts. In some legal jurisdictions, this is not necessarily the case. Banks must, therefore, seek legal opinions from all relevant jurisdictions when negotiating.

The specific terms of each deal are set out in a supplement to the master agreement, called a confirmation. Each confirmation refers to the master agreement and is governed by the terms agreed between the parties in that contract. This enables the confirmation to be considerably shorter than it otherwise would be. If there is a conflict between something contained in the confirmation and the master agreement, the confirmation takes precedence for that deal.

Market practitioners have also developed 'master confirmations', a template-style mezzanine document which incorporates standard terms for specific types of transaction (eg, equity options), meaning that the confirmation for an individual transaction can be a very short document covering only the variable items (eg, strike price, premium and valuation date).

The increased use of master confirmations using standardised transaction terms allows transactions to be electronically matched through intermediaries, such as the Depositary Trust Clearing Corporation (DTCC) or CCPs. In addition, in the wake of the global financial crisis of 2007–08 and the corresponding creation of regulatory regimes for OTC products in the years since, there is significant pressure on firms to both report trades to central repositories in a timely fashion as well as clear the trades on CCPs in order to minimise credit risk.

If a master agreement has not yet been agreed and signed between the parties, the general terms of the published contract (ie, without any variations as may be agreed in the schedule) apply. This will generally protect both parties as to how their rights and obligations will be legally interpreted. There is some risk, however, that in the event of default this interpretation may depend on the legal jurisdiction of each party. It is, therefore, best practice to have the master agreement negotiated and signed between the parties as quickly as possible.

5.1.1 ISDA Protocols

A protocol is the term used to describe the set of documents, such as master agreements, that are widely used by market participants and that define the procedures associated with specific financial transactions and the responsibilities of each counterparty.

They are useful in that these agreements set out all the legal requirements and are regularly updated when necessary. For example, the ISDA set out several protocols after the euro was introduced, to ensure an easy transition for those existing transactions such as currency swaps that were originally denominated in euro members' old national currencies, so that euro-based settlement could take place.

These protocols cover a wide range of transactions. The use of these is not restricted to the ISDA – the Federal Reserve and China Securities Regulatory Commission (CSRC) have also issued them, when required, for example.

There are protocols that define the most basic aspects, such as the particular nature of a swap. The specific definition of each type of swap can be found earlier throughout this chapter.

5.2 OTC Collateral Processes

Learning Objective

5.1.10 Understand the potential impact of credit exposures on OTC positions: nature of OTC contracts; mark-to-market and potential exposures; term of OTC derivatives; acceptable forms of collateral (certainty and currency of asset); the margin/collateral process (mark-to-market, hurdle, minimum cashflow, parties involved)

Collateral is something of value that is held against the risk of default by a counterparty. It is important that the collateral is an asset that is easy to liquidate in the case of default. In this respect, it is the OTC version of the margin process that participants who trade in exchange-traded contracts are subject to. The main types of collateral that are accepted include cash, bank guarantees, high quality CDs, government bonds and negotiable (ie, tradeable) securities. However, some major exchanges only accept cash or high-grade government bonds.

Collateral management is the process that allows market participants to reduce the counterparty credit exposure that arises from longer-maturity OTC derivative contracts, such as swaps and options.

If a bank considers that the credit risk incurred by trading with a particular counterparty is too great, or has already reached the credit limit in place, it may ask for collateral from the counterparty in order to continue trading with it (this is similar to when an exchange performs a 'margin call' on a participant, requiring an increase in their maintenance margin). Cover for initial margin can also be provided using collateral rather than cash (see chapter 6, section 4).

A bank ensures that it has the most up-to-date and accurate measure of its credit exposure to a counterparty by ensuring that its operations area processes all deal tickets and term sheets (a non-binding agreement which sets out the basic terms and conditions under which an investment or trade will be made; a term sheet is usually used as a template to develop a more detailed legal document) on a timely basis.

The bank assesses the size of the risk it is taking in making the transaction and requires that the counterparty places collateral to that value with it, either at the same time as dealing or beforehand. Typically, the arrangement will allow for the bank to ask for more collateral subsequently (ie, the delivery amount) if the value of the existing trade or collateral falls during the life of the deal. It might also return some collateral if the value of either the collateral or the trade rises (ie, the return amount).

The delivery amount normally has a pre-agreed minimum, the minimum transfer amount. This is useful in reducing the cost and number of transfer payments between the bank and its counterparty during the contract's existence.

The bank ensures that the amount of collateral reflects both the current risk associated with the counterparty's possible default to the transaction, and the current value of the collateral it holds by having its operations area conduct regular marking to market (MTM) valuations of both the transaction and the collateral it currently holds. This enables the bank to manage its exposure to the counterparty, since the counterparty's potential loss is the cost that the bank would incur if the counterparty defaulted and it had to close out the transaction in the market. This will ensure that, at any given time, the bank has the amount of risk collateral required, which is referred to as the threshold amount for the transaction.

If either the risk increases and/or the value of the collateral falls, the counterparty will be required to deposit more collateral with the bank. As an extra insurance, most banks will require more collateral than the current risk requires to ensure that it is fully covered at all times. This practice is similar to the amount of margin that exchanges require. For example, suppose that a bank transacts a straightforward interest rate swap with a counterparty, whereby the bank is paying fixed and receiving floating. At the time of the transaction, there is no immediate credit risk. This is the same as saying that the MTM value of the swap at that moment (ie, the threshold amount) is zero. Ignoring transaction and legal costs, if the counterparty were to go bankrupt immediately, the bank could instantly replace the transaction by an identical transaction with another counterparty.

However, if the market moves so that swap fixed interest rates rise slightly, the bank could only replace the transaction at a slight loss if the counterparty defaulted. At this point, if the bank has an arrangement in place to do so, it can ask the counterparty to transfer some collateral to it – (known as the delivery amount). Depending on the agreement with the counterparty, this will be a specified percentage of the potential loss, the maximum percentage being 100% of the loss.

Any collateral called by a bank will normally be held in a third-party account and not the company's own account. This is to protect the depositing counterparty's assets from being used to meet any liabilities of the holding bank (eg, in the case of bankruptcy). If the counterparty then goes bankrupt, the bank can try to use this collateral to offset the loss. In practice, the extent to which it can do so depends on the documentation governing the transaction and the collateral (known as dispute resolution clauses), the law governing each, and the legal jurisdiction of each of the two parties. The bank is nevertheless generally in a stronger position than it would be without the collateral.

Collateral of this nature is often called margin, and asking for collateral, or more collateral, is making a margin call. It may be that the bank subtracts or assigns a reduced value to the collateral's market value, known as a 'haircut'. The size of the haircut reflects the bank's perceived risk of holding the specific asset. In other words, it is applied to protect against any potential movements in the market and potential changes in the collateral's value which might arise before there is time for extra collateral to be transferred from the counterparty. The size of this haircut is directly related to the minimum threshold amount and the price volatility of the collateral.

Depending on the transaction's agreement, collateral or a margin might be called for by either party (ie, by whichever party is currently in MTM profit from whichever party is currently in loss) or by the higher credit-rated party. The agreement may be that margin calls can be made daily, weekly or monthly, or only at the time of an event such as an interest settlement.

The quality of collateral varies. The best is cash in the currency of the risk, which will not vary in value. The next best is generally a government security in that currency – while its value will vary with the market (thereby requiring margin calls to be made), there is generally no significant credit risk.

It is important to note that it is the bank's/broker's decision as to what types of securities are acceptable as collateral. Their relationship with the client and the specific regulatory rules they are subject to are major factors. Also, the types of acceptable collateral vary among different clearing houses. Generally speaking, lower-quality assets (eg, junk bonds and illiquid shares/equities) are not acceptable forms of collateral. The issues to be considered regarding the quality of collateral are the volatility in its value, its creditworthiness, and its liquidity (ie, the ease with which it can be sold if necessary in the event of a counterparty default). Even if the original trade has not moved but market conditions change and the estimated value of the pledged collateral declines, this could lead to additional margin calls.

Swaps are sometimes transacted on the basis of mutual collateralisation. This involves both counterparties depositing collateral at the start of the transaction. A party is then obliged to add further collateral subsequently, either because of an increasing loss, or because its credit rating falls. There must be a benchmark pricing source agreed for marking the transaction to market. For convenience, this benchmark might be an exchange-traded price or accepted market published price, such as SONIA. For example, a swap involving an equity index might use the closing futures market price for the index.

In summary, management of collateral requires that the bank and/or the bank's custodian:

- marks the transaction to market on a regular basis
- monitors the value of the collateral (if necessary, converted to the same currency as the MTM value of the transaction)
- makes margin calls and returns as appropriate
- checks that margin calls have been received
- makes transfers to the counterparty in response to any margin calls it makes against the bank, and
- pays interest on any cash collateral according to whatever has been agreed.

6. Market Platforms and Trade Processing

The derivatives markets have seen a significant increase in both trading volumes and the number of different types of products traded. One of the key developments that has helped volumes increase, while limiting costs and making deal processing more efficient, is electronic processing. This covers a wide range of electronic trading platforms as well as a number of electronic processing and clearing services.

Some electronic processing platforms have direct links to a number of trading platforms, which allows trade execution direct feeds to straight-through processing (STP) tools. Regulators are greatly concerned about the operational as well as the legal, regulatory and financial risks posed by the growing use and complexity of OTC derivatives. This was highlighted during the global financial crisis and was subsequently focused upon with great interest by regulators. There is, therefore, a great deal of scope to apply superior electronic processing and confirmation processes to improve the post- trade and downstream processes attached to OTC derivative instruments.

For example, the very large global custodian banks whose clients include both traditional and hedge fund managers are institutions that are very exposed to operational risks in this field. Therefore, they are now leading efforts to improve the processing, servicing and valuation of OTC derivatives of all kinds. They, together with investment banks, have embarked upon building derivative-processing platforms.

Many specialist trade confirmation services, such as the DTCC Deriv/SERV have been adopted throughout the industry.

The following are brief descriptions of the most well-known electronic services that are currently available in the derivatives market.

6.1 MarkitSERV

MarkitSERV is a company that combines IHS Markit's (MarkitWire) and the DTCC's electronic trade confirmation and workflow platforms to provide a single gateway for OTC derivative trade processing. The strategic partnership was first announced in 2008 and received regulatory approval in 2009 from the UK's then regulator, the Financial Services Authority (FSA), and the US Department of Justice.

Jointly owned by DTCC and IHS Markit, MarkitSERV combines the DTCC Deriv/SERV and MarkitWire trade confirmation platforms to cover all major asset classes including credit, interest rate, equity, FX non-deliverable forwards (NDFs) and commodity derivatives. It connects multiple market participants and execution venues to downstream processing platforms such as DTCC's trade information warehouse (TIW) for CDSs. It also connects to various central counterparty platforms for interest rate swaps and CDSs, in collaboration with the DTCC TIW.

MarkitSERV also connects dealers and their clients to CCPs, trade repositories and third-party administrators and buy-side institutions. MarkitSERV's main aim is to increase greater co-operation within the industry over infrastructure to accelerate the adoption of electronic trade confirmation and reduce risk in the OTC derivative markets.

6.2 SwapClear

SwapClear was launched by LCH Group in 1999 to provide clearing for basic interest rate swaps and was the first service designed by LCH Group to meet the needs of the OTC derivatives market. In clearing swaps, LCH becomes the central counterparty to each half of the OTC trade.

In effect, SwapClear provides the clearing house function to the OTC derivatives markets.

SwapClear is not an STP system. Before a swap is registered with SwapClear, the bank must have already confirmed and processed the swap with its original counterparty. The benefits of the system are realised after the swap has been received, since SwapClear provides an automated facility for MTM swaps and collateral, and allows for net payment of margin requirements per currency.

To be a SwapClear clearing member (SCM), an organisation must:

- be an LCH Group shareholder
- contribute to LCH Group's default fund

- meet minimum resource requirements
- make regular financial reports to LCH Group, and
- maintain adequate systems and records, and employ operations staff with adequate expertise in swaps.

To be a SwapClear dealer, other than being a clearing member, an organisation must:

- be a principal in wholesale market transactions
- be a SWIFT user, and
- have (or be a fully guaranteed subsidiary of an entity that has) a credit rating of BBB or better.

Both counterparties to a swap transaction must be SwapClear dealers for the transaction to be registered through SwapClear.

The benefits of SwapClear are:

- a reduction in credit risk through effective multilateral netting and margining of exposures, freeing up bank credit lines for further business
- a reduction in regulatory capital requirements through the **Capital Requirements Directive (CRD)** Annex II exemption, removing the need for banks to calculate counterparty risk requirements
- initial margin offsets between swaps and interest rate and government bond futures and options positions traded on Euronext
- a reduction of operational risk through the centralisation and standardisation of processes providing post-trade STP, and
- a reduction in operational and administrative costs.

6.3 The Depository Trust & Clearing Corporation (DTCC)

The DTCC is currently the largest global securities processing service. It provides a matching service (Deriv/SERV) for OTC derivatives, which is used in post-trade processing. The service requires mainframe-to-mainframe connections between the DTCC and each firm. Deriv/SERV is a global service offering, focused on automating the entire life cycle of OTC derivatives. This includes front-office trade affirmation, automated confirmation and matching, payment processing, and a trade warehouse. The services offered includes the following:

- **Omgeo OASYS** – a screen affirmation platform that allows traders and front office staff to affirm credit derivative trades from multiple inter-dealer brokers (IDBs) at the point of trade. The platform allows immediate trade affirmation of brokered transactions. It also supports credit derivatives, including single-name and index CDSs, and tranched index swaps.
- **Omgeo Central Trade Manager (Omgeo CTM)** – provides a platform for the central matching of cross-border and domestic transactions, automating the trade confirmation process across several asset classes, such as equities, fixed income, repurchase agreements (repos), exchange-traded derivatives and synthetic equity swaps.
- **Payments** – Deriv/SERV provides payment matching and bilateral netting services, providing greater accuracy and STP.
- **Trade information warehouse (TIW)** – comprises a comprehensive database containing the most up-to-date record of each contract, as well as a processing component that standardises and automates downstream processing over a contract's life cycle.

In addition:

- The **DTCC**, through its subsidiaries, provides post-trade clearance, settlement, custody and information services for a wide range of cash market and derivatives equities.
- The **National Securities Clearing Corporation (NSCC)** subsidiary, which acts as a central counterparty, provides trade guarantees, netting and risk management services for equity and debt transactions from all US stock exchanges and markets.
- The **Depository Trust Company (DTC)** subsidiary has custody of, and provides asset servicing for, millions of securities issues of issuers from the US and over 60 other countries. The DTC serves as a major clearing house for institutional post-trade settlement.

Many market participants have designed direct links between their internal MIS systems to the DTCC to increase efficiency, reduce operational risk and provide better service for their clients.

6.4 NEX TriOptima

TriOptima is a financial software and service technology company that has developed products that help its users reduce the capital, credit, and operational costs, and centrally manage counterparty risk associated with their OTC derivative portfolios.

Its core services provide a wide range of OTC derivative portfolio management that range from the reduction swap inventory and counterparty risk to managing disputes and automatic margin management. Currently, TriOptima's core services meet current and anticipated regulatory regulations for OTC derivatives compression and reconciliation.

6.5 Financial Products Markup Language (FpML)

Financial products Markup Language (FpML) is a free open-source industry-standard protocol developed for the electronic dealing and processing of OTC derivatives communications. It is based on extensible markup language (XML), which is the standard metalanguage for describing data shared between software applications. The purpose of FpML is to automate the flow of information across the entire derivatives network, independently of the underlying software or hardware infrastructure supporting the activities related to these transactions.

FpML provides the standard data content and structure to exchange derivatives transactions electronically. While it is an open data standard, it is not an application nor an electronic dealing or processing service. It is the standard used by many of the services cited in the previous section, and also by most participants in the derivatives markets. In addition, organisations have developed their own proprietary versions of FpML for specific applications.

The following are the main products that are currently covered by FpML applications:

- **Interest rate derivatives** – interest rate swaps, swaptions, FRAs, caps and floors, inflation swaps, and bullet payments.
- **FX** – foreign exchange swaps, spots, forwards, and options.
- **Credit** – single-name CDSs, CDS indices and baskets.
- **Equity** – equity swaps, equity options, variance swaps, and total return swaps.

6.6 ICE Link

ICE Link (formerly known as T-Zero) is an electronic credit derivatives trade matching and processing services provider. It provides trade information and novation of credit derivative transactions on a T+0 basis, which meets industry targets set by the ISDA Board Oversight Committee (IBOC).

6.7 SWIFTNet FpML

ISWIFT, the financial sector's co-operative payment system, has developed SWIFTNet FpML, which allows users to send and receive secure messages and OTC derivative trade confirmations and advice via their SWIFTNet system. This is a real-time matching and exception service for handling FX, money market and OTC derivative confirmations. Its main goal is to enhance the efficiency of the user's STP of OTC derivative contracts.

SWIFTNet FpML is accessible via SWIFT's secure IP network. It also provides a long-term archival service for all trades processed through the system, which will be held for one year after their maturity. FpML is widely recognised as the standard of choice among ISDA members for communicating information electronically. The service is geared to work with users' existing processing systems and is available to all SWIFT members.

Its key benefits are:

- reducing operational risk
- lowering costs
- ease of access via graphical user interface (GUI) and application programming interface (API)
- increasing STP, and
- reducing **settlement risk**.

6.8 EurexOTC Clear

EurexOTC Clear is a transaction management service for OTC swaps provided by the Eurex Group. Its goal is the reduction of counterparty risk, margin and collateral requirements, as well as the clearing for OTC interest rate swaps, FX and zero-coupon inflation swaps.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **What is a cap?**
   Answer reference: Section 2

2. **How do collars relate to caps and floors?**
   Answer reference: Section 2

3. **What is the benefit of using an asset swap spread to price a CDS over a modelled approach?**
   Answer reference: Section 3.1.1

4. **What is a credit linked note?**
   Answer reference: Section 3.1.2

5. **Describe a Bermudan option.**
   Answer reference: Section 4.1

6. **What is a puttable bond?**
   Answer reference: Section 4.2.1

7. **What is a Master Agreement?**
   Answer reference: Section 5.1

8. **How is collateral used?**
   Answer reference: Section 5.2

9. **Name the conditions for being a SwapClear clearing member.**
   Answer reference: Section 6.2

Chapter Six

Principles of Clearing and Margin

1. **Clearing** 177
2. **Prime Brokers** 184
3. **Margin** 188
4. **Collateral and Credit** 196

This syllabus area will provide approximately 14 of the 100 examination questions



1. Clearing

1.1 Clearing and Risk

Learning Objective

6.1.1 Understand the purpose of clearing and the function of novation: mutual offset system; principal to principal; broker's position

6.1.2 Understand the risks mitigated through the clearing process: settlement risk; counterparty risk

Clearing is the process by which derivatives trades are confirmed and registered. Registration is with a clearing house that 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 (such as LCH Group or ICE Clear Europe) 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.

As a member of a clearing house and exchange, clearing members must maintain an account in the clearing house's currency, which in turn minimises currency risk. Should there be any currency risk in the clearing process, this arises from the exchange rate movements between the member's home currency and that of the exchange's, for the amounts of their net daily margin payments.

This central counterparty (CCP) structure removes almost all counterparty risk (ie, 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 the close-out and delivery of futures contracts and the exercise and assignment of option contracts. In the rare case of default, the clearing house faces one day of market risk, due to the daily margin payments that all members must pay.

On the rare occasion that the margin payments do not cover the net position's loss, all clearing houses maintain a default fund, which is cash that is paid in by its members. To ensure the fund is sufficient, the clearing house runs a wide range of stress tests, so that the fund's size meets worst-case estimates of the market's volatility. Note that this fund only covers default by members directly to the clearing house.

One of the major advantages of having such a clearing system, therefore, is that it greatly reduces counterparty risk. The clearing house guarantees the financial performance of the contract and, provided the clearing house is backed by substantial financial resources, and is thus highly creditworthy, market users and investors can have a high degree of confidence in the system. Another advantage is that contracts become very easy to trade, with the clearing house making it easy to close out a trade by taking an equal and opposite position – since both long and short positions are novated to the clearing house as CCP, the previous position is effectively closed.

While not exactly traditional credit risk, Brexit has introduced some operational and regulatory risk for UK-based CCPs and clearing firms, as they lost their passporting rights for European Union (EU) clients. These firms have since been required to open EU-based units and apply for new authorisation, and not all formerly EU-passported firms have completed the process or chosen to do so.

Settlement risk – (ie, the risk that an expected payment of cash or a security will not be made on time or at all) – is another risk associated with the delivery/clearing process. The establishment of a netting system/agreement is an effective method of minimising this kind of risk.

One extension 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 another. Such an agreement exists between the CME and the Singapore Exchange (SGX) for a few of the contracts that are traded on both. These contracts include eurodollar, Nikkei 225 and Japanese government bond (JGB) contracts.

In a principal-to-principal system, such as that operated by ICE Clear Europe, the clearing house guarantees the performance of trades executed 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, provided the broker is an ICE Clear Europe member.

Major Exchanges	Clearing Houses
LME	LME Clear
LSE Derivatives (renamed CurveGlobal Markets)	EuroCCP, LCH Group, EMCF, x-clear
ICE Futures Europe	ICE Clear Europe
Eurex	Eurex Clearing and EurexOTC Clear
Euronext Derivatives	Euronext Clearing
CME Group (CBOT, CME and NYMEX)	CME Clearing

Major Exchanges	Clearing Houses
Nasdaq	Nasdaq Clearing
Mercado Español de Futuros Financieros (MEFF)	MEFF Clearing House
Singapore Exchange (SGX)	SGX-DC (exchange's clearing house)
Osaka Securities Exchange (OSE)	Japan Securities Clearing Corporation (JSCC)
B3#	Trades are cleared through the B3 clearing house
Dubai Mercantile Exchange (DME)	CME Clearing
NDCEX National Commodity & Derivatives Exchange ltd (India)	Trades are processed via the exchange's clearing house, physical delivery through its depository clearing system. Margin payments and cash settlement are via an approved clearing bank
South African Futures Exchange (Safex)	Exchange's clearing house
Shanghai Futures Exchange (SHFE)	Exchange's clearing house
Nairobi Securities Exchange Derivatives (NEXT)	NSE Clear
FMDQ Nigeria	FMDQ Clear ltd

Over the past decade, there has been a similar shift to establishing a central counterparty and a formal trade reporting procedure for over-the-counter (OTC) derivative contracts. The main reason for this is to provide greater stability in the market, by reducing counterparty credit risk and better risk management. The European Market Infrastructure Regulation (EMIR) is the regulatory legislation for this clearing and margin structure for the EU derivatives market.

Europe as a whole faces specific, ongoing challenges at present with Brexit; the EU initially implemented a commitment to avoid disruption in the cross-border derivatives market. Without this arrangement, EU customers would have been immediately cut off from UK-based market operators. This protection of so-called 'passporting' rights for UK firms offering financial services in the EU ended on 31 December 2020. UK-based firms, including clearing houses and exchanges, are now considered 'third-country' participants by the EU, on par with Singapore or the United States with previously automatic passporting rights withdrawn.

A result of this withdrawal is that clearing houses in the UK will need to decide whether to tell EU customers to shift derivatives positions worth billions of euros from London to the EU. An example of the seriousness with which the disruption to cross-border activity is being taken by regulators is that the London Stock Exchange's (LSE's) LCH unit, which typically clears over 90% of euro-denominated interest rate swaps, has secured a key mitigation from European Securities and Markets Authority (ESMA) and the Bank of England (BoE) to continue providing clearing services to all EU members until 30 June 2028. This is an example of the bilateral agreements that are being sought by major financial service providers, in the absence of passporting rights in the Brexit Withdrawal Agreement.

1.1.1 Mutual Offset

CME Group and the Singapore Exchange (SGX) allow common settlement or offset for four of the contracts that are traded on both exchanges. A wide range of contracts is included in this agreement such as the yen-denominated and USD-denominated Nikkei 225 future, E-mini FTSE China H50 Index and E-mini FTSE Emerging Index. Alongside this, the CME has a wide range of other exchange partners.

Here is a brief summary of this global partnership network:

Exchange	Summary
Bursa Malaysia Derivatives Berhad (BMD)	Commercial agreement based on cross investment, settlement price licensing of BMD crude palm oil futures (FCPO) and listing of BMD contracts on CME Globex.
Dubai Mercantile Exchange	Joint venture with Dubai Holdings and the Oman Investment Fund (OIF) establishing the Middle East's premier commodities exchange.
Japan Exchange Group	Cross-listing arrangement for benchmark indices for US and Japanese equities, for example Nikkei futures on CME.
JSE (formerly Johannesburg Stock Exchange) – South Africa	Licensing agreement of various CME Group exchanges' settlement prices, including corn, platinum, gold and crude oil futures.
Korea Exchange (KRX) – Seoul	Market linkage agreement to list Kospi 200 futures and USD/KRW FX futures on CME Globex during KRX night-time operating hours.
MexDer – Mexico	Commercial agreement for CME repository services to report MexDer TIIE interest rate swap transactions.
Minneapolis Grain Exchange (MGEX)	Commercial agreement to list MGEX products on CME Globex.
Multi Commodity Exchange of India ltd (MCX) – Mumbai	Licensing agreement for CME Group's settlement prices on WTI oil and natural gas.

1.2 The Structure of the Clearing System

Learning Objective

6.1.3 Understand the role played by the clearing house in the clearing process: margin process; clearing house relationship with members in settlement; transfer of payments

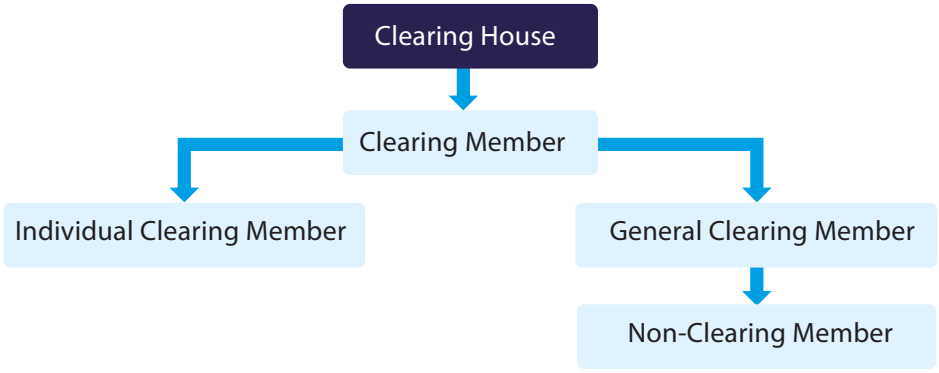
6.1.4 Understand the relationship between clearing members and non-clearing members: clearing versus non-clearing member; use of general clearing members to clear trades

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The different tiers that make up the clearing system at the exchange level are the clearing house, the clearing members (of which, as we saw in section 5 of chapter 1, there are two types: general and individual) and the non-clearing members.

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 CME's clearing house is a division of the exchange itself. ICE Clear Europe's parent is Intercontinental Exchange Holdings.

The tiers are:



To illustrate its different tiers and the clearing process, it is useful to look at a typical trade and the individual steps involved. The futures example that follows highlights the systems and procedures that are used when a trade initiates on ICE Europe, for which ICE Clear Europe acts as the clearing house.

As mentioned in chapter 3, section 3, the first part of the clearing process is trade reporting or registration. For most exchanges, its electronic trading system automatically reports a trade, once it happens, to the universal clearing platform (UCP). Once this takes place, the clearing process begins.

Example

Step 1 – The trade
Client X is a client of ABC ltd, a member firm of ICE Futures. The client places a market order. ABC ltd will act as broker, executing the trade on the ICE Futures exchange. ABC ltd is not a member of ICE Clear Europe.

Any trade executed needs to be reported to and registered with the clearing house (ICE Clear Europe). The trade must 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 ICE Clear Europe.

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 UCP, used by ICE) 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 ICE Clear Europe (via UCP), 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 ICE Clear Europe, the contract is novated, resulting in ICE Clear Europe 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 ICE Clear Europe (the clearing house). ICE Clear Europe guarantees the performance of the contract to its immediate counterparty, the clearing member (KMM ltd in this case). This is known as a principal-to-principal guarantee.

ICE Clear Europe 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 Assured Payments Service (APS) – this is a system used by ICE Clear Europe in conjunction with several leading banks, which will automatically debit members' bank accounts. KMM ltd will collect any payments from ABC ltd (its customer); and in turn, ABC ltd will call on any payments from Client X (its customer). Each party has a principal-to-principal relationship with the other.

When Client X 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 also that the clearing house does not give any guarantees to Client X. Thus, Client X and ABC ltd (their broker) have a risk of each other defaulting, as does ABC ltd and KMM ltd (the clearing member). Although the system substantially reduces the risk of default, it does not eliminate it along the whole system.

1.3 Clearing House Guarantee

Learning Objective

6.1.5 Understand the principles and backing arrangements in place in the event of a member default: novation; guarantee of performance of the contract; default fund; members' contributions; principal to buyer and seller; control of funds to clearing members' accounts, requirement for members to use an approved bank

Clearing houses operate a principal-to-principal guarantee based on a mutual guarantee structure. There are many clearing houses and their models differ. As an example, the supporting financial resources pertaining to ICE Clear Europe in London are provided as follows:

- Clearing members must hold an account with approved banks, known as assured payment system (APS) banks, that are used to collect margin and collateral.
- Initial margins are collected from clearing members in the form of cash (in various prime currencies) and acceptable securities and other collateral.
- In the event of a member default, the clearing house will first utilise the margin monies and collateral placed by the defaulting member.
- The major tranche of financial support which is next in line is the member default fund, which is a pool of units and to which every clearing member contributes in cash (interest-bearing) according to the volume of its clearing activities. The amount that members are required to deposit is reviewed normally every three months. Hence, for example, a member default occurring in swaps clearing is also supported by the fund provided by those firms involved in futures or equity clearing. 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.

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 (in the order in which they are drawn upon):

- The default member's margin held by the clearing house.
- The default fund contributions of that member.
- The default fund contributions of other clearing member firms.
- The insurance policy.

This process is called the default 'waterfall'.

To demonstrate how this works, in 2018, the following is a brief summary of events and actions that were taken when a member default occurred on Nasdasq:

> *'On September 10, 2018, the Nordic and German power markets experienced an extreme movement in the spread. One of Nasdaq Clearing's members had a portfolio containing a large spread position between Nordic and German Power that was negatively impacted by the fluctuations and an intraday margin call was issued to that clearing member. The member could not meet the margin requirement due to the losses in the portfolio and Nasdaq's rules require that the portfolio be closed out as soon as possible to mitigate further risk of loss. Nasdaq clearing declared the member in default on 11 September. Within 48 hours after the default, the portfolio was closed out through an*

auction according to Nasdaq clearing's close-out procedures. However, the close out resulted in a loss for Nasdaq clearing that exceeded the defaulting member's collateral and default fund contribution. That shortfall was replenished within a few days with members absorbing losses reported to total $122 million, and Nasdaq clearing has now increased its margin requirements on spread positions'.

Source: risk.net

2. Prime Brokers

2.1 Prime Broker Services

Learning Objective

6.2.1 Understand the services offered by prime brokers as they relate to derivatives: borrowing and lending securities; financing positions; providing custody and safekeeping of assets; clearing and settling trades; administering onshore and offshore funds; corporate actions; capital introductions; risk management

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A prime broker's role in relation to derivatives is that it is primarily responsible for the following:

- Efficient and best execution of all trades.
- Ensuring confirmation of client trades through the required trade documentation.
- Settlement of trade cash flows, to provide cash financing or securities lending as pre-agreed and when needed.
- Providing custody and safekeeping of all assets, as well as any risk management systems that the client may require.
- Keeping clients aware of all issuer correspondence, such as annual meetings and corporate actions.

A prime broker can provide a number of services for its client, including:

- Clearing and settlement of trade in global markets.
- Central custodianship of assets and using consolidated positions for the extension of leverage.
- Financing multiple currencies, as required.
- Stock borrowing capabilities to support trade strategies.
- Integrated web reporting of positions, activities and performance.
- Hedge fund consulting services.
- Acting as counterparty or broker for OTC derivatives.
- Facilitating communication between sales, trading and research.

In addition, certain prime brokers provide additional value-added services which may include some or all of the following:

- **Capital introduction** – a process whereby the prime broker attempts to introduce its hedge fund to qualified hedge fund investors who have an interest in exploring new opportunities to make hedge fund investments.

- **Office space leasing and servicing** – certain prime brokers lease commercial real estate and then sublease blocks of space for hedge fund tenants. These prime brokers, typically, provide a suite of on-site services for clients who utilise their space.
- **Risk management advisory services** – the provision of risk analysis technology, sometimes supplemented by consulting with senior risk professionals.
- **Consulting services** – a range of consulting and advisory services, typically provided to startup hedge funds, and focused on issues associated with regulatory establishment requirements in the jurisdiction where the hedge fund manager will be resident, as well as in the jurisdiction(s) where the fund itself will be domiciled.

Given the wide range of services and different types of clients prime brokers deal with, from large hedge funds and companies to individual investors, the regulation of prime brokers is the responsibility of a number of agencies. In the UK, they are regulated by the FCA and if they also operate in the EU, the **Markets in Financial Instruments Directive (MiFID II)** (which is administered by the European System of Financial Supervision). In the US, both the Federal Reserve, the Securities and Exchange Commission (SEC) and the CFTC monitor their activities. Regulation in China is managed through joint mandates between the State Cabinet's Finance Stability and Development Committee, People's Bank of China (PBOC), China Securities Regulatory Commission (CSRC), China Banking and Insurance Regulatory Commission (CBIRC). However, in a bid to simplify financial regulation in China, the government announced on 7 March 2023 that it intends to set up a new regulator, the National Financial Regulatory Administration (NAFR), that will take over some of the responsibilities of the four aforementioned organisations.

2.2 Exchange-Cleared OTC Products

Learning Objective

6.2.2 Understand how OTC products can be centrally cleared: eligibility and credit standing of counterparts; constraints placed upon contract terms; advantages and uses of centralised clearing of OTC products

The increased concern over counterparty risk combined with exchanges' desire to expand and diversify has led to exchanges offering clearing facilities and guarantees to a range of OTC derivatives.

One such clearing facility is the London Stock Exchange (LSE) 's LCH Group. LCH Group provides clearing for a wide range of individual and index equity, commodity and other financial futures and options – these include contracts on all of the major European indices and a few key US indices, plus many individual equities, as well as bond and short-term interest products. One of the few restrictions on the OTC contracts that can use LCH Group is based on volume or trade size. This varies for specific contracts, but most have a minimum trade size to use LCH Group.

The CME Group's Clearing360 clearing facility provides a similar if somewhat more restricted service for OTC interest rate derivative contracts and foreign exchange (FX) option block trades. Access to Clearing360 is restricted to firms that act as principal or agent for the OTC trades including hedge funds, major banks, prime brokers and proprietary trading firms. Rather than simply clearing the OTC trades, Clearing360 substitutes the OTC FRAs and interest rate swaps with corresponding futures contracts.

Eurex also provides clearing of OTC block trades, EFP, EFS and Vola trades (bilateral volatility trades which involve OTC options and the off-exchange purchase or sale of the underlying futures contract) using its EurexOTC Clear system.

The main advantage of having an OTC derivative cleared or substituted by an exchange's clearing house is that it eliminates any counterparty risk, which is particularly attractive for longer-term contracts. Once the OTC contract is cleared, it is subject to the same requirements as any other exchange-traded derivative, such as margin payments and delivery procedures. Centrally-cleared OTC products are executed and delivered in a similar process to exchange-traded products. For any type of delivery to take place, both counterparties must be exchange members and have either a direct or indirect clearing relationship with the respective clearing house.

Unlike exchange-traded contracts, the clearing house does not assign or match buyers to sellers, but it does monitor and guarantee that delivery is made on both sides of the trade. The trades are executed between two counterparties and delivery takes place using the respective clearing system.

Clearing Funds

A clearing fund (sometimes terms a 'guarantee fund') is a pool of assets contributed by market participants (clearing members) in a CCP or by providers of guarantee arrangements that may be used to meet the obligations of a defaulting CCP participant. In certain circumstances, it may also be used to cover losses and liquidity pressures resulting from such defaults. A clearing fund serves as insurance against unusual price movements not covered by the margin calculation in the event of a member defaulting.

Every clearing member is required to contribute to the clearing fund. The required amount is based on a risk assessment using each clearing member's level of uncovered risk, which is based upon the trading activity. This risk-based payment is reviewed on a regular basis. For example, LCH Group recalculates each clearing member's payment on a monthly basis; other exchanges reassess these payments on a quarterly basis. The clearing fund will be used should a clearing member default in the delivery process (only after any margin or other related funds have been utilised).

The main types of collateral that are accepted by these clearing funds are:

- cash (most liquid and stable currencies: EUR, USD, GBP, CHF, JPY, AUD, SEK, DKK, NOK), or
- government bonds (high quality, varying maturities, to be deposited with the clearing house, valued at market; haircuts are applied upon maturity).

2.3 Price and Position Limits

Learning Objective

6.2.3 Understand price limits/circuit breakers and position limits and the effects of their application: price limits; who imposes limits; purpose of price and position limits; action in the event of breach

2.3.1 Price Limits

Price limits are circuit breakers imposed by the exchange that place limits maximum bounds on 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 is 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. It may also give time for market participants to enter new orders attempting to profit from the sharp move, which should help (on average) to stabilise the market, although it does not always work.

An example here is the global coronavirus pandemic, which affected all securities and derivatives markets on March 2020. The NYSE's S&P 500 index declined 7%, three minutes into the market open (9.33am ETY), on the morning of 9 March, at which point trading was halted for 15 minutes. This was the first time the circuit breaker was triggered in the US since 27 October 1997, and only the second time since its inception in 1988. Although the price limit worked to slow the pace of the decline and avoid a total frenzy, the pandemic also showed the restricted efficacy of these circuit breakers in slowing the pace of frenzied orders. For example, Halliburton, listed on the NYSE, hit two further downward price limits on 9 March, realising a total decline of 37% through the day's trading.

While some exchanges do not have any standing price limits on most derivatives contracts, others do. For example, on ICE there are no price limits for long gilt contracts, while there are for their Japanese government bond (JGB futures), of ¥2 from the TSE closing price.

Others have scaled price limits. The CME Group has several down-price limits on most of its equity index futures, starting at 5% down to 20% down (each requiring a longer time before trading can resume). Also, CME Globex has a 5% 'either direction' price limit on all of its equity contracts.

The National Commodity and Derivative Exchange (NCDEX) also has scaled daily price limit rules. The price limit depends on the specific contract, although it ranges from ±4% for its gold futures to ±6% for several of its agricultural/soft contracts. Once that limit has been breached, trading resumes after a 15-minute cooling-off period, and the price limit is increased by 50% – ie, the new price limits would be ±6% and ±9% respectively. However, if that limit is broken, trading will be ended for that day.

An exchange's electronic systems 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.

2.3.2 Position Limits

In the past, traders have succeeded in cornering the market of an asset, by building up large derivatives positions. An early example is portrayed by Aristotle, whereby a 6th century BC mathematician, Thales of Miletus, secured the entirety of an olive crop in advance of harvest, and was able to sell it at a price of his own choosing. More recently, the Hunt brothers in the US cornered the silver market, buying large sums of silver futures contracts on COMEX from 1979 through early 1980. The silver price more than sextupled over this period, before a dramatic collapse on 27 March 1980, after the introduction of restrictions on positions by COMEX, known as 'Silver Rule 7'. Cornering the market, if left unchecked, therefore has the potential to give traders the power to manipulate short-term price movements to their advantage. Position limits attempt to prevent this from happening.

With this in mind, many exchanges do have position limits when contracts approach their maturities. For example, the CME Group has established a limit during the last ten days of trading for Treasury futures and the last five days for their wheat contracts. Less liquid markets have established stricter limits – for example, the Kuala Lumpur Stock Exchange (KLSE) has a position limit of 10,000 contracts per open position for its composite index future, for the future's entire life.

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. An example of this is Mercado Español de Futuros Financieros (MEFF)'s open position limit (OPL), which limits a member's open position to one that will require a theoretical extraordinary margin that is 20% of the member's shareholder's funds. Such a position limit is based on credit risk, rather than market manipulation concerns.

3. Margin

3.1 Introduction

Learning Objective

6.3.1 Understand how a firm deals with margin payments for its own positions and for clients' positions through its books: use of house accounts; use of client segregated accounts; use of client non-segregated/pooled accounts

6.3.2 Understand the difference between the clearing house's margin and that of the broker and the collection/payment process: amounts paid by clearing member and its clients; flow of margin

In guaranteeing contracts, the clearing house is taking on a substantial risk, especially on those contracts which have a **contingent liability** (ie, a liability that depends on the outcome of a certain event), such as futures contracts and written options.

In order for any clearing house to protect itself, there are a number of steps that it might take:

- **Quality of membership** – it only permits firms that meet (and continue to meet) its membership and financial criteria to become clearing members. This is the first line of defence.
- **Financial resource requirements** – It only deals directly with clearing members, all of whom have the most onerous financial resources requirements.
- **Margining system** – the level of cash (or equivalent) that is deposited with the clearing house to cover the risk of the clearing member defaulting on its position. This includes both initial margin and variation margin.
- **Its own financial resources, and perhaps operates a default fund** – it has lines of credit with a consortium of major banks, and it has insurance policies.

Standard Portfolio Analysis of Risk (SPAN) is a system used to calculate daily margin requirements and has been adopted by most of the leading futures and options exchanges. It uses a set of algorithms to measure and determine a portfolio's daily risk and, therefore, the daily margin requirement based on the entire portfolio, rather than on each specific open position. It allows both futures and options to be included together when calculating a portfolio's risk. SPAN has the capacity to allow for both inter-maturity and inter-commodity spreads. SPAN has the capacity to allow for both inter-maturity and inter-commodity spreads.

One of the first exchanges to use SPAN was the Chicago Board of Trade (CBOT). SPAN's ability to measure across a wide range of products and contracts allows clearing members more efficient use of their capital, as it often implies lower margin requirements. 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 were segregated. However, the client faces an additional risk if they are non-segregated. If the firm were to default, they would potentially lose out.

Margin demands are made of the clearing member; and for LCH Group and ICE Clear Europe, any cash payments are drawn directly from a bank account held by that member. This process (mentioned in section 1.2 of this chapter) is known as the Protected Payments System (PPS), and the accounts are referred to as PPS accounts. Note that no cash call will be made for initial margin if the clearing member is covering initial margin requirements by an acceptable form of collateral, and sufficient value of that collateral is already in place.

For the clients of the clearing member, in the UK, the financial rules set by the FCA 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.

The concept and protection provided by margins has started to be applied to a select group of exchange-cleared OTC products. The two types that have been most popular to date have been CFDs (which are mainly cash-settled) and certain types of energy contracts. In both cases, the clearing house will swap the OTC contract with an exchange-based equivalent. It can then apply its standard margin requirements to the position, and normal payments and procedures are then followed.

3.2 Types of Margin

Learning Objective

6.3.3 Understand the differences between initial and variation margin: marking to market; offsetting long and short positions; when paid

6.3.4 Know methods of margining for centrally cleared OTC products and their implications: how exposure is calculated; what margins are applied; how and when margin payments are made

6.3.5 Understand the nature and use of offsets for spread/spot month margining: purpose of offsets; what is spot month margin; purpose of spot month margins; purpose of spread margins

6.3.6 Understand why the clearing house might call intra-day margin: purpose of intra-day margin; when is intra-day margin paid

6.3.7 Know the methods of initial margining including SPAN: use of delta; use of SPAN

3.2.1 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. 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 for an option buyer is the premium payment that was paid when they purchased the option.

Initial margin seeks to protect the clearing house (and in turn the broker) 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 by the clearing house following consultation with the exchange.

Example

By continually monitoring market prices, ICE Clear Europe calculates that the most the price of a 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. Thus, 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 recomputed every business day and effectively called first thing in the morning before markets open. After the market has opened, 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) then it can call for an extra intra-day margin which is taken immediately from the clearing members via their PPS accounts.

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 ICE Clear Europe, the OCC and the CME Group are rather longer than those of smaller clearing houses. See section 4 of this chapter.

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. Therefore, as delivery for that product draws near, the clearing house may wish to minimise the speculative and delivery pressures by increasing the initial margin (known as a spot month margin or spot month charge). This ensures that those position holders contemplating taking the contract to delivery either have the underlying asset to deliver or have allocated adequate funds to effect settlement. It will also force any less well-capitalised speculators out of the market, thereby reducing short-term speculative pressures.

SPAN and Other Methods

As stated in section 3.1 of this chapter, the system used to calculate initial margins for futures and options positions is known as 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 Corporating (OCC). However, in 2006, the OCC implemented its new STANS system (System for Theoretical Analysis and Numerical Simulations), which is more sophisticated.

SPAN, TIMS and STANS are portfolio approaches that examine the risk of futures and options positions in the same portfolio and work out the worst scenario from a standard set of scenarios in order to fairly reflect the risk of the clearing house.

Standard Portfolio Analysis (SPAN)

SPAN is a scenario-based risk programme used for calculating daily margins. It was originally developed by the CME Group, which then permitted LCH (previously used by NYSE Liffe) to adapt its specifications to produce London SPAN. It has also been licensed by the CME Group for use by many other clearing houses.

Essentially, SPAN 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, and
- 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 programme'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, the clearing house 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, a 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, SPAN uses deltas to calculate the equivalent number of futures to quantify any potential offset. SPAN produces an overall initial margin requirement for the member, covering all of the contracts registered in the member's name at ICE Clear Europe. If a member has registered positions in both house and client accounts, it must simultaneously meet a separate requirement for each account.

Theoretical Intermarket Margining System (TIMS) and System for Theoretical Analysis and Numerical Simulations (STANS)

TIMS was launched in 1986 and 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 physicals, 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. It bases its total margin calculation for each position on 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.

In 2006, the OCC implemented STANS, which is a proprietary risk margining system based on a more modern approach to measuring risk. This new approach requires more sophisticated statistical methods, more complex calculations and greater computing power than TIMS; it addresses certain shortcomings of the TIMS model, particularly with respect to correlations in price movements and the modelling of extreme events. STANS generates a set of 10,000 hypothetical market scenarios that incorporate information extracted from the historical behaviour of each individual security, as well as its relationship to the behaviour of other securities. Scenarios are generated for more than 7,000 risk factors, including a broad range of individual equities, exchange-traded funds (ETFs), stock indices, currencies and commodity products.

Although the OCC continues to use TIMS for several risk management functions, it relies on STANS for the critically important purpose of assessing clearing member margin requirements. According to the OCC, the STANS model provides margin calculations that are more precise, more realistic, and more consistent across portfolios, which should improve the financial stability of the derivatives markets and produce capital efficiencies beneficial to investors.

Both SPAN and TIMS were designed to measure the market risk associated with derivatives.

Net Liquidation Value (NLV)

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 or to be received is based on the net liquidation values (NLVs) of the constituent parts of the portfolio. This allows 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.

Spreads

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 in this case because the two positions largely offset each other, and the price movements of each month do tend to correlate in their movement (although not perfectly).

Spreads also exist between different instruments that always exhibit correlation in their price movements. These are called inter-commodity spreads and apply to such contracts as ICE Futures Europe Gas Oil and ICE Futures Europe Brent Crude Oil.

Therefore, most exchanges consider the offsetting nature of these positions when setting the margin requirements. The net result is a reduction in the margin required for the two spreads mentioned above. For example, the CBOT has a comprehensive list of the offset that is applied to spreads margin due to their reduced risk – it depends on the particular contract and varies from $25 to as much as $110 per contract.

3.2.2 Variation Margin

Learning Objective

6.3.8 Know the means by which exchanges establish settlement prices: what are settlement prices; closing ranges/prices

Exchanges establish settlement prices every business day to provide the price yardsticks for calculation of mark-to-market (MTM) 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 that have a global pricing influence (such as the LME), or markets that are in operation for most of the 24-hour day.

The closing range is a measure of the range or spread of prices that are quoted during a specified time just before daily trading ends. Each exchange has its own criteria for determining the closing range; most have different time frames for different contracts, and they are usually longer for commodity contracts compared to financial contracts.

LCH Group uses the following standard criteria on its futures contracts to arrive at daily settlement prices for each delivery month:

- A time is specified at which the daily settlement price is calculated (eg, the close of trading for that day). The two minutes up to this time are known as the settlement range.
- The first 90 seconds of the settlement range allow 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 has 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, if a loss, the clearing member must pay the clearing house variation margin by the following day. If a profit, the clearing house will also adhere to the same timeline for payment to the clearing member. 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) in the currency of the contract. It is calculated as:

$$\text{Variation margin} = \text{ticks moved on the day} \times \text{tick value} \times \text{number of contracts of the open position}$$

where: ticks moved on the day = today's closing price – yesterday's closing price.

Each clearing member has at least one bank account to which ICE Clear Europe has access via a direct debit system so that variation margin payments can be transferred. These are the PPS accounts. Similarly, CME Clearing will also have access to funds from an approved bank, from which variation margin payments are transferred, via the Banking & Asset Management System (BAMS).

Exercise 1

A trader goes short five FTSE 100 futures at 7140 and, at the end of the day, the daily settlement price is 7175. What is the variation margin payable?

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

Exercise 2

A trader has a position of being long 20 LME three-month tin futures at $45,300 and at the end of the day, the daily settlement price is $45,330. What is the variation margin flow for this position?

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

3.2.3 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 level breaches the pre-set limit (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 US.

The level of maintenance margin is usually set at 25–50% below the initial margin payment of any new positions.

Example

The EUR/USD future has a maintenance margin of $4,000 and an initial margin of $5,400. In other words, the uplift on maintenance is 1.35.

To enter the position, $5,400 is needed, but the position can lose up to $1,400 (ie, $5,400 – $4,000) before additional funds/closure of positions is required.

Although US FCM's are legally required to charge margin per clearing house requirements on client positions, a UK broker holding positions for a UK client on a US exchange does not necessarily have to collect margin requirements from the client if agreed lines are in place. The UK broker will still have to record the margin requirements on the client account and will have to pay margin requirements to the US broker which ultimately holds the positions for the UK broker.

4. Collateral and Credit

4.1 Acceptable Collateral

Learning Objective

6.3.9 Know the definition, purpose and uses of collateral and the major types of acceptable collateral (cash versus non-cash)

Collateral is the term used to describe the assets that are used as a guarantee or as security for a line of credit or loan. Collateral reduces the exchange member's credit risk from the client to whom they have extended the credit line or loan.

Cover for initial margin can be provided using collateral rather than cash. The following is the full list of assets that some of the major clearing houses accept as payment for initial margin from their members:

- **Cash** in most major currencies (including sterling, euros, US dollars, Swiss francs, Swedish kronor, Danish kroner, Norwegian kroner and Japanese yen). Most national exchanges accept cash deposits at approved banks in their local currency.
- **Bank guarantees** from an approved bank in an approved form.
- **Certificates of deposit** denominated in pounds sterling and US dollars.
- **Government debt** (bills, bonds and notes) from major developed market countries, among them: the UK, Germany, Japan, Sweden, the US, France, Canada, Australia and Singapore.

However, it is important to note that:

- Undated bonds are not acceptable.
- The bonds must be denominated in the currency of the issuing country.
- Collateral is also marked to market daily and is subject to a published 'haircut', which means that the full market value is not credited; this has become more common after the downgrading of several government bonds on the list.
- The securities that are used as collateral are lodged with depositories and custodians that are acceptable to the specific clearing house.

4.2 Credit Lines

Learning Objective

6.3.10 Understand the significance of credit and initial margin lines

Although it is uncommon, some exchanges allow their members to extend credit to their clients to cover margin requirements. Deals requested in 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 FCA has rules on customer borrowing; under FCA 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 the ICE markets for their financial products.

4.3 Collateral Management

Learning Objective

6.3.11 Understand the mechanisms of collateral management: valuation and pricing; Credit Support Annex (CSA); one-way CSAs; threshold amounts; haircuts; minimum transfer amount

Collateral management is the process that allows market participants to reduce the counterparty credit exposure that arises from longer-maturity OTC derivative contracts, such as swaps and options.

Example

Two companies, Company A and Company B, enter into a ten-year commodity swap. Company A agrees to deliver a set amount of wheat, and Company B agrees to pay a set price for this amount. As the market price of wheat falls, Company A is showing an MTM profit on the swap, which represents a loss for Company B. This, in turn, increases Company A's risk exposure to Company B, since it has a loss on this swap position.

One way that Company A can reduce the risk exposure created by the swap is to enter into a credit support annex (CSA), which contains the details of the conditions and procedures by which collateralisation will occur.

This process is very similar to the daily margin process that all exchange clearing houses go through with their members. As well as reducing counterparty risk, collateral management can also improve capital usage, increase the potential number of transactions that can be undertaken with an individual counterparty, and reduce dealing spreads.

4.3.1 Credit Support Annex (CSA)

In response to the growing concern over the counterparty credit risk associated with longer-term OTC derivative contracts, the ISDA has included, as part of its documentation procedures that allow counterparties to periodically reduce this exposure, a CSA as part of an ISDA agreement.

A CSA is a legal document that regulates and defines the criteria for collateral payments (credit support) for OTC derivative transactions. It is one of the four parts of an ISDA contract. A CSA defines the rules and conditions under which collateral is transferred between the counterparties to the derivative contract. Its main aim is to mitigate the credit risk arising from the OTM or MTM loss from a derivatives position. The CSA defines the timing (how often), the minimum transfer allowed and the type of collateral accepted for these transfers. All CSAs require an ISDA agreement to be in place.

For example, Company A enters into a ten-year interest rate swap, as a fixed-rate payer, with one of its main banks. As market rates fall, in favour of the bank and against Company A, the MTM profit on the swap represents a loss to Company A and a profit for the bank. This, in turn, increases the bank's risk exposure to the company, since it has a loss on this swap position. One way that the bank can reduce its risk exposure created by the swap is to enter into a CSA, which contains the details of the conditions and procedures by which collateralisation will occur.

In addition to setting the timing of the MTM, the CSA will also include key procedural details, setting:

- **The threshold amounts** – the unsecured credit exposure that one counterparty is prepared to accept before making a collateral request, usually set at a relatively low level to reduce credit risk.
- **Minimum transfer amounts** – the minimum amount of a collateral request; any collateral transfer below this amount is not permitted. It is designed to prevent frequent and unnecessary calls of collateral, as well as to avoid the costs involved with small transfer payments.
- **The valuation percentage or 'haircut'** – the discount that is applied to the collateral's market value; this protects the collateral receiver from falls in the collateral's value in the period between collateral calls. The higher the quality of the collateral, the lower the haircut.

Once the new valuation has been agreed, the counterparty with the negative MTM valuation will transfer the change in value to the counterparty with the positive MTM. CSAs can be two way, when both sides may be required to pledge additional collateral and are used in cases when the counterparties are roughly the same size and have a similar credit rating, or one way when the size and credit ratings differ greatly and one party (signatory to the CSA) represents a significantly greater risk of default.

Most CSAs that a bank or dealer would enter into with counterparties that are other banks or clients are two-way agreements. This means that both sides of the trade are subject to the terms of the agreement that ensures that both will be able to meet their respective obligations to the OTC trades. However, most sovereign, supranational and agency (SSA) counterparties do not agree to this and, in most cases, the bank is subject to a one-way CSA.

A one-way CSA is an agreement that requires only one of the counterparties to post the required amount of collateral with the other counterparty when the trade moves in that counterparty's favour; however, if the opposite occurs, that counterparty is not required to reciprocate and post the collateral when the trade

moves against them. Traditionally, most sovereign government counterparties (such as central banks and supranational agencies) do not expect to have to post collateral on any cleared trades, and have received exemptions from such mandatory clearing requirements in light of their credit rating and sovereign status.

One-way CSAs have posed some real problems for any bank/dealer that is a counterparty to one of these transactions which has then hedged it with another bank/dealer or has put the hedge through a clearing house – it would not receive any collateral when the original trade is in its favour, but would still have to post collateral on the offsetting position.

In addition, the credit problems encountered by several EU governments (eg, Greece, Italy and Portugal) in the early 2010s have seen a reluctance by dealers to enter into long-term deals with these counterparties with one-way CSAs; this has, in turn, increased the costs for these sovereign counterparties. Also, following the financial crisis, there was an effort by market particpants to move towards cleared OTC trading for vanilla OTC derivatives trades. Having the clearing house between both parties to a transaction largely removes the need for CSAs.

4.4 Uncleared Margin Rules

Learning Objective

6.3.12 Understand the impact of Uncleared Margin Rules (UMR): what does UMR stand for; what are UMR rules; what is the purpose of UMR; what is the UMR phase 6 thresholds; what is the AANA calculation; what derivatives are in scope; what is the standardised initial margin schedule; UMR collateral thresholds

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In wake of the 2007–08 global financial crisis (GFC), the G20 mandated the Basel Committee on Banking Supervision (BCBS) to develop consistent regulatory standards for reducing systemic risks arising from derivatives. The main purpose of this directive was to address counterparty credit and default risks from OTC derivatives in the global financial system, by introducing a framework of rules that govern areas of the OTC market that were previously under regulated, and likely contributed to the severity of the global financial crisis.

Although there is a stipulation to centrally clear 'standardised' OTC trades, a substantial portion of the OTC market contained non-standardised and niche products that became known as 'non-centrally cleared, (also referred to as 'uncleared') OTC derivatives. These were the primary area of concern as there was minimal transparency and no legally-binding set of rules that mitigated credit and default risk. To quote directly from the BCBS resulting guidance directly: 'the recent financial crisis demonstrated that improved transparency in the OTC derivatives markets and further regulation of OTC derivatives and market participants would be necessary to limit excessive and opaque risk-taking through OTC derivatives and to mitigate the systemic risk posed by OTC derivatives transactions'.

In September 2013, BCBS released a global policy framework that contained detailed guidance on new margining requirements for uncleared OTC derivatives, known as the '**Uncleared Margin Rules (UMR)**'. Overall, the intention is to bring this previously opaque portion of the market more in line with cleared derivatives, by using margining and collateral as the basis for reducing credit and default risk.

The UMR has eight key principles, with sub-requirements, for market participants, as well as an implementation timeline for national regulators, which spanned six phases, starting in September 2017 and the final Phase Six being implemented in September 2022. The phases were designed to increase the number of participants covered by the UMR over time.

Each national regulator in the G20 has subtle variations to the UMR rules that were adopted, but on the next page is a table containing each of the UMR principles as recommended by BCBS.

Principles	Key requirements
1. Margin requirements apply to all derivatives that are not cleared through a central counterparty.	• Initial margin excluded for FX forwards and swaps, although they count towards AANA. • Firms below pre-set threshold (set by the 'AANA calculation' will be exempt from IM (threshold phased-in). • IM rates pre-determined by BCBS-IOSCO.
2. All entities that are covered by the UMR rules (see below for '**Aggregate Average Notional Amount (AANA)** thresholds') must exchange variation and initial margin.	• Daily variation margin exchange is mandatory without thresholds. • Once initial margin is calculated (on a consolidated group basis, by jurisdiction), if the total initial margin due is less than €50 million, the entity can be considered not above the threshold of uncleared-derivative activity, and therefore not requiring mandatory initial margin posting. Any initial margin above €50 million must be collected. • The same uncleared-derivatives thresholds that apply to financial firms apply to non-financial firms, regardless of whether the non-financial firm is using uncleared OTC derivatives for hedging, speculation or arbitrage.
3. Initial and variation margin must be calculated according to a regulatory-approved methodology.	• Initial margin calculations must use the Grid or Standardised Initial Margin Schedule (SIMM) methodologies, or some other method that is within the guidance from the BCBS. • Variation margin to use daily mark-to-market calculations.
4. Collateral must be of high quality.	• Specific collateral rules devolved to national regulators.
5. Segregation and custodianship of initial margin.	• Specific rules devolved to national regulators.
6. Margining between affiliated firms within the same group is not mandatory.	-

Principles	Key requirements
7. Regulators in separate jurisdictions must co-operate when dealing with multi-jurisdictional entities.	-
8. Daily variation margin must be exchanged on all uncleared OTC deals from 2015 onwards. Posting initial margin to be phased in.	• The final phase was enacted in September 2022, completing the implementation of the UMR rules.

Which Derivatives are in Scope for UMR Rules?

In scope	Out of scope
Non-deliverable forwards (NDFs)	Cleared instruments
Physical FX forwards and swaps	Exchange-traded derivatives
Swaptions	
FX options	
Interest rate products (including caps and floors)	
Equity swaps and forwards	
Hedging trades	

What is the Aggregate Average Notional Amount (AANA) Calculation?

The Aggregate Average Notional Amount (AANA) is the sum total gross notional value of all outstanding uncleared derivatives. It includes all OTC derivative products that are not cleared, and although deliverable FX forwards are not subject to the initial margin requirements as part of UMR, they do count towards the AANA calculation.

The calculation has a specific period over which it must be measured, namely, March, April and May of a given year. For US firms, they must take an average of the AANA across every business day in this period, while EU and UK firms must use an average of every business day during the calculation period.

Notably, each progressive phase of the UMR rules has reduced the AANA threshold that determines whether an entity is subject to the initial margin part of the UMR rules, thereby drawing firms with ever smaller derivative portfolio sizes into obligated-entity status. The sixth, and final, phase of the thresholds are listed below:

Jurisdiction	AANA threshold
EU and UK	8 billion euros
United States	8 billion USD
Switzerland	8 billion CHF
Japan	1.1 trillion JPY
South Korea	10 trillion KRW
Singapore	13 billion SGD
Hong Kong	60 billion HKD

Once an entity is considered within scope of the UMR rules, according to their AANA amount, it must continuously monitor whether its initial margin on uncleared derivatives is above €50 million, as this figure is the minimum level before initial margin becomes collectable according to the UMR. Notably, regulatory initial margin is only due when it breaches above the €50 million threshold.

Initial Margin Calculation Methodologies

Since the calculation of initial margin is fundamental to the practicality of the UMR rules, the BCBS provided a guideline methodology called 'Grid', which it believed would give some baseline formula for compliance. However, the OTC derivatives industry has opted to use a separate methodology, advocated for by ISDA, called the Standardised Initial Margin Schedule (SIMM), with the 'Grid' considered a fall-back method, since it often leads to higher initial margin levels than SIMM. The usage of SIMM is compliant with the UMR.

Appendix

Answers to Exercise 1

Sold at	7140
Less: current cost of purchase	(7175)
Loss in index points per contract	(35)

Variation margin payable = 35 index points x £10 per index point x 5 contracts = £1,750.

Answers to Exercise 2

Bought at	$45,300
Daily settlement price	$45,330
Profit	$30

Variation payable to the trader = $30 per tonne x 5 tonne contract size x 20 contracts = $3,000.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **How does the process of 'clearing' work?**
   Answer reference: Section 1.1

2. **What is used to minimise settlement risk?**
   Answer reference: Section 1.1

3. **Which exchanges allow mutual offset?**
   Answer reference: Section 1.1.1

4. **A prime broker's role in relation to derivatives is primarily responsible for what?**
   Answer reference: Section 2.1

5. **In what way is a clearing fund paid for?**
   Answer reference: Section 2.2

6. **What is the purpose of price limits?**
   Answer reference: Section 2.3.1

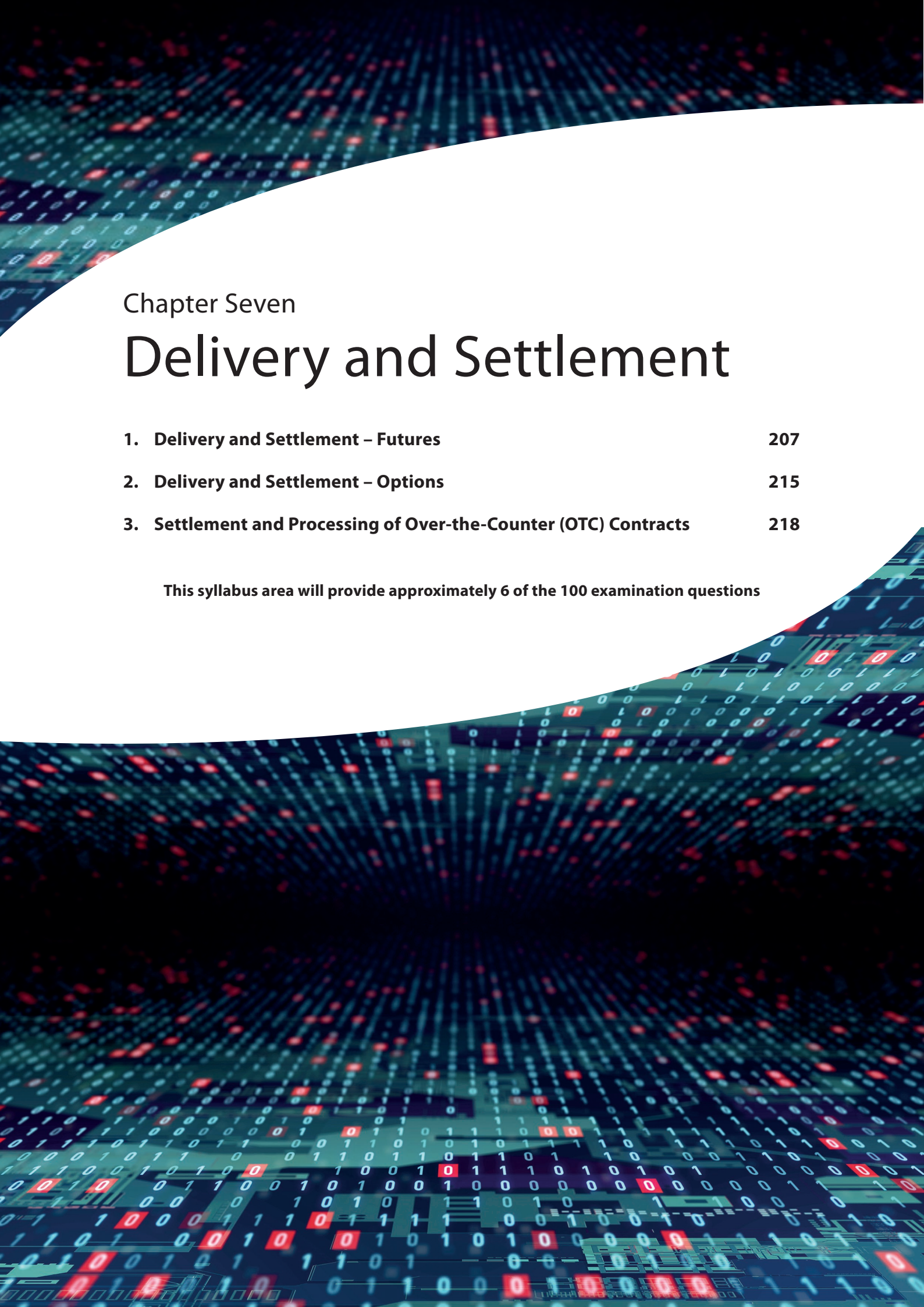
7. **In what way is initial margin collected?**
   Answer reference: Section 3.2.1

8. **What is SPAN?**
   Answer reference: Section 3.2.1

9. **How is initial margin used?**
   Answer reference: Section 3.2.1

10. **What is the closing range?**
    Answer reference: Section 3.2.2

11. **How is variation margin for a future's position calculated?**
    Answer reference: Section 3.2.2

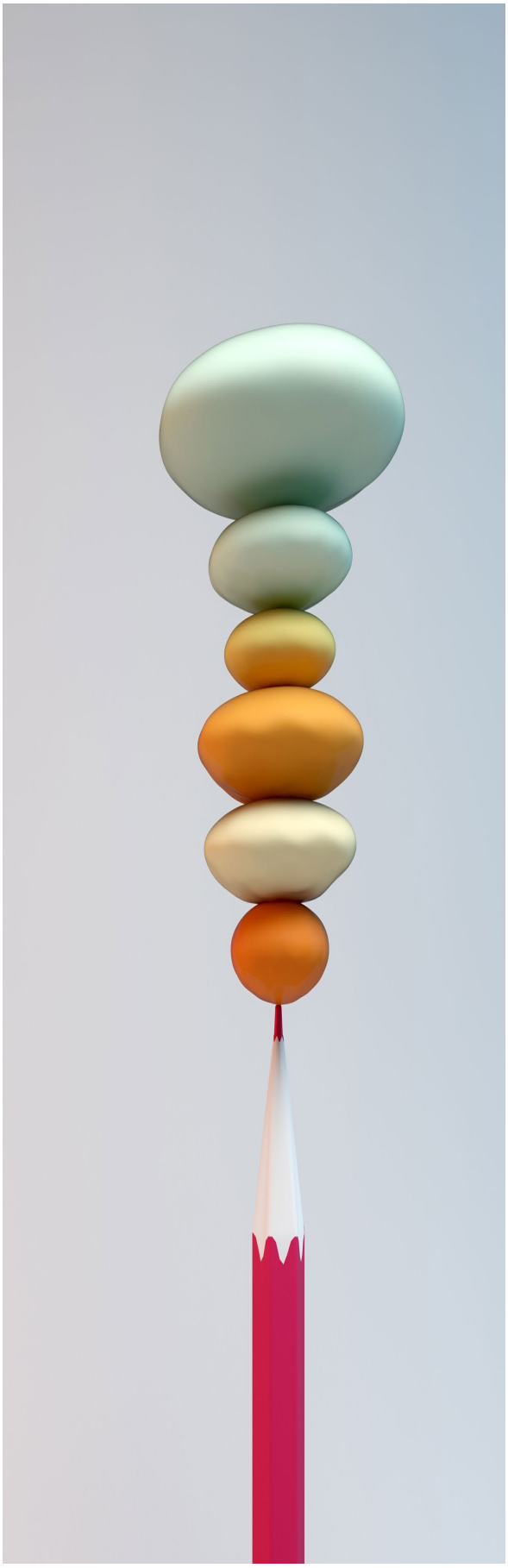


Chapter Seven

Delivery and Settlement

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3. **Settlement and Processing of Over-the-Counter (OTC) Contracts** 218

This syllabus area will provide approximately 6 of the 100 examination questions



1. Delivery and Settlement – Futures

1.1 Introduction

Learning Objective

7.1.1 Know the role of the clearing house as counterparty in delivery: when the clearing house becomes the counterparty; role of the clearing house as counterparty; role of the clearing house as guarantor; counterparty risk; assignment; use of warrants in delivery

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 6, section 1.1, 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 manages the contract delivery of open contracts between clearing members 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 (LME)).

For example, each LME warrant represents one lot of a specific type/grade of metal. The buyer of the metal (or holder of the warrant) presents this to an LME-listed warehouse and, upon receipt of the warrant, it will deliver to the holder the precise amount and grade of metal that it represents.

1.2 Closing Contracts

Holders of futures contracts have three choices:

1. to close out the contract before expiry
2. to roll the position forward by closing out the existing position and simultaneously establishing a new position in a new quoted futures month, or
3. to proceed to deliver the underlying asset.

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. Since futures contracts are fungible, they simply need to do an opposing trade in the open market.

While any gains or losses will be realised when a contract is closed out or delivered, the decision to close it out provides the holder/seller with more flexibility, since they can do it at any time up to its maturity. Also, it may be cheaper, since it allows the holder/seller to realise any profits or losses, without incurring any delivery/storage charges that would occur if the contract went through its delivery process.

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 (ie, both long and short positions held gross), there are various common methods for performing close-outs:

- **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. This may reduce the build-up of credit risk and free up credit lines for further trading by the client.

Positions can be designated to be left open, for instance if they are part of a specific strategy.

There are other close-out methods that can be 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, it is possible to bust the settlement. This is the term used for reversing the closing action and reopening a position.

1.2.1 Calculating Profit and Loss

Learning Objective

7.2.1 Be able to calculate the profit/loss on delivery/expiry of future and options

In order to understand how to calculate the profit/loss on the delivery of equity index futures and options, it is best for candidates to study some examples and then attempt the exercises. Recall that:

$$\text{Profit/loss} = \text{number of ticks moved} \times \text{tick value} \times \text{number of contracts}$$

Example – The FTSE 100 Index Future

An investor buys five FTSE 100 futures at 7200 and holds them to delivery. The EDSP, which is the official price at the expiry of the contract, is 7423.

The contract size for the ICE Futures Europe FTSE future is the index x £10 per point, the tick size is 0.50 index points, and the tick value is £5 per tick.

The investor's position has moved into profit by 223 index points (ie, 7423 – 7200).

Since each index point represents two ticks, that is a movement of 223 x 2 = 446 ticks.

The investor's total profit = 446 x £5 x 5 contracts = £11,150.

While £11,150 is the investor's total profit of this position, the final payment will be based on the difference between the previous day's closing price and the contract's official price at expiry (in this case, 7423). This is due to the exchange's daily margin payments.

Example – SHFE Natural Rubber Future

A manufacturer buys ten SHFE July natural rubber futures at CNY (yuan) 19650. One month ahead of its maturity, the position is closed out at CNY 20250.

The contract specification is as follows: contract size is 5 tonnes, quotation is in yuan per tonne and the tick size is 5 yuan. The profit/loss is calculated by obtaining the difference between the opening and close-out prices, and then multiplying this by the contract's size and also by the number of contracts.

The manufacturer's position moved in their favour by CNY 600 (the futures were bought at CNY 19650 and sold at CNY 20250).

On each contract, the investor makes a profit of CNY 3000 (ie, CNY 600 x 5 tonnes). The total profit for the position = CNY 30,000 (ie, CNY 3000 per contract x 10 contracts).

Example – FTSE 100 Index Option

An investor buys three FTSE call options with a strike of 7200 for a premium of 12. At expiry, the cash index stands at 7210.

The investor's options are worth exercising because the value of the underlying exceeds the strike price at expiry. The gain on exercise will be ten index points (ie, 7210 – 7200), but the investor has incurred a premium cost of 12 index points. Thus, the overall position is a loss of two index points per contract.

The investor's overall loss is 2 index points x £10 x 3 contracts = £60.

(Remember that the options' contract size is the same as that of the underlying futures contract.)

You will have seen in chapter 6, section 3 that all losses are 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 losses may have already been paid through the margining system during the life of the contract.

Exercise 1

An investor buys six FTSE 100 contracts on ICE Futures, London at 7205. At expiry, the EDSP is 7251. What is the investor's gain or loss?

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

Exercise 2

An investor buys seven FTSE put options with a strike of 7047 for a premium of 15. At expiry, the cash index stands at 6927. What is the gain or loss to the investor?

(Remember that the option's contract size is the same as that of the underlying futures contract.)

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

Exercise 3

A fund manager sells 20 London Metal Exchange Index (LMEX) put options with a strike of 4180 and receives a premium of 18. At expiry the index stands at 4170. What is the fund manager's profit or loss?

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

Exercise 4

A trader at a hedge fund buys 100 Tadawul (Saudi Stock Exchange) MT30 index futures at 1270. At expiry, the index settles at 1222.50. The contract size is Saudi Riyal 100 x the index and tick size is 0.5 points, equalling 50 riyals. What is the fund manager's profit or loss?

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

1.3 Physical Delivery or Cash Settlement

Learning Objective

7.2.2 Understand the differences between cash settlement and physically delivered contracts and the final payment process: what is cash settlement; what is physical delivery; factors used in ascertaining the invoice amount; who calculates the invoice amount; differences between financial and commodity products

7.3.1 Understand the importance and implications of the delivery of open contracts at expiry and the significance of the short position: physical versus cash delivery; financials versus commodities; avoidance of delivery – reasons and methods; advantages and disadvantages of cash delivery; asset delivery via clearing house; relevance of first notice day, last notice day and delivery day or period

1.3.1 Physical Delivery

For contracts that have not been closed out and remain open at expiry, the exchange rules define what physical 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 ICE Futures similarly defines delivery points and deliverable grades for its deliverable gas oil contract.

The LME uses a warrant-based system, known as **LMEsword**, that allows for easy delivery, since its approved warehouses are located around the world. LMEsword is a secure electronic transfer system for LME warrants which are to be held in a central depository, which allows the LME to accommodate metal producers that have excess supply at times. In this aspect, it becomes the market of last resort.

LMEsword, which was launched in 1999 as SWORD, is a secure transfer system for LME warrants which can be held in a central depository; acting as a central database, holding details of ownership, and is subject to stringent security controls. This assures the buyer that the metal that they have purchased is of the correct deliverable quantity and grade and that he will have ownership upon payment.

All LME warrants are produced to a standard format with a barcode. Warehouse companies issuing these warrants ensure that the details are known to LMEsword, which acts as a central database, holding details of ownership and is subject to stringent security controls. The ownership of LME warrants can be transferred between LMEsword members in a matter of seconds and all rent payments are automatically calculated.

LMEsword brings a number of benefits, particularly in administrative efficiency, by removing the physical transfer of warrants and simplifying the manual operations involved. It also reduces the number of times a warrant has to be passed by hand, as warrants no longer need to be physically transferred from owner to owner every time the material is bought or sold. Warrants are immobilised in a depository.

For physically deliverable futures 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 the ICE Futures Europe markets, this is known as the exchange delivery settlement price (EDSP). At expiry, the exchange rules define what assets, in terms of quality, quantity and location, may be finally delivered. The delivery process then begins for all open positions.

Futures sellers give notice declaring their intention to deliver the asset to the clearing house, a process known as a tender notice since they are tendering for delivery. The clearing house then assigns those assets to futures buyers, usually on a random basis. If the contract allows for any flexibility, the seller has the choice of what, where and when to deliver (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 euro-bund 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 robusta coffee futures on ICE Futures, London). The underlying asset is then delivered on the delivery day.

There are four stages forming ICE's delivery procedure:

1. The seller of the short futures position advises ICE Clear Europe of their intention to deliver the underlying asset.
2. ICE's universal clearing platform (ICE Connect) then matches sellers to buyers on a random basis. ICE Connect is also used for trade and position management following the transaction providing daily position management. It then feeds the positions and margin requirements to ICE Clear's Extensible Clearing System (ECS).
3. ICE Clear Europe 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.

Whether the physical delivery is for a financial or commodity contract, the process can be significant. The seller must ensure that they deliver the correct quantity and quality, as specified in the contract. However, for the most part, the delivery process for commodities can be more involved and sometimes more expensive. In any case, the delivery process ensures that the buyer receives what was paid for and that it is available to them.

In some instances, participants would like to avoid delivery. They may not be in possession of or have a desire to receive the underlying asset. They are merely in the derivative to hedge a separate transaction or speculate on the derivatives price. Therefore, in order to avoid unwanted delivery, the participant must close out their position before the first notice day of the contract, as listed on the exchange website. In extreme circumstances, where liquidity after the first notice day is thin, there have been instances where a receiving party (holding a long position) has been forced to take delivery, and pay for storage of the asset.

Invoice Amount

For physically delivered contracts, the futures buyer will receive an invoice for the asset and have to pay the amount stated in the invoice. The formula is:

$$\text{Invoice amount} = \text{EDSP} \times \text{scale factor} \times \text{number of contracts}$$

The scale factor converts the price quote to reflect the total value of the assets being delivered, as in the following example:

Example

The EDSP for Brent crude is $77 per barrel, and the contract size is 1,000 barrels. As the price is quoted in barrels, and each contract is for 1,000 barrels, the scale factor is 1,000.

The invoice amount for five contracts might be:

$77 x 1,000 x 5 = $385,000

The EDSP is unlikely to be the price originally agreed. Suppose the buyer went long at $79. By paying $77, the buyer is paying less than the agreed price. Remember, though, that the buyer will already have had to pay variation margin over the lifetime of the contract and that loss will be in their account. In net terms, therefore, the actual price paid is the agreed price of $79 per barrel.

The invoice amount for a bond futures contract is more involved as shown by the following formula:

$$\text{Invoice amount} = (\text{EDSP} \times \text{price factor} \times \text{scale factor} \times \text{number of contracts}) + \text{accrued interest}$$

There are two additional elements here. Firstly, the price factor is used to convert the EDSP based on the notional bond to the equivalent EDSP for the bond actually being delivered. Secondly, 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).

Exercise 5

What will be the invoice amount for the following delivery of ICE Europe'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 scale factor is 1,000.

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

1.3.2 Cash Settlement

With cash-settled contracts there is no exchange of the underlying asset. Instead, there is an exchange of funds (ie, cash) 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 STIR deposits, and equity and bond indices.

As variation margin payments will already have been made/received daily throughout the life of the open position, the only element required to settle the trade is the payment of the last day's variation margin against the EDSP – this would satisfy the delivery obligations.

However, in some cases, cash settlement is seen as a disadvantage. This could be the case in some bond index contracts, which are based on the price of several bonds and does not provide for pricing factors that allow for delivery of a specific bond that is a component of the index.

In addition, cash settlement also carries risks, in that trading activity on the underlying market during the EDSP period is likely to be affected by participants seeking to manipulate the EDSP. Such participants might typically seek to achieve this by unwinding their bond positions during the EDSP period at prices which they anticipate will contribute to the calculation of index figures, which will, in turn, be used to determine the final EDSP. A more favorable EDSP may improve their return on their expiring position, for example where a higher EDSP may increase the return on a long position.

1.4 Exchange Delivery Settlement Price (EDSP)

Learning Objective

7.3.2 Understand the purpose of the exchange delivery settlement price (EDSP) and the factors affecting it: purpose of EDSP; auction process; factors included in calculating the EDSP value; reasons for exchange to set the EDSP

The EDSP is the ICE Europe market's 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 that will

prevent any price manipulation. The resulting price must be a fair reflection of the underlying asset at expiry and be truly representative of spot prices.

Note that many contracts are cash-settled and, by definition, physical delivery does not apply. The EDSP process is still of fundamental importance, however, as it effectively becomes the final price at which variation margin changes hands. Some exchanges have contracts which offer the option of cash settlement instead of settlement by physical delivery (eg, ICE Futures Europe Brent Crude oil).

The EDSP could be subject to manipulation, though. As a result, the exchange will endeavour to avoid manipulation by following the procedures, outlined in chapter 6, section 3, for establishing the daily settlement prices. Exchanges and regulators keep such matters under close supervision.

For example, the EDSP for FTSE 100 futures and options contracts on ICE Futures Europe is derived from an intra-day auction. Every share in the FTSE 100 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 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 US.

ICE Futures Europe 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 Objective

7.4.1 Understand the significance and implications of the exercise of options, the assignment of obligations, abandonment and expiry: purpose of assignment of obligations; instigating an assignment notice; receiving an assignment notice; abandonment; which options are most likely to be exercised before expiry; exercise at expiry; European-, American- and Asian-style options; action upon exercise; assignment

Assignment is the process of obliging option sellers to perform their obligations. For example:

- A seller of an equity call is obliged to sell the shares at the option's strike price.
- A seller of a bond call will potentially become the short to a bond future at the option's strike price.

2.1 Exercise of Physically Deliverable Options

Recall from chapter 1, section 5.2 that European-style options can only be exercised at expiry, whereas an American-style option can be exercised over a set period up to the expiry date. However, remember that even American-style options are unlikely to be exercised until the expiry date approaches, because the holder will likely prefer to sell the option and realise the time value that adds to the option's premium.

Furthermore, an option holder will only exercise an option if it is ITM, with the exercise itself either realising a profit or reducing the loss on the open trade.

If the holder decides to exercise an ITM option, they must notify their 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 holder 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 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

On exercise of an ICE Futures Europe 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 a Panel on Takeovers and Mergers (PTM) levy. The trade will settle through the UK equity cash market settlement mechanism (Euroclear UK & Ireland ltd) on the normal equity settlement timetable of T+2.

2.2 Exercise of Cash-Settled Options

The process is effectively to transfer the IV of the option from the writer to the holder.

Example

If an investor exercises one FTSE call option with a strike at 7200 when the EDSP is 7450, since the contract size is £10 per point he will receive:

$$(7450 - 7200) \times £10 = £2,500$$

Remember, for options which have futures-style premium payment (as with all ICE markets), variation margin will have accounted for most of this, and only the final day's variation margin will change hands.

However, if this were an OTC option, the holder would most likely receive the full amount upon its exercise.

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 will abandon options that are OTM, or slightly ITM, but not worth exercising when transaction costs are considered.

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.

2.5 Automatic Exercise

Learning Objective

7.4.2 Understand the significance of automatic exercise: purpose of automatic exercise; options that may be subject to automatic exercise; reasons for clearing houses to adopt automatic exercise; benefits to members and holders of long positions; prevention of automatic exercise

ICE Clear Europe and CME Group operate an automatic exercise facility whereby it will automatically exercise any option that is sufficiently ITM at expiry. This is usually a minimum of $0.01 per contract. This reduces the paperwork and also means that participants need not worry about forgetting to exercise.

The trigger for automatic exercise is when the price of the underlying asset is at or above a certain level for a call or at or below a certain level for a put – in other words, when the option is ITM at its expiration enough to cover any delivery cost associated with exercising the option.

Capped-style options are ones that are subject to automatic exercise. They have an established profit cap; once the underlying asset's price has moved beyond that cap and the option is ITM at expiration, it will be subject to automatic exercise.

Note that there are exercise fees to be paid, so, if an investor does not want the option exercised (in cases where the option is only slightly in the money or when costly physical delivery would be required, for example), 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 (recall that European-style options cannot be exercised before 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, since exercising realises the IV of the option and not its TV. It makes more sense to sell the option to capture the TV 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. **American-style** – European-style options cannot be exercised before expiry.
2. **Deep-ITM** – the option must have significant IV.
3. **Close to expiry/short-dated** – there must be very little TV 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 obtain voting rights.

3. Settlement and Processing of Over-the-Counter (OTC) Contracts

Learning Objective

7.5.1 Know the importance of accurate and timely settlement processes: deal tickets and term sheets; trade confirmations; reconciliation processes (internal and external); cashflow/asset movement instructions and control processes; close-out or maturity instructions

7.5.2 Understand the main control process: front to back office reconciliation; trade validation; profit and loss reporting

3.1 The Importance of Controls

The efficient administration of all transactions is essential. In the case of derivatives, the risks arising from inefficiency are potentially greater because derivatives are geared, therefore the full risk of any trade can be significantly more than the initial transaction. There is no set structure that organisations apply for the administration of their derivatives business. For example, the structure in a bank will generally be different from that within a fund management company. Indeed, a firm's internal audit or compliance function will be the first port of call in assessing and prescribing controls, in consultation with the front, middle and back office teams. Thereafter, the external auditor will evaluate the controls and ensure they are both compliant with regulatory requirements, and effective in completing the Board's prudential responsibility to shareholders.

There will be many factors involved when creating a control regime, including:

- **volumes of transactions** – the market players will undertake many more transactions, particularly if they are market makers, so they will tend to have more specialist areas within overall operations
- **range and complexity of products** – an end-user, such as a fund manager, is likely to be involved in a narrower range of products, so will require a narrower range of expertise
- **valuations and risk monitoring** – both market makers and end-users need to have efficient systems that value all existing positions, as well as measure all of their associated risks

- **reporting** – while the regulatory reporting requirements for the fund manager may be less onerous and less frequent than for a bank, both will have to report their respective positions on a regular and timely basis. Fund managers who serve retail clients (for example, via unit trusts or mutual funds) will still have significant restrictions and requirements.

In some organisations, the structure of the operations area is along product lines; in others, it cuts across product lines and is organised along process lines instead (eg, by domicile of the counterparty or by complexity of the deal). Within derivatives operations, particularly among major market participants, there is also often a split between OTC and exchange-traded instruments. Within a bank, there is often a front office, a middle office (typically risk management and mark-to-market) and a back office (confirmations and general administration). Which processes are performed in which area can vary from bank to bank; hence, it is better to concentrate on the processes themselves. No matter how the operations area is organised, the key objectives are efficiency, flexibility, security and control.

The processing and settlement of all transactions will include:

- **the individual deal tickets for the derivative trades** – commonly known as trading tickets, deal tickets are a record of all the terms and conditions of the trade agreement, and
- **any term sheets** – this document is attached to deal tickets. Term sheets are important due to the fact that financial institutions often use derivatives as a hedge in order to manage the risk associated with these commitments. Therefore, it is very important that all the details of these term sheets have been processed correctly since, without them, a deal ticket that is inteneded to hedge would appear as an outright risk or a speculative position.

3.2 The Process Flow

The process that an OTC derivatives transaction follows has many steps that are common to all financial transactions.

3.2.1 Trade Capture and Verification

Since most trades are automatically input into the system via the trading desk, the details of the transaction must be verified by the middle office by the end of the trading day. Trade entry must follow the deal immediately, because any delay means that market risk and credit risk are not being monitored correctly, and because, in turn, it delays the confirmation and settlement process.

The same problems arise if trades are booked incorrectly. For example, if the sale of an equity index call is booked as a purchase, not only will the trader's position be incorrect, so will the bank's risk report. This type of error will also result in the bank paying the premium, as well as not being able to monitor that it has in fact received the premium from its counterparty. The error will also cause a failed settlement. The late or incorrect booking of trades, particularly where exacerbated by poor controls, can result in a wide range of potential problems including:

- inaccuracies in evaluating risk, managing positions and investment decisions
- late settlement-related interest payments and fees owed to counterparties
- operational losses through funding and timing difficulties (eg, late receipt of sales proceeds can create knock-on delays in settling other trades)

- poor-quality client servicing (eg, inaccurate or late reports)
- rule breaches, leading to fines or disciplinary action taken by exchanges and/or regulators, or
- reputational loss, including loss of trading/research opportunities with certain counterparties, and negative impact on client and stakeholder relationships.

Similar risks can arise through over-reliance on spreadsheets, which are very accessible and familiar to many people, but nevertheless proven to distort our perceptions of efficiency, accuracy and utility. When replaced by expertly programmed and tested software designed to work as part of a bigger system, spreadsheets are often found to be much slower to run, and highly susceptible to bugs and human error. In particular, software which has been designed to handle large volumes of specific types of OTC transactions are often more robust and auditable compared to spreadsheets. This, by no means, ensures that the system is foolproof, and can still be open to human error and hacking.

3.2.2 Position Keeping and Profit and Loss Analysis

Positions must be monitored for risk control and the profit and loss calculated. The extent to which position keeping is a responsibility of the front office or of the operations area varies between organisations. It is of prime importance to the traders to monitor their own position, as that is what gives rise to their profit or loss. Most traders are able to monitor their current position using a real-time position system.

However, the role of checking for risk management purposes should fall outside the trading area. One of the key roles of this outside risk management team is to ensure all trades, that have been used as a hedge to a term sheet-related transaction, have been applied correctly. Most banks or hedge funds have a product control team or similar unit that performs this function. Again, using electronic position keeping, this area can ensure that each dealer and the trading area as a whole remains within their respective individual, product and area limits at all times. Any positions that are above their limit should be reported. Failure to maintain up-to-date and reconciled end-of-day positions between the dealing room and product control team could result in losses from unreported transactions or positions in excess of risk management limits.

3.2.3 Confirmation and Documentation

The details of the trade and any documentation to be used are agreed. It is important that these be agreed between the operations areas of the two parties, independently of the traders, to reduce the risk of either fraud or unauthorised dealing on the part of the trader.

A confirmation sets out the terms and conditions of an individual transaction at the point of trading; it is a written representation of the verbal contract (the trade) and is evidence that the transaction has occurred. Once it has been signed by both parties, there is no possibility of dispute over the trade's terms and conditions. It is important that there is a reference on the confirmation to the date of the master agreement. The confirmation incorporates the ISDA definitions appropriate to that trade.

Historically, the key difference between the administration of OTC transactions and that for exchange-traded contracts concerns the documentation relating to the trades. As there are no standard terms for OTC contracts, unlike for a listed product on an exchange, both counterparties to an OTC transaction were required to ensure that the trade was recorded on the terms that both counterparties agreed at the time of the trade.

However, for those counterparties with high mutual trading, a master confirmation can be agreed upon. This provides a general framework for the confirmation of each type of transaction. Its use improves the speed of the confirmation process, thus avoiding later settlement and risk management problems that arise when incorrect position records are encountered or with late or missed payments.

A master confirmation represents the market consensus as to how a product is expected to work and sets out the standard definitions and terms for that product on either a global or regional basis. It allows thereafter for the exchange of what is called a transaction supplement, which has only the trade-specific details of the individual transaction. The transaction supplement merely has to reference the fact that it is written under the terms of the master confirmation and so, in most cases, it is shorter than a normal confirmation.

The details of all trades must be reported no later than the working day following the conclusion (modification or termination) of the contract. The reporting obligation, which came into force with EMIR in August 2012, applies to all derivatives contracts, except those that were closed out before that date.

EMIR reporting requirements do not apply to individuals nor do they extend to non-EU counterparties. However, in the case of an EU counterparty under EMIR dealing with American counterparties (or from other jurisdictions), the equivalent Dodd-Frank or other OTC derivative reporting requirements will apply to the other side of the transaction.

Similarly, IHS Markit (which is part of a joint firm with S&P Global) has been responsible for achieving consensus in the credit market in the same way as the ISDA and, by publishing standard terms has allowed market participants to reference those terms, in much the same way as if they had executed a specific master confirmation.

Any disagreements with the terms of the trade must be identified, reported and resolved immediately, and if a confirmation (or acknowledgement of a confirmation) is not received from the counterparty within a prescribed time, escalation procedures must be in place.

3.2.4 Settlement

At the time of the trade and/or subsequently, there will be one or more settlements to be made, which must be monitored, calculated, netted if appropriate, and settled.

The settlement process in OTC derivatives is more complex than with cash instruments. With cash instruments there is often only one fixed settlement date; the amount to be settled is fixed, and this amount can be calculated as soon as the deal has been transacted. With OTC derivatives, apart from the premium paid upfront for an option, this is often not the case.

For example:

- A cap has a series of potential settlement dates; all, some or none may involve a settlement.
- An American-style option can be exercised at any time until expiry, and a European-style option on the day of expiry only.
- The settlement amount on a fixed/floating swap cannot be calculated until the floating rate has been set.
- The fact that a payment is necessary and the specific amount related to a CDS is determined should the predefined credit event occur.

Timely trade processing can help avoid the risks that can arise through late settlement.

3.2.5 Reconciliation

Reconciliation is the control process that ensures trades are done within the limits set out by the firm's trading mandate. A typical reconciliation process is set out below:

- Internal trade capture is the recording of the execution of a trade. This initial step is completed by the traders in the front office, usually entering deal terms into a trade capture system, or a spreadsheet. This is before the official confirmation is received from the counterparty.
- The back office team will then check that the details of the internally captured trade match the request from the client. If there is a discrepancy, the front office desk will be notified immediately and they may have an opportunity to amend or cancel the trade. If this is not possible, it will give the front office desk an opportunity to enter further trades, on their own account, to mitigate any losses from the trading error.
- Once the 'official' confirmation has been shared by the counterparty, the back-office team will again check the details match the internal trade capture. Though similar to the internal reconciliation process, reconciling the external confirmation with the internal trade capture is a legally-binding process. An approved-signatories list is shared with counterparties on a regular basis and after any personnel change. The confirmation must be signed by these approved-back-office signatories and returned to the external counterparty within 24 hours, or as agreed in an ISDA master agreement.
- The middle-office function is the most varied across trading functions. Their involvement in the reconciliation process is limited, with staff on this desk sometimes managing internal trade-capture verification, in place of back office. However, their usual role is outside of the immediate trade reconciliation process, involving mark-to-market calculation, regulatory compliance and trading limit management, as well as counterparty and market risk analysis. They may also hold accountability for documenting the front office's trading mandate, as well as the overall reconciliation process.

Appendix

Answer to Exercise 1

The investor has gained 7251 – 7205 = 46 index points on each contract.

46 x 2 = 92 ticks.

92 ticks x £5 = £460 per contract.

£460 x 6 contracts = £2,760 gain.

Note: The contract specification of FTSE 100 index futures is that the tick size is equal to 0.5 index points. Therefore, in the exercise, the gain of 46 index points is equal to 92 ticks of the futures contract. Therefore, while the value of one index point is £10, the contract's tick value is £5.

Answer to Exercise 2

The put options will be worth exercising, each gaining 7047 – 6927 = 120 index points. However, the investor's option cost 15 index points, so the overall gain is 120 – 15 = 105 index points.

105 index points x £10 x 7 contracts = £7,350.

Answer to Exercise 3

The put will be exercised against the fund manager since the index is 10 points lower than the strike price. However, the fund manager still has a profit of 8 per option (18 – 10), as the premium from selling the puts will partly offset the loss.

Net loss = 8 index points x $10 x 20 puts = $1,600.

Answer to Exercise 4

The net loss is 47.5 index points, or 95 ticks. Each index point is SAR 100 and the trader was long 100 lots (contracts). Therefore, the loss is 47.5 x 100 x 100 = SAR 475,000.

Answer to Exercise 5

The invoice amount is given by the equation:

(EDSP x price factor x scale factor x number of contracts) + accrued interest

where:

EDSP	=	£98.50
Price factor	=	1.12142
Scale factor	=	1,000 (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)
Number of contracts	=	5
Accrued interest	=	£4.54 x 1,000 x 5 = £22,700 (the accrued interest must reflect £100,000 nominal per contract)
Invoice amount	=	(98.5 x 1.12142 x 1,000 x 5) + 22,700 = £574,999

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **How would a London Metal Exchange (LME) warrant be used in the delivery process?**
   Answer reference: Section 1.1

2. **What three choices do holders of futures contracts have?**
   Answer reference: Section 1.2

3. **What is meant by the term 'bust the settlement'?**
   Answer reference: Section 1.2

4. **How is a contract's invoice amount calculated?**
   Answer reference: Section 1.3.1

5. **What is the key advantage of cash settlement over physical delivery?**
   Answer reference: Section 1.3.2

6. **What is the EDSP?**
   Answer reference: Section 1.4

7. **How is an assignment notice used?**
   Answer reference: Section 2.1

8. **What is a cabinet trade?**
   Answer reference: Section 2.4

9. **What triggers automatic exercise?**
   Answer reference: Section 2.5

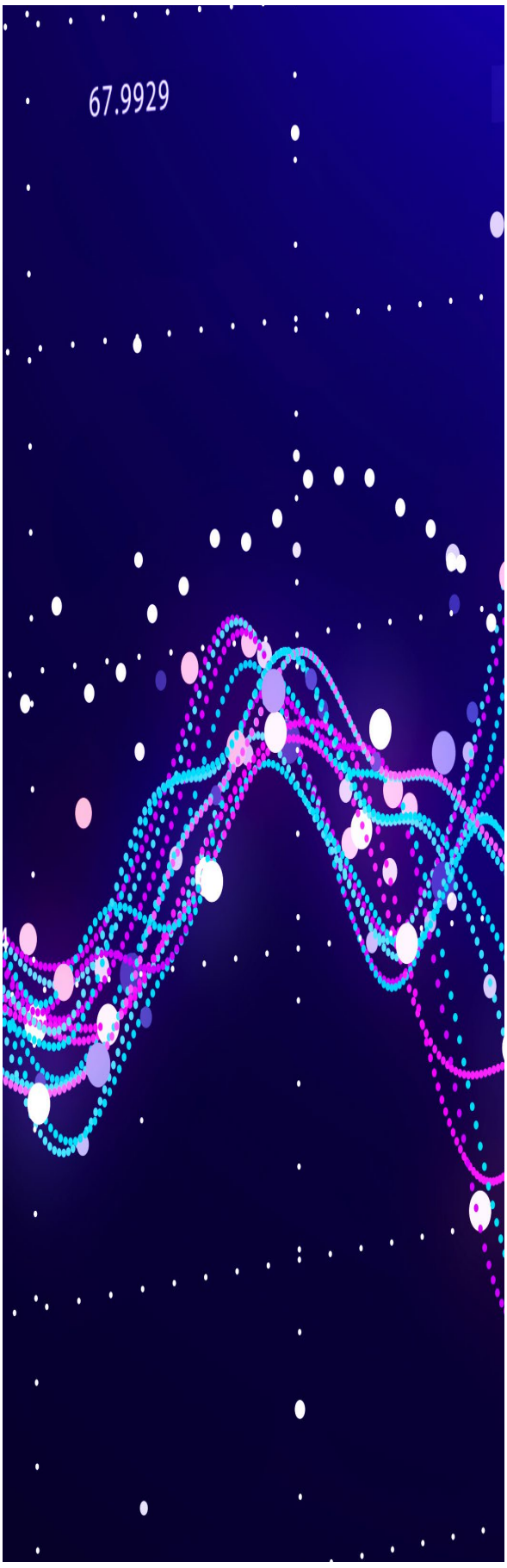
10. **Describe the main difference between front and back office.**
    Answer reference: Section 3.1

Chapter Eight

Trading, Hedging and Investment Strategies

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This syllabus area will provide approximately 14 of the 100 examination questions



1. Introduction

Learning Objective

8.1.1 Understand the categories of users of derivatives and structured products and their respective use of derivative products: hedger; speculator; arbitrageur

A structured product, also known as a market-linked product, is generally an investment strategy that is based on derivatives, such as futures, options and, to a lesser extent, swaps.

Given the variety of products that are considered to be structured products, there is no single, uniform definition of the term. They can include a combination of an underlying asset and a single derivative, or a strategy that includes a number of different contracts or derivatives, such as a range of options or series of futures contracts.

As such, structured products were created to meet an investor's specific needs that cannot be met from the standard or underlying financial instruments available in the markets. Structured products can be used as an alternative to a direct investment, as part of the asset allocation process to reduce risk, to increase one's exposure to an asset or market, or to take advantage of any mispricing that may occur.

Remember that hedging involves reducing the risk of adverse price movements on an underlying position, arbitrage activities take advantage of mispricings and speculators are placing bets on the direction of the price of the underlying asset by taking on new or extra risk.

2. Spreads

Learning Objective

8.2.1 Know the distinctions between intra-market spreads and inter-market spreads and the scenarios in which they may be appropriate: use in differing market conditions; situations resulting in profitability/loss

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 at a later date. 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** – ie, the basis is expected to strengthen or weaken. In the above gilt example, the trader has shorted the time spread, so a strengthening in the basis reduces the profitability of this short spread position.
- **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** – as would be the case of selling the June natural gas on ICE, to close out an existing long futures position, and then buying the December natural gas future, to continue the hedge for another six months.

2.2 Inter-Market Spreads

Inter-market 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.

These trades 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). For example, someone who anticipates a steepening of the yield curve may buy September short sterling contracts and sell September long gilt contracts.

Inter-market trades are used in particular industries for hedging of the production process or to exploit anticipated changes in costs. Additionally, they are used as a means of quickly and cost effectively changing an asset allocation within a portfolio.

Example

A fund manager is looking to reduce their long equities exposure by selling some shares and using the sale proceeds to buy bonds. By using the futures market (eg, selling FTSE 100 futures and buying long gilt futures), it is possible to produce the same effect without the need to trade the actual securities.

In the meantime, the fund manager can continue to benefit from dividend income until the securities are sold as needed, and will unwind the futures positions only when they have the required physical portfolio in place.

In differentiating between intra- and intermarket spreads, it is the underlying asset that is important and not the physical location of the futures product:

- Intra ('**within**') = underlying assets are the same.
- Inter ('**between**') = underlying assets are different.

3. Basics of Hedging

Learning Objective

8.3.1 Know the characteristics and implications of long and short positions

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 price risk in the underlying asset by taking an opposite position in the futures market. So, someone who is long the underlying asset will sell the equivalent number of futures contracts to hedge the risk (a short hedge). Note that, although the cash and futures prices are strongly correlated, there is some flexibility in that relationship. Basis changes will affect the performance of the hedge. This is termed the basis risk of the hedge.

3.1 Cheapest to Deliver (CTD)

Learning Objective

8.4.1 Understand the importance of hedging ratios in cheapest to deliver (CTD) bonds: price factors; highest implied repo rate; number of contracts to hedge an exposure to the CTD bond; duration-based hedge ratios for non-CTD bonds

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If a long bond futures contract is used to hedge a portfolio of underlying bonds, any risk is limited to the basis risk (assuming that the appropriate number of contracts are entered into). Remember that the long bond futures contract has a basket of deliverable bonds, one of which is cheaper to deliver than any of the others – this specific bond is known as the cheapest to deliver (CTD) bond.

The CTD bond is the deliverable bond with the highest implied repo rate – this is a measure of the funding cost implied in futures prices, which reflects the difference between a bond's cash price and the price of a futures contract. 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 bond in the portfolio, not any other bond.

For many 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 conversion factor of the CTD bond needs to be taken into account. The conversion factor is set by the exchange to normalise bonds as each bond has a different yield. The formula is:

$$\text{Number of contracts} = \text{conversion factor} \times \frac{\text{nominal value of CTD portfolio}}{\text{nominal value of the contract}}$$

Example

You have a portfolio of CTD gilts with a nominal value of £10 million and a market value of £11,500,000. The conversion factor is 1.1214645. The contract size of the long gilt future is £100,000 nominal.

Number of contracts needed to hedge = 1.1214645 x £10 million / £100,000 = 112.15

Approximately 112 contracts are needed to hedge the portfolio.

Note that if you did not have a portfolio of CTD bonds, interest-rate futures contracts would be used to hedge the portfolio. Therefore, a different methodology is used to calculate the hedge ratio, per below:

$$N = \frac{P \times DP}{FC \times DF}$$

where:

N = Number of contracts
P = Nominal value of the non-CTD portfolio

DP = Duration of portfolio
FC = Interest-rate futures price
DF = Duration of the underlying asset in the interest-rate future

Sometimes a negative sign is put ahead of the number of contracts to signify that this is a hedge (offsetting position), rather than the cash or outright position.

Exercise 1

An investor has sold short CTD gilts with a nominal value of £15 million and a market value of £15.4 million. The conversion factor is 1.12486. They wish 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.

3.2 Hedge Ratio Calculation

Learning Objective

8.4.2 Understand hedge ratio calculation for other short-term interest rate futures: basis point value; number of contracts to hedge an interest rate exposure

8.4.3 Understand hedge ratio calculation for equity futures: stock and portfolio beta; number of contracts to hedge an equity exposure

A stock or portfolio's beta (ß) is its volatility relative to the entire market. It is calculated per below:

$$\text{Beta}(\beta) = \frac{\text{Covariance}\left(R_p, R_m\right)}{\text{Variance}\left(R_m\right)}$$

Where:

R_p = Return of the stock or portfolio

R_m = Return of the overall market, typically the stock index of the relevant jurisdiction (eg, NIFTY 50 in India or the Tadawul All Share Index in Saudi Arabia)

If the beta is:

More than 1 = the stock or portfolio is more volatile than the market
Equal to 1 = in line with the market
Between 0 and 1 = less volatile than the market
Equal to 0 = no relationship
Less than 0 = inverse relationship

The strength of the relationship is signified by the magnitude.

When using futures to hedge an equities portfolio, the portfolio's beta is useful when calculating how many contracts need to be traded for that portfolio to be fully hedged. A share's beta is the measure of its relative volatility or risk versus the market; therefore, a portfolio's beta is the weighted average of the individual betas of the shares that make up that portfolio.

Example

A portfolio has a beta of 1.1 relative to the S&P 500 (eg, if the S&P rises by 10%, that portfolio will rise by 11%).

The portfolio has a value of US$8.0 million and the fund manager wants to hedge this portfolio using S&P 500 E-mini futures. The S&P 500 index is currently trading at 4400. The CME S&P 500 E-mini contract's size is US$50 times the index.

Number of contracts = $8.0 million / ($50 x 4400) x 1.1 = 36.4 x 1.1 = 40 contracts

In the case of short-term interest rate (STIR) futures, a different formula is used as the hedge ratio is dependent on the relative change in portfolio and STIR prices, given one basis-point change in yields.

$$\text{Hedge ratio} = \frac{\text{Price change in portfolio given one basis point change in yields}}{\text{Price change in STIR futures given one basis point change in yields}}$$

3.3 Basis, Basis Trading and Basis Risk

Learning Objective

8.4.4 Understand basis, basis trading and basis risk: problems caused by changes in basis; how changes in basis can be used to advantage by an investor

Basis and basis trading were covered in section 2 of chapter 3. 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 main disadvantage of changes in basis is for hedgers. When derivatives are used to hedge cash positions, auditors typically require an analysis of the efficiency, or correlation, of the hedge with the cash position. If basis changes are volatile or unpredictable, auditors are unlikely to allow a firm to use derivatives, and in the worst case may force an existing hedge to be listed as a speculative derivative in the firm's accounts. In the latter case, the change in the value of the derivative will be put straight through the firm's profit and loss statement, which can cause large fluctuations in the firm's profitability.

The main advantage of changes in basis is for speculators and arbitrageurs. The change in basis allows these participants to profit, as they both believe they have the capability to predict the changes to a greater or lesser degree. Another advantage is that basis trading carries less price risk than trading outright in either leg of the basis (ie, trading only cash or only derivatives). This is because the profit or loss on the outright position is offset, to varying extents, by the other leg.

Example

A fund manager has a portfolio of large UK equities, currently valued at £15 million. They hedge the portfolio by selling 250 FTSE 100 index futures at 7230.

The FTSE 100 stood at 7785. A day later, the FTSE 100 had fallen by 25 index points to 7760 and the future had fallen by 16 points to 7214. The outcome for the fund manager is as follows:

1. Unhedged equity portfolio value = £15 million
2. Value on Day 2 =

Day 1				Day 2
£15 million	x	$\frac{(7785 - 25)}{7785}$	=	£14,951,830

Changes in value of physical portfolio = £14,951,830 – £15,000,000 = –£48,170

3. Futures profit = 250 x (7,230 – 7,214) x £10 = £40,000
4. Hedged portfolio value: loss (due to change in basis) = £40,000 – £48,170 = –£8,170

While there is still a loss due to the change in basis, it is greatly reduced due to the futures hedge.

4. Hedging Using Options

Learning Objective

8.4.5 Understand the application and effects of delta hedging and be able to establish an investor's net long/short position

8.4.6 Understand the use of derivatives for speculation and hedging: speculation: long calls, short puts (bullish); speculation: short call, long puts (bearish); covered calls and protective puts; recognise diagrammatic representation of each strategy; maximum upside and downside for each strategy

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 that the efficiency of hedging using options is dependent upon the delta of the option's position mirroring the delta of the underlying position, in other words, creating an overall delta neutral portfolio.

Broadly, the deltas are as follows:

Position	Delta
Long underlying	+1
Short underlying	–1
Long future	+1
Short future	–1
Long call (deep ITM)	+1
Long call (ATM)	+0.5
Short call (deep ITM)	–1
Short call (ATM)	–0.5
Long put (deep ITM)	–1
Long put (ATM)	–0.5
Short put (deep ITM)	+1
Short put (ATM)	+0.5

4.1 Hedging a Long Underlying Position using Options

Hedging using options is best illustrated by examples. Also see the notes on **covered calls** in section 4.3 of this chapter.

4.1.1 Buy a Put Option

Example

Investor A owns a portfolio of FTSE shares with a current value of £550,000. The FTSE index stands at 7155. 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 ICE, London is the index level x £10 per point.

With the put option exercise price at, say, 7100, each contract hedges £71,000 of shares (7100 x £10 per point).

So, the number of contracts needed = £550,000 ÷ £71,000 = 8 contracts.

4.1.2 Sell a Call Option

Example

An aluminium producer does not have forward sale agreements for all of its production over the next six months. One way to hedge against a possible fall in the cash price would be to sell calls on the LME's primary aluminium futures. The contract size is 25 tonnes. If the amount of the unsold December production is 100 tonnes, the producer can sell four primary aluminium calls with a strike price of $1,900, its budgeted sale price. By selling this covered call, since the producer has the underlying metal, the premium received will partially offset any price fall that might occur. But if the price rises, the producer will only receive $1,900 – the strike price – plus the premium for the option he has sold, if the option expires ITM.

4.2 Hedging a Short Underlying Position Using Options

The following illustrates how a short position might be hedged:

4.2.1 Buy a Call Option

Example

Investor B needs to buy 500oz of gold for June; gold is currently trading at $1,950 per ounce in the cash market.

The investor is exposed to an increase in gold's price. One way to hedge the risk is 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 five 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 their costs, after recouping the premium paid for the call.

4.2.2 Sell a Put Option

See notes on covered short puts in section 4.3 of this chapter.

It is useful to note the following:

- Unlike a futures hedge, an options hedge will underperform 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 (in this case, if the underlying asset's price falls) instead of against him, because the loss on the option is limited to the premium paid.

4.3 Covered Options Positions

Learning Objective

8.5.1 Understand the uses and advantages of covered calls and protective puts: motivation for the writer of a covered call; motivation for the buyer of a protective put; risks/maximum losses; use in different market conditions

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4.3.1 Covered Short Call

A covered short call is constructed by combining a long underlying position with a short call position, therefore, it is sometimes referred to as a **buy-write** strategy.

The motivation behind covered short calls is to enhance returns in a stagnant market and, at the same time, to partly hedge a long underlying position:

- If the market remains **stagnant**, an investor will enhance the return on the asset, since they have collected the option's premium and the option will expire unexercised.
- In a **falling market**, the premium will reduce the loss, but will not provide a true hedge. This is because the gain on the short call in a falling market is limited to the premium.
- In a **rising market**, overall gains will be limited, since the call will be exercised and any further gains above the strike price will not be realised, since the investor no longer owns the asset.

The following example illustrates the potential outcome of a covered short call strategy.

Example

An investor is long 1,000 ABC plc shares. Current share price is 407. He sells an ABC plc 425 call for a premium of 11 (each contract is for 1,000 shares).

Analysis of outcome at expiry

If the share price is unchanged at expiry, the option is abandoned. The investor keeps the premium, thereby creating a positive return on investment.

If the share price drops, the premium helps to cushion the fall. The investor is hedged to the extent of the premium:

- If the fall is less than the premium, the investor is still better off.
- If the fall is greater than the premium, the investor loses the excess above the premium.

If the price continues to fall, the investor's losses will increase. Should the share price fall to zero, the investor will lose their entire investment, with only the 11p premium receipt to offset those losses.

If the share price rises to 425, the investor will make a profit on the shares and keep the premium – their total profit will be 29 (ie, 18 on the underlying + 11 on the premium). This is the 'point of maximum profit', which is the highest profit that can be earned on the position.

The return on investment is 18 (ie, 425 – 407). Since the premium of 11 that was received for the call reduces the initial investment to 396, in percentage terms, the return is 4.55% (ie, (425 – 407) / 396) over the period. The difference between the point of maximum profit and the return on investment lies in the premium, since this is received at the inception, rather than through the course, of the investment.

If the price rises above 425, the option will be exercised against the investor, and the investor will deliver the share for 425. Therefore, the investor has effectively capped their maximum potential profit at 29 (ignoring dividends paid on the shares).

Exercise 2

Client Z holds 1,000 shares in XYZ, with a current price of 215p. They write 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 Client 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. This is more of a speculative position, where the investor may be happy to sell the asset at that price, based on the outlook that its price will fall later. Again, receiving the premium does raise one's break-even level but, like covered calls, this strategy has created an open risk that the asset's price will continue to rise. It is important to note that naked shorting of securities is illegal in many countries, notably the US, EU, India and Hong Kong. This is because there is a significant risk of writers not fulfilling their obligation to provide the underlying asset in the event of exercise, which can cause disruption to orderly securities markets – a key mandate for most financial regulatory authorities.

4.3.2 Covered Short Put

A covered short put position is constructed by:

1. writing a put but, at the same time, holding sufficient funds to buy the asset if necessary, or
2. already having a short position, such as being short the futures contract, then writing a put on the futures contract.

The motivation of a covered short put is to enhance the return on funds in a stagnant market and to partially hedge a short underlying position. It is also an attractive method of making profit on a short position. However, it does limit gains on that short position since, once the put is exercised, the investor no longer has a short position in that asset and, therefore, will no longer profit from further falls in its price.

Example

The ABC plc share price is 407p. An investor sells shares at 407p and sells a 400 put for 20p per share.

Analysis of outcome at expiry (the opposite of the covered short call)

If the share price is unchanged at expiry, the option is abandoned by the long put and the investor keeps the premium. This increases the return on their funds by the premium retained.

If the share price rises above 400p, but stays below 427p, the loss of being short will be more than offset by the premium collected. Above 427p, the investor will experience a net loss.

If the share price falls below 400p, the option will be exercised against the investor. The investor will have to buy the shares at 400p. They have effectively reduced the cost price of the shares to 400p, less the amount of the premium – that is, to 380p (ie, 400p – 20p).

The point of maximum profit is at 400p. The investor will make 20p on the premium, plus the interest on the funds, and be able to buy the shares at 400p rather than 407p.

Exercise 3

Client P enters into a covered short put position on the shares in QRS plc. They write a 700p put option for a premium of 12p at the time QRS plc shares are trading at 718p. What is the outcome for Client 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.

5. Options Spreads

Learning Objective

8.5.2 Be able to calculate (through the knowledge gained above) a derivatives position with an underlying market equivalency, either to establish or to hedge a required exposure: long/short through futures; long/short through single options; long/short through option combinations; limits to upside and/or downside exposures

An options spread involves the simultaneous purchase and sale of options in the same class (ie, 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. For example, 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. For example, 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. For example, buy April 200 call and sell May 220 call.

We will now consider each of these types of options spreads in turn.

5.1 Vertical Spreads

Learning Objective

8.5.3 Understand the characteristics and effects of vertical spreads: bull call and bear call spreads; bull put and bear put spreads; use in differing market conditions; anticipating modest market rises/falls (bull/bear markets); risks

8.5.4 Be able to calculate maximum profits/losses in simple examples of the above strategies

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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. Therefore, they 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 a 500 call and selling a 600 call (a bull call spread), or buying a 500 put and selling a 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 a 500 call and buying a 600 call (a bear call spread), or selling a 500 put and buying a 600 put (a bear put spread).

Example

The current price of ABC plc is 550. The options available with the premium (PM) at a range of exercise prices are as follows:

Call PM	Strike	Put PM
70	500	18
49	525	23
37	550	35
25	575	47
19	600	67

Rationale

Suppose an investor is bullish on ABC shares. They could buy the 550 call and pay a premium of 37. However, they are moderately bullish and do not think the shares will rise beyond 590 by expiry. Therefore, they sell the 600 call at the same time. They receive a premium of 19, which reduces their net outlay to 18, as they paid a premium of 37 to buy the 550 call. This is known as a bull call spread.

Analysis

If the price remains at 550 or below, both the 550 call and 600 call options will expire OTM and be abandoned. The investor's loss will be limited to the net outlay of 18.

If the price rises beyond 600, both calls are ITM and the investor will exercise. In effect, the investor will exercise the 550 call and will be obliged to deliver the ABC shares at 600. The profit will be capped at 32 (ie, (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.

Exercise 4

Client 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

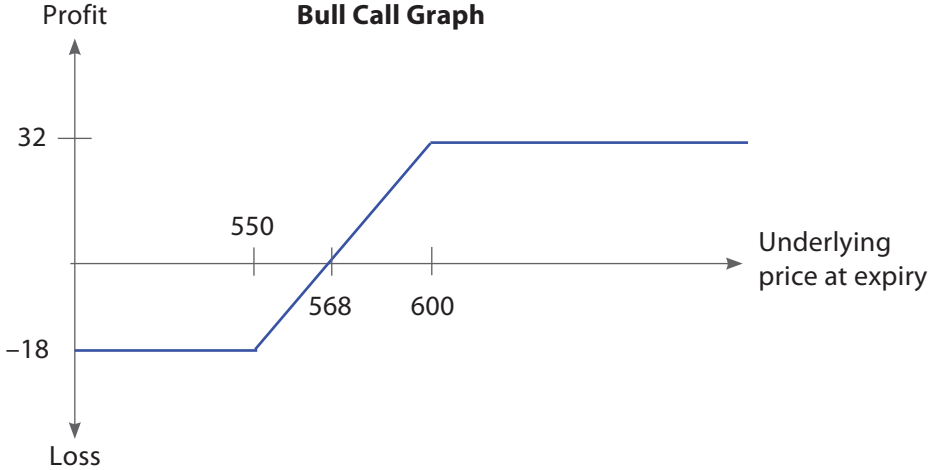
The answer can be found in the appendix at the end of this chapter.

5.1.1 Summary of Vertical Spreads

Bull Call

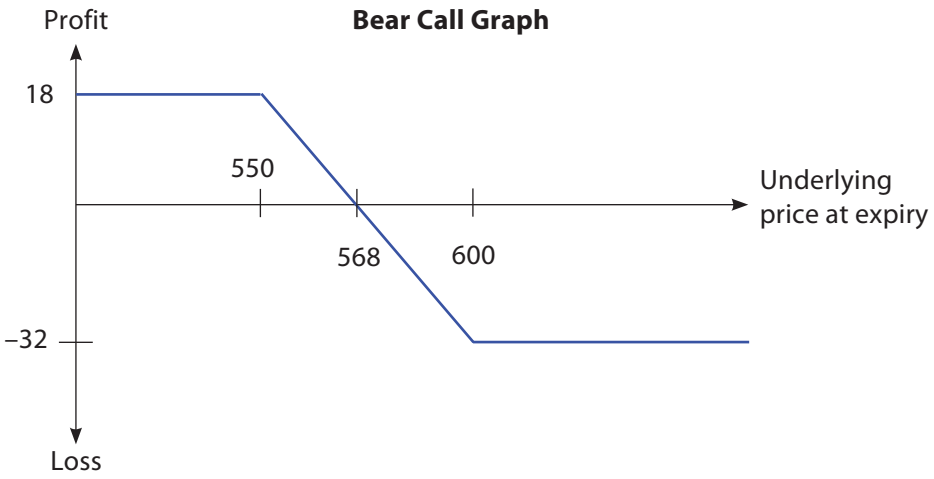
Motivation	Moderately bullish.
Construction	Buy at lower strike price, sell at higher strike price.
Net premium	Paid out.
Maximum risk	Net premium paid.
Maximum reward	Difference in strike prices less the net premium paid.
Break-even point	Lower strike price + net premium paid.

Bull Call Graph



Bear Call

Motivation	Moderately bearish.
Construction	Sell at lower strike price, buy at higher strike price.
Net premium	Received.
Maximum risk	Difference in strike prices less the net premium received.
Maximum reward	Net premium received.
Break-even point	Lower strike price + net premium received.



Bull Put

Motivation	Moderately bullish.
Construction	Buy at lower strike price, sell at higher strike price.
Net premium	Received.
Maximum risk	Difference in strike prices less net premium received.
Maximum reward	Net premium received.
Break-even point	Higher strike price less net premium received.

The shape of the bull put graph will be identical to the bull call graph.

Bear Put

Motivation	Moderately bearish.
Construction	Sell at lower strike price, buy at higher strike price.
Net premium	Paid out.
Maximum risk	Net premium paid.
Maximum reward	Difference in strike prices less net premium paid.
Break-even point	Higher strike price less net premium paid.

The shape of a bear put graph will be identical to the bear call graph.

Exercise 5

Client Z buys a 500 put in ABC plc shares for 18p and sells a 550 put at 35p. What is the break-even point and what is the maximum profit on this trade?

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

5.2 Horizontal and Diagonal Spreads

Learning Objective

8.5.5 Understand the uses, characteristics and effects of horizontal and diagonal spreads: use in differing market conditions; anticipating modest market rises/falls (bull/bear markets); risks

5.2.1 Horizontal Spreads

Horizontal spreads (also known as **calendar spreads**) 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 rise, and involves selling shorter-maturity options and buying longer-maturity options 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 more quickly to a fall in volatility than the longer-dated option.

Example

The GBP/USD spot rate is currently quoted at 1.2500/05. The following options, with ATM strike prices, are currently quoted in the market.

Expiration	Call Premiums	Strike Price	Put Premiums
1 month	65	1.2550	70
3 months	130	1.2550	145
6 months	280	1.2550	295
12 months	575	1.2550	585

Rationale

Based on the viewpoint that currency rates will remain steady over the near term, and that the slight premiums the sterling short-term puts have will decrease, an investor will sell the one-month 1.2550 put and buy the six-month 1.2550 put, for a net cost of 225. This is known as a horizontal spread.

Analysis

If the spot GBP/USD exchange rate remains fairly steady and looks set to settle into a trading range, the implied volatility combined with the larger time decay will cause the premium on the shorter-term GBP put to fall faster than that of the longer maturity.

After two weeks, when the premiums of these same options have fallen to, say, 60 for the two-week and 290 for the five-and-a-half month GBP put, the investor will receive a net premium of 5, since they are able to unwind the spread and receive a net payment of 230, compared to the initial cost of 225.

The second type of horizontal 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.

Exercise 6

An investor holds the view that a company's earnings report is going to be much higher than the market's expectations. Based on this view, the investor buys a two-week 110p call on its shares for 20p and sells a three-month 110p call at 130p.

If the investor is right, and the premium on the short-term option goes to 35 and the longer option goes to 135p, what is the investor's net profit/loss?

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

5.2.2 Diagonal Spreads

Diagonal spreads are directional depending on market view. They will be constructed with call options (if the investor's view is bullish) or put options (if bearish) by selling shorter-dated options and buying longer-dated and further OTM options. Diagonals are difficult to compute as, once again, they use options with different expiry months (as well as different strikes).

Both the bullish and bearish strategy types take advantage of the different rates of time decay for options with different expiries. Essentially, the trades are designed to take advantage of changes in volatility.

Although there will be no calculation questions in the exam on horizontal and diagonal spreads, there may be questions on the theory and, of course, these are fundamental strategies used by options traders in the actual marketplace.

6. Options Combinations

Learning Objective

8.5.6 Understand the characteristics and effects of long and short straddles and strangles: use in differing market conditions; anticipating modest market rises/falls (bull/bear markets); risks

8.5.4 Be able to calculate maximum profits/losses in simple examples of the above strategies

8.5.2 Be able to calculate (through the knowledge gained above), a derivatives position with an underlying market equivalency, either to establish or to hedge a required exposure: long/short through futures; long/short through single options; long/short through option combinations; long/short through simple OTC derivatives; limits to upside and/or downside exposures

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 as the purpose of synthetic positions is to simulate the features of another comparable position, rather than being the original way of creating a specific type of exposure).

The two major strategies are straddles and strangles, both of which attempt to profit from a change in the volatility of the underlying asset. Straddles utilise a put and call with the same strike and expiry. Strangles are identical to straddles, aside from each leg in the structure having a different strike price. Long positions anticipate an increase in volatility and short positions anticipate a decrease.

To understand how these strategies work, let us consider an example of DEF shares. The current price is 550p and the following options are available:

Call PM	70	49	37	25	19
Strike	500	525	550	575	600
Put PM	18	23	35	47	67

The following sections give the rationale and analysis of long and short straddles and strangles.

6.1 Long Straddle

Rationale

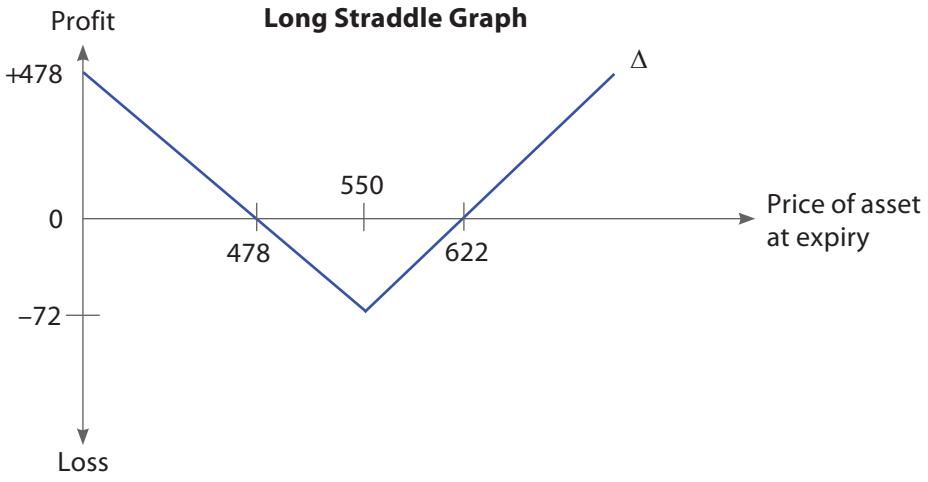
An investor is unsure about the direction of movement in DEF shares. Perhaps a major announcement is due, for example – good news will likely push the share price higher, whereas bad news will likely push it lower. By buying a 550 call for 37, the investor will profit if the price rises, and by buying a 550 put for 35, they will profit if the share price falls. By doing both, a long straddle position is created for a net premium outlay of 72 (ie, 37 + 35).

Analysis

If the news is good, and the share price rises to, say, 660 by expiry, the investor will exercise the call (IV of 110) and abandon the put. They have paid 72 for the strategy, giving a net profit of 38 (ie, 110 – 72). For the strategy to make a net profit, the price has to rise above 622 (ie, 550 + 72).

If the news is bad and the share price falls to 500, the investor will exercise the put (IV of 50) and abandon the call. The price move has not been large enough to offset the premium paid. The price will have to fall below 478 (ie, 550 – 72) before the strategy shows a net profit.

There is profit potential on this trade in either direction, provided the price movement is large enough (high volatility) to overcome the cost of both premiums. The strategy has two break-even points: an upside and a downside break-even.



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.
Break-even point	Downside: strike price less total premium paid. Upside: strike price plus total premium paid.

Exercise 7

What is the break-even 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.

6.2 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, will be looking to sell both call and put, ie, 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.

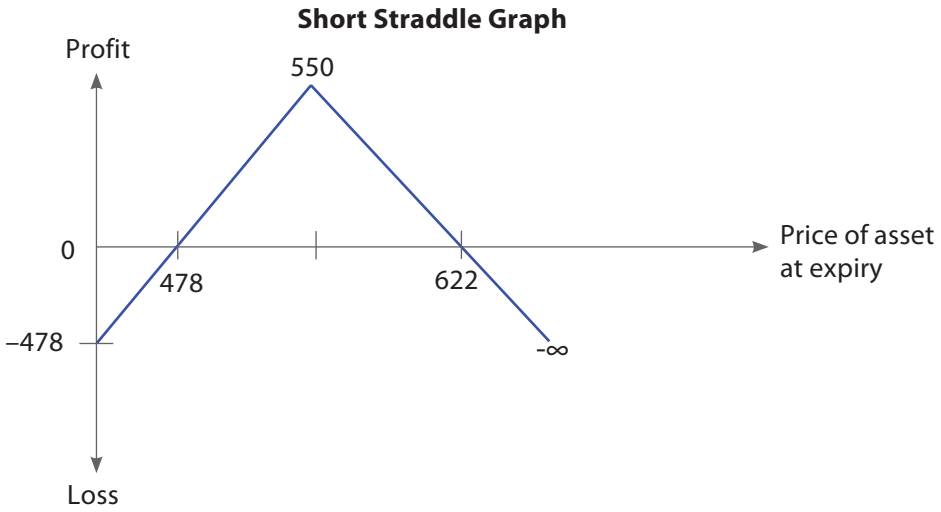
Analysis

The investor will have received a net premium of 72 (ie, 37 + 35).

If the share price rises, the investor will have the call exercised against them and lose the IV. Provided this is less than 72, the investor is still making a net profit. A movement above 622 will produce a net loss, which is the call's strike price plus the net premium received for the structure as a whole.

If the share price falls, the investor will have the put exercised against them and lose the IV. Provided this is less than 72, the investor will still be making a net profit. A movement to below 478 will produce a net loss, which is the put's strike price minus the net premium received.

The point of maximum profit will be at 550. Here, both options will be abandoned. The investor's loss will be limited to the net outlay of 18.and the seller of the straddle will keep the total premium. You can see that there is a profit potential on this trade in either direction, provided the price movement is not large enough (low volatility) to outweigh the net premium received.



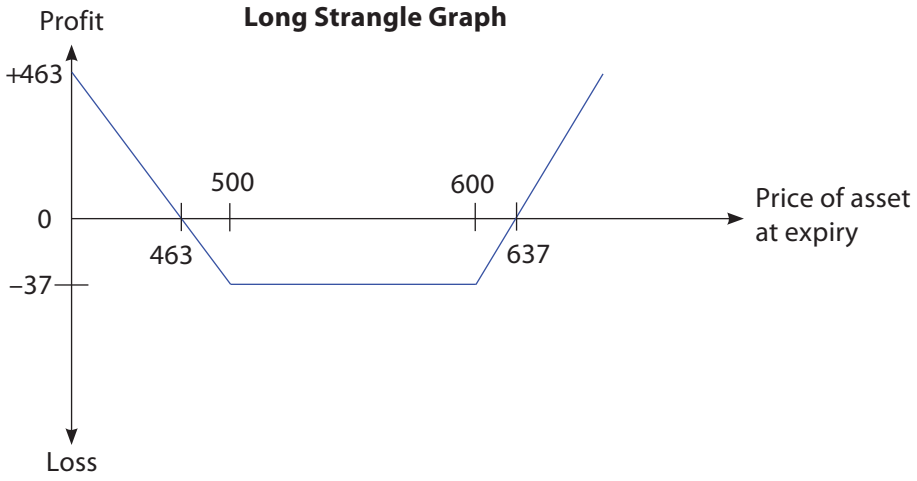
Motivation	Expectation of decrease in volatility.
Construction	Sell a call and a put with the same strike price and expiry.
Maximum risk	Unlimited.
Maximum reward	Limited to the sum of the premiums received.
Break-even point	Downside: exercise price minus premiums. Upside: exercise price plus premiums.

6.3 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.

The 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 strike prices (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.
- A strangle needs more volatility to succeed, because not only does the sum of the premiums paid need to be exceeded, but so does the difference in the strike prices, before a profit is achieved.
- The maximum loss on a long position will be crystallised over a range (between the two strike prices) where neither option will be worth exercising.



Motivation	Expectation of large increase in volatility.
Construction	Buy a call and a put with the same expiry but with different strikes.
Maximum risk	Total premiums paid.
Maximum reward	Unlimited.
Break-even point	Downside: lower strike price less total premiums paid. Upside: higher strike price plus total premiums paid.

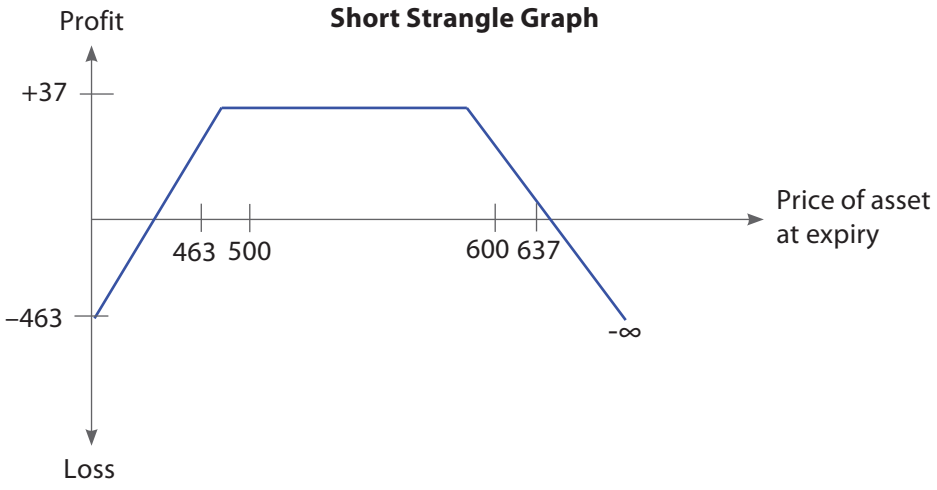
Exercise 8

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.

6.4 Short Strangle

A short strangle is the other side of a long strangle strategy. For example, it will be created by selling a 500 put for 18 and selling a 600 call for 19.



The 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.
- A strangle can withstand more volatility than a straddle before losses are incurred, as not only must the sum of the premiums received need to be exceeded, but so does the difference in strike prices.
- The maximum profit on a short position will be crystallised over a range (between the two strikes) where neither option will be worth exercising against the seller.

Motivation	Expectation of a large decrease in volatility.
Construction	Sell a call and a put with the same expiry but different strikes.
Maximum risk	Unlimited.
Maximum reward	Total premium received.
Break-even point	Downside: lower strike price minus premiums. Upside: higher strike price plus premiums.

7. Synthetics

Learning Objective

8.5.7 Understand how to create basic synthetic options and futures: synthetic long/short; synthetic put/call

8.5.4 Be able to calculate maximum profits/losses in simple examples of the above strategies

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By combining futures and options, it is possible to create positions synthetically. There are six basic synthetics that you should be familiar with:

1. **Synthetic long future** – buy a call and sell a put with the same strike and expiry. Also known as a reversal.
2. **Synthetic short future** – sell a call and buy a put with the same strike and expiry. Also known as a conversion.
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 short call 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 short put 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 are available, the investor could create a futures position synthetically, provided options are available.

The main reason for the use of synthetics is arbitrage. The put/call parity formula encountered earlier (chapter 4, section 2.2) 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 one another, it is possible to lock in riskless profits. This is illustrated in the following example, creating synthetic futures.

Example

The long gilt future is currently trading at 114.14. The premium of the 114 call is 0.45 and the premium of the 114 put is 0.39. What should you do?

Buy the call and sell the put for a net premium outlay of 0.06 (ie, 0.45 – 0.39). This gives you a synthetic long futures position at 114.06, since the entry point of the synthetic position must include the cost of entry.

However, the actual future is trading at 114.14, so sell the future to lock in the difference of 0.08, which is the gross profit.

Both OTC and exchange-traded derivatives can be used in the wide range of trading strategies discussed in this chapter. Many include both types as part of the same strategy.

The same factors that an investor or fund manager uses when deciding which type of contract to use in a basic position are also used in these strategies. The most basic is: which type of contract best fits the goal of the strategy? If it is a hedge, does the flexibility of an OTC contract better suit the hedge, or does the extra liquidity and ease of trading an exchange-based product better suit one's goal?

While they are important, they are just some of the many factors that are used when deciding what type of contract is best.

8. Exchange-Traded versus Over-the-Counter (OTC)

Learning Objective

8.5.8 Understand the advantages and disadvantages of using exchange-traded versus OTC products: exposure flexibility versus contract specification; ease/cost of closing OTC transactions versus exchange-traded positions; price transparency; best execution; documentation; clearing and settlement mechanisms

As we have seen in previous chapters, exchange-traded derivatives (ETDs) and OTC derivatives each have their advantages and disadvantages with respect to speculative and hedging strategies, which are summarised in the table that follows on the next page.

	Advantages	Disadvantages
ETDs	Generally, more liquidity. Full price transparency. Counterparty credit risk limited to the exchange's clearing house (effectively almost none).	Margin payments required. Standardised contracts.
OTCs	Flexible contracts to fit any exposure. No margin required (although usually marked to market), any collateral process depends on the counterparty.	Counterparty credit risk. Limited price transparency. Higher transaction costs.

Note that best execution depends more on the client's relationship with their broker. While the increased price transparency associated with ETD contracts does give them a slight advantage, in this aspect it is more of a case-by-case basis.

When comparing an OTC to an ETD, any investor has to weigh up the advantages and disadvantages. One of the key advantages of OTC is the flexibility that this contract gives to an investor. An OTC derivative can be negotiated and customised to meet the specific needs of an individual investor including contract amount, maturity/expiration date and contract price. This flexibility is key to OTC derivatives, but there is a trade-off since OTC derivatives have several drawbacks compared to exchange-traded derivatives; for example, OTC contracts tend to have more counterparty risk and less market transparency, which might result in limited liquidity and higher transaction costs.

Since most ETDs have standard specifications, their documentation and trade processing and clearing is also fairly standard. In contrast, while some OTC derivative counterparties can have netting and other credit management agreements that will enable them to reduce the associated trade documentation, the fact that the OTC derivatives are individual means that, for most, the trade documentation process is more involved, usually meaning higher transaction and processing costs.

The same is true for settlement agreements/procedures. The fact that the clearing house is the counterparty to every trade means that there are specific and standard delivery procedures for those ETDs that do go to delivery. This again reduces counterparty risk, as well as delivery costs. Regulatory changes over the years since the global financial crisis have promoted the level of standardised or straightforward settlement processing of a wide range of OTC derivatives, with the use of central counterparties (CCPs), also known as central clearing parties.

The flexibility of OTC derivatives with regard to contract maturity/expiration also extends to its delivery mechanism. When an OTC derivative is negotiated, either counterparty can include specific delivery arrangements that meet their specific requirements. For example, a buyer of a silver call may have included, as part of the contract agreement, specific details of where the seller will deliver the silver, if the buyer chooses to exercise the call. This flexibility should be priced into the call's premium.

9. Indirect Investment

Most investors are unlikely to become involved directly in the 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:

1. **Accounts** – a discretionary account operates where the client (usually a wealthy individual) 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. The key advantage of such accounts is that the client benefits from professional management and oversight. The client also benefits from profits, but is equally liable for losses on the portfolio which could be more than the funds invested.
2. **Pooled funds** – these are collective investment schemes (CISs) managed by regulated fund management companies on behalf of investors whose money is pooled together and invested. CISs can include derivatives. The maximum loss to the investor is restricted to the amount they invest. The main advantage of CISs is that, by pooling the funds, risk is diversified because there are multiple sources of investment capital, so withdrawals will have a small impact on the overall ability of the fund to function. Also, the larger size of the fund allows potentially higher diversification of investments and lower transaction costs, which reduces the impact of singularly poor performing investments. These schemes may have any number of investors, sometimes quite a high number but usually small, and the investors are routinely charged management fees (which can be high).

9.1 Investment Style of Derivatives-Based Funds

The investment style/objectives of derivatives-based funds vary, but can be categorised by three main types:

1. **Speculative** – these are highly geared funds investing in derivatives to produce high returns, at a high risk. Clients cannot lose more than the funds invested.
2. **Guaranteed** – also known as structured funds, these are funds that lock in the investor for a minimum period and provide exposure to a market but guarantees that, at worst, the investor will get their capital back (or a preset amount, eg, 95% capital protected). Typically, most of the funds will be invested in ZCBs or cash, with the balance being used to buy options (eg, FTSE 100 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 ten years). If an investor only received their initial stake back, their cost is the lost returns they could have received elsewhere; for example, bank interest – this is known as opportunity cost.
3. **Synthetics** – these are funds designed to replicate the performance of an index. They use the techniques described in section 6 of this chapter to achieve their objectives. Typically, the capital is invested in risk-free deposits and the relevant numbers of futures contracts (representing the value of the funds) are purchased. Note that, even though futures are being used, there is no gearing in these funds as the nominal exposure is fully backed by cash or other liquid securities.

9.2 Derivatives-Based Funds

CISs are a means of investing money alongside other investors, while benefiting from professional fund management.

The prime CIS vehicle is the unit trust. There are two types of unit trusts: authorised (AUTs) and unauthorised. The authorisation, which comes from the FCA, is of significance since it dictates the marketability of the fund to private customers – AUTs can be freely advertised and marketed; unauthorised unit trusts cannot. CISs that primarily use derivatives are generally referred to as hedge funds.

Exchange-traded funds (ETFs) may be an underlying (options on ETF shares), but many funds are also extensive users of derivatives. Commodity-based funds and funds which invest in relatively illiquid segments of the market (high yield bonds, for example) often use derivatives to provide some or all of their exposure to their mandated asset class. Likewise, leveraged ETFs and particularly inverse ETFs (the latter provide short exposure to a given benchmark) are also often completely composed of cash and derivatives, rather than actual securities or physical assets.

9.3 Offshore Funds

Investors can invest in CISs established onshore (ie, those that are domiciled in the investor's home country) or offshore (usually domiciled in low-tax countries). Offshore funds may provide an 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 onshore fund. Most offshore funds are based in financial centres such as Luxembourg, the Cayman Islands, the British Virgin Islands or Mauritius.

10. Application – Different Uses

Learning Objective

8.5.9 Understand the relative attractiveness of derivative positions or investments to specific client circumstances: private client investment portfolios; individual portfolios; institutional asset managers; corporate treasurers; hedge funds; sovereign wealth funds; pension funds

As we saw in chapter 1, section 1, derivatives can be used to reduce risk (ie, hedging) or increase risk as a way of increasing profit (ie, speculation) or indeed obtaining risk-free profits through arbitrage. We also know derivatives are leveraged, some more than others. The following provides an overview of how different types of clients/investors are most likely to use derivatives.

10.1 Private Client Investment/Portfolios

A private client (also called a retail client) is someone who is neither a professional nor is considered to be an eligible counterparty. This classification of client is defined by a wide range of regulations including those in the FCA's Handbook, the EU's MiFID and SEC guidelines, to name a few (see chapter 9). While each of the specific guidelines for each agency differs slightly regarding, for example, capital and knowledge

thresholds for investor classification, previously defined 'individual' investors are no longer automatically considered retail investors. Retail investors are provided with the highest level of protection – the main reason for this is the view that these investors have the lowest risk tolerance, and many have a limited understanding of the risks associated with many investments.

Their use of derivatives can range from never having used them before, through to limited hedging of existing securities investments, to moderate speculation, depending on their knowledge of the markets. The institutions that execute trades for private clients are bound by rules set by the FCA in the UK, ESMA in the EU and the SEC in the US (as well as the SFC in Hong Kong and the MAS in Singapore, to name a few more). These rules typically set out know your customer (KYC) guidelines so investors are correctly marketed investment opportunities that are appropriate to their risk appetite, knowledge and capital. In addition, private clients will find that their speculative use of derivatives may be restricted by their banks/brokers, since they must ensure that clients have sufficient assets/credit facilities to meet all of their obligations, which range from margin calls to the liabilities associated with writing a naked option. There are also regulations that restrict private client use of derivatives, particularly when it is related to self-managed pension accounts.

10.2 Individual Portfolios

Most banks/brokers have their own in-house parameters to classify an individual investor from a retail client. They usually define an individual as 'high net worth' (or HNWI) when they have a specific minimum amount of wealth or income, such as $1 million (excluding primary residence) in net worth or income over $200,000 per year, according to the SEC's rules. This will vary across jurisdictions; for example, the UK's FCA defines HNWI as someone with an income of at least £100,000 or net assets of at least £250,000. While slightly more relaxed, the KYC rules still apply since, with these relatively large sums, the regulators are concerned about money laundering as well as client protection and the protection of client assets (CASS).

Given their increased assets, this class of client will normally have a wider range of derivative products available for their use. They tend to have a higher risk tolerance, therefore, their use of derivatives is more speculative than that of private retail clients. Such clients are also assumed to be fairly sophisticated and knowledgeable of more complex trading strategies; however, banks/brokers should always try to ascertain a client's level of understanding and appetite for risk.

In summary, HNWIs normally take riskier derivative positions, depending on their wealth; these positions can sometimes match those of small hedge funds. This class of investor will normally be more restricted by the limits placed upon them by their banks/ brokers, who must ensure that they have sufficient funds/credits to cover any margin calls or funds to cover the exercise of any naked written option position held by these clients.

10.3 Institutional Asset Managers

Fund managers of CISs may use derivatives to both reduce (hedge) and increase risk (speculate), as a means to increase the return of their fund. Each fund will have specific guidelines in terms of returns, risk and other factors, within which they must operate. While the Undertakings for Collective Investment in Transferable Securities (UCITS) Directive III has allowed OTC funds to increase their use of derivatives,

provided they report and account for such use and manage it within their guidelines, institutional asset managers will be more conservative in their use of derivatives than hedge fund managers (for the most part), but generally less so than a corporate treasurer (section 10.4).

Institutional fund managers may also use derivatives during client transition periods; for example, when a client has given notice of their intention to change managers, but the current manager is still responsible for performance against a benchmark. The current manager will often liquidate the portfolio in order to avoid a sudden need to sell less liquid securities later, then utilise the cash as margin for derivatives to simply track the benchmark until the funds are finally moved by the client. Derivatives can also be used in some markets where owning the cash securities could be problematic, for example in certain international markets where custody is difficult or where capital controls exit.

10.4 Corporate Treasurers

Most companies are not in the business of speculating in derivatives as a way of generating profit. Therefore, most corporate treasurers will use derivatives as a hedge in order to reduce risk. Their use of derivatives ranges from buying or selling futures (both financial and commodities) to reducing any price risk associated with their line of business.

For example, a mining company might sell copper futures when planning their budget to lock-in the future price they will get for the copper they produce. Corporate treasurers may also buy options (eg, FX options) if they are involved in international transactions in order to reduce any currency risk. Many corporate treasurers are also active users of derivatives to manage interest rate risk, as they ensure the firm has access to long-term funds for capital investment while minimising borrowing costs.

10.5 Hedge Funds

There is a wide range of hedge funds, each with its own goal and risk parameters. Funds' use of derivatives will range from hedging to highly geared speculative positions. Another use would be to gain short exposure to markets where securities loans are not possible, as is the case in a number of emerging markets. Again, their use of derivatives depends on their investment goals and specific guidelines.

Regulations, such as UCITS III, have made the use of derivatives by OTC funds less restrictive, while also ensuring that these funds report their use properly and remain within guideline limits.

10.6 Sovereign Wealth Funds (SWFs)

SWFs are pools of money derived from a country's central bank reserves, which accumulate over time as a result of budget and trade surpluses, and are set aside for investment purposes that will benefit the country's economy. The types of acceptable investments included in each SWF vary from country to country but, generally, they include stocks, bonds, property, precious metals and other financial instruments (which, in some cases, include derivatives). Many SWFs are also significant investors in long-term private deals, such as infrastructure projects and private equity.

Some countries have created SWFs to diversify their revenue streams. For example, the United Arab Emirates (UAE) relies on oil exports for its wealth; therefore, it devotes a portion of its reserves to an SWF that invests in other types of assets that can act as a shield against oil-related risk. Nigeria also has a SWF to absorb and invest revenue from the country's oil exports.

Some SWFs may be held by a central bank, which accumulates the funds in the course of its management of a nation's banking system; this type of fund is usually of major economic and fiscal importance. Other SWFs are simply state savings schemes that are invested by various entities for an attractive investment return.

The accumulated funds may have their origin in, or may represent, foreign currency deposits, gold, special drawing rights (SDRs) and International Monetary Fund (IMF) reserve positions held by central banks and monetary authorities, along with other national assets such as pension investments, oil funds, and/or other industrial and financial holdings. Such investment management entities may be set up as official investment companies, state pension funds, or sovereign oil funds, among others.

The following is a list of the ten largest SWFs as at June 2022:

Fund's name	Country	Size of fund – USD billion
Norway Government Pension Fund Global	Norway	1,338
China Investment Corporation	China	1,222
Kuwait Investment Authority	Kuwait	738
Abu Dhabi Investment Authority	UAE	709
GIC Private ltd	Singapore	690
Public Investment Fund	Saudi Arabia	620
Hong Kong Monetary Authority Investment Portfolio	Hong Kong	589
Temasek Holdings	Singapore	484
Qatar Investment Authority	Qatar	450
National Council for Social Security Fund	China	447

Source: Sovereign Wealth Fund Institute (SWFI)[1]

10.7 Pension Funds

Pension funds, which are also known as superannuation funds in some countries, include any plan, fund or scheme that provides retirement income to its members. Pension funds are pooled monetary contributions from any pension plan set up by employers, unions, or other organisations to provide for their employees' or members' retirement benefits. These funds, typically, have large amounts of money

1 SWFI, 2022. Top 100 Largest Sovereign Wealth Fund Rankings by Total Assets. Retrieved from https://www.swfinstitute.org/fund-rankings/sovereign-wealth-fund (Accessed: November 2022)

to invest and are major investors in a wide range of financial assets, such as bonds, public and private companies and, in many cases, derivative markets.

10.8 Sustainability and Impact Investors

Environmental, social and governance (ESG) principles have come to the forefront in the past decade or so. What was seen as a niche segment of the investment management industry ten years ago has become a requirement for many institutional investors.

- The **'E'** implies that investors should favour companies whose operations are environmentally sustainable and avoid companies and industries which are large polluters or producers of carbon emissions.
- The **'S'** signifies that companies should seek to have a positive social impact on the communities where they operate, on their employees and across the entire value chain of their industry.
- The **'G'** represents transparency, responsible and ethical management at the senior executive level and a refusal to engage with corrupt entities (including within government) even if this leads to lower profitability.

Based on these three criteria, many institutions are reducing their holdings of companies which:

- operate coal-fired power plants
- are in extractive industries which lack environmental safeguards or proper cleanup
- produce armaments
- deal with gambling, tobacco or alcohol, or
- have been too opaque in their reporting to evaluate properly.

These are simply examples of the types of actions that ESG-focused investors are taking and not comprehensive, as market practices and standards are still evolving. It is also important to note that all the above categories of derivatives users could be considered ESG investors if they apply such principles in their investment style.

The carbon emission derivatives mentioned in chapter 2, section 6.5.2 could be used to help implement an ESG-focused investment strategy. Some exchanges are also beginning to introduce futures on ESG equity indices. The CME, for example, offers futures and options on futures for the S&P 500 ESG index, which is the well-known index with a filter applied to remove companies which score poorly according to ESG standards.

10.9 Robo-Advisors

Robo-advisors are investment advisor firms which, unlike traditional advisors and consultants, attempt to automate the process of creating and managing investment portfolios. They often have little or no direct human contact with their clients, as all interaction takes place via an online platform. These firms, after assessing a client's profile (time horizon, investment preferences, risk tolerance) then employ algorithms to build and manage a suitable portfolio. The main attraction of such firms is that they offer professional advice at a low cost. While these firms were run in a similar fashion to quantitative investing firms ('quants') and used rules-based approaches to their operations in the past, increasingly such firms are introducing artificial intelligence (AI) techniques to run their client portfolios.

One of the earliest such firms was Financial Engines, a firm co-founded by Nobel Prize economist William Sharpe, who is famous for inventing the Sharpe ratio (which is a measure of the risk-adjusted return of a financial portfolio). Financial Engines was one of the first firms that attempted to automate the investment process for retail investors.

Most robo-advisors serve the retail market and only provide fairly basic portfolios, consisting of stocks, bonds and cash. However, as the field grows, certain firms are bringing to market an increasing range of products, including derivatives and particular investment styles. For example, Harvested Financial is a US-based robo-advisor offering systematically-run option strategies and their promotional phrase is 'Derivatives For Everyone.' Yova, a Swiss robo-advisor offers customisable impact investing, combining both access to ESG filters and the ability to steer the portfolio towards a client's individual interests or preferences.

Example

A US public employees' pension fund with a multi-billion dollar equity portfolio has been ordered by its board of trustees to begin adhering to, what it defines as, ESG principles in its investment process. Indeed, the board is concerned that the fund will soon be evaluated according to a new benchmark index which utilises a filter to remove low ESG-scoring funds. The benchmark provides some clarity around what the fund could do to redeploy some of its capital.

However, with hundreds of companies in the portfolio and a relatively small staff of employees to perform investment research, it will take many weeks to determine which stocks should be increased and which should be sold. What could the investment committee of the fund do?

As an interim strategy, the investment managers could propose selling a number of E-mini S&P 500 index contracts against their cash equity portfolio and buying an equivalent notional amount of E-mini S&P 500 ESG index contracts, while they conduct a more detailed review of each company in their portfolio. This could partly hedge the portfolio against broad market moves but, more importantly it would lower or eliminate net exposure to what are generally considered low ESG-scoring companies. Importantly, ESG rating agencies differ, so you can get very different scores for the same company; therefore, this is by no means a complete solution for the fund to avoid a poor evaluation.

The interim strategy will increase net exposure to what are generally considered 'high' ESG-scoring names and bring the fund's performance more in line with an index of only companies which have 'good' ESG compliance. This is because its performance will be more strongly correlated with 'good' ESG companies' performance, with the addition of the E-mini S&P 500 ESG index contracts, and the reduction of correlation with overall US equities markets as this has been hedged with the sale of E-mini S&P 500 index contracts.

Appendix

Answer to Exercise 1

$$\text{Number of contracts} = \text{conversion factor} \times \frac{\text{nominal value of CTD portfolio}}{\text{nominal value of the contract}}$$

Number of contracts needed to hedge = 1.12486 x (£15 million / £100,000) = 168.729

As the investor has short sold the gilts, they should buy 169 long gilt futures.

Answer to Exercise 2

a. There is a loss on the shares of 21p (ie, 215p – 194p); however, the option is not exercised, so Client Z keeps the premium of 9p, resulting in an overall loss of 12p (ie, 21p – 9p) per share.

b. There is a loss on the shares of 7p (ie, 215p – 208p); however, the option is not exercised, so Client Z keeps the premium of 9p, resulting in an overall profit of 2p (ie, 9p – 7p) per share.

c. The gain would have been 15p (ie, 230p – 215p); however, the option is exercised, so Client Z needs to deliver the shares at 220p, giving a gain of 5p (ie, 220p – 215p). Client Z also keeps the premium of 9p, resulting in an overall profit of 14p (ie, 9p + 5p) per share.

Answer to Exercise 3

a. The option is exercised and Client P has to pay 700p under the terms of the option. However, since they were short of the shares at 718p, that will give them 18p of profit which, combined with the premium received from writing the covered put, results in a total profit of 30p.

b. The option is not exercised so Client P keeps the 12p premium.

c. While the option is not exercised, Client P will realise a loss of 32p (ie, 750p – 718p). However, that will be reduced by the 12p premium that Client P received for writing the put, which results in a net loss of 20p (ie, 32p – 12p).

Answer to Exercise 4

a. The 550 put will be exercised, so Client Z will buy the ABC shares at 550p each and they will be able to sell the shares for 500p under the terms of the put option they hold. The loss will be 50p, but Client Z has received a net premium of 17p (ie, 35p – 18p). Therefore, in overall terms, Client Z has lost 33p (ie, 50p – 17p).

b. The 550 put will be exercised, so Client Z will buy the ABC shares at 550p each and they will be able to sell the shares for 530p on the market. The loss will be 20p, but Client Z has received a net premium of 17p (ie, 35p – 18p), so in overall terms, they have lost 3p (ie, 20p – 17p).

c. Neither option will be exercised, so Client Z will keep the net premium of 17p (ie, 35p – 18p).

Answer to Exercise 5

This is a bull put spread.

The break-even will be when the share price reaches 533p. At this price, the holder of the 550 put will exercise, so Client Z will lose 17p (buying shares for 550p that are only worth 533p). However, there is also the net premium receipt of 17p (ie, 35p – 18p) to consider, so overall, Client Z will break even.

The maximum profit will occur at 550p or above. At 550p, Client Z will keep the premium of 35p, having spent a premium of 18p on the bought put with the lower exercise, giving a net profit of 17p (ie, 35p – 18p).

Answer to Exercise 6

This is a horizontal spread.

The initial cost of the strategy was 0 (since the investor paid a 20p premium for the long call and received a 20p premium for the short call). If the investor is right, on unwinding both legs of the strategy, they will have gained 15p on the long call and lost 5p on the short call. Therefore, the net change in the horizontal spread is plus 10p.

Answer to Exercise 7

This is a long straddle, and the break-even range is the strike ± the two premiums. Here, the premiums together total 25p (ie, 7p + 18p). Therefore, in this instance, the shares need to fall below 475p (ie, 500p – 25p) or rise to above 525p (ie, 500p + 25p) to bring about a profit for the investor.

Answer to Exercise 8

The underlying share has to:

- rise above 450 + the two premiums, or
- fall below 400 – the two premiums.

Therefore, the break-even range is from 375 to 475.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **What is a market-linked product?**
   Answer reference: Section 1

2. **What are intra-market spreads based on?**
   Answer reference: Section 2.1

3. **When using futures to hedge an equities portfolio, how is its beta useful?**
   Answer reference: Section 3.2

4. **What is a covered short call?**
   Answer reference: Section 4.3.1

5. **From what do vertical spreads attempt to profit?**
   Answer reference: Section 5.1

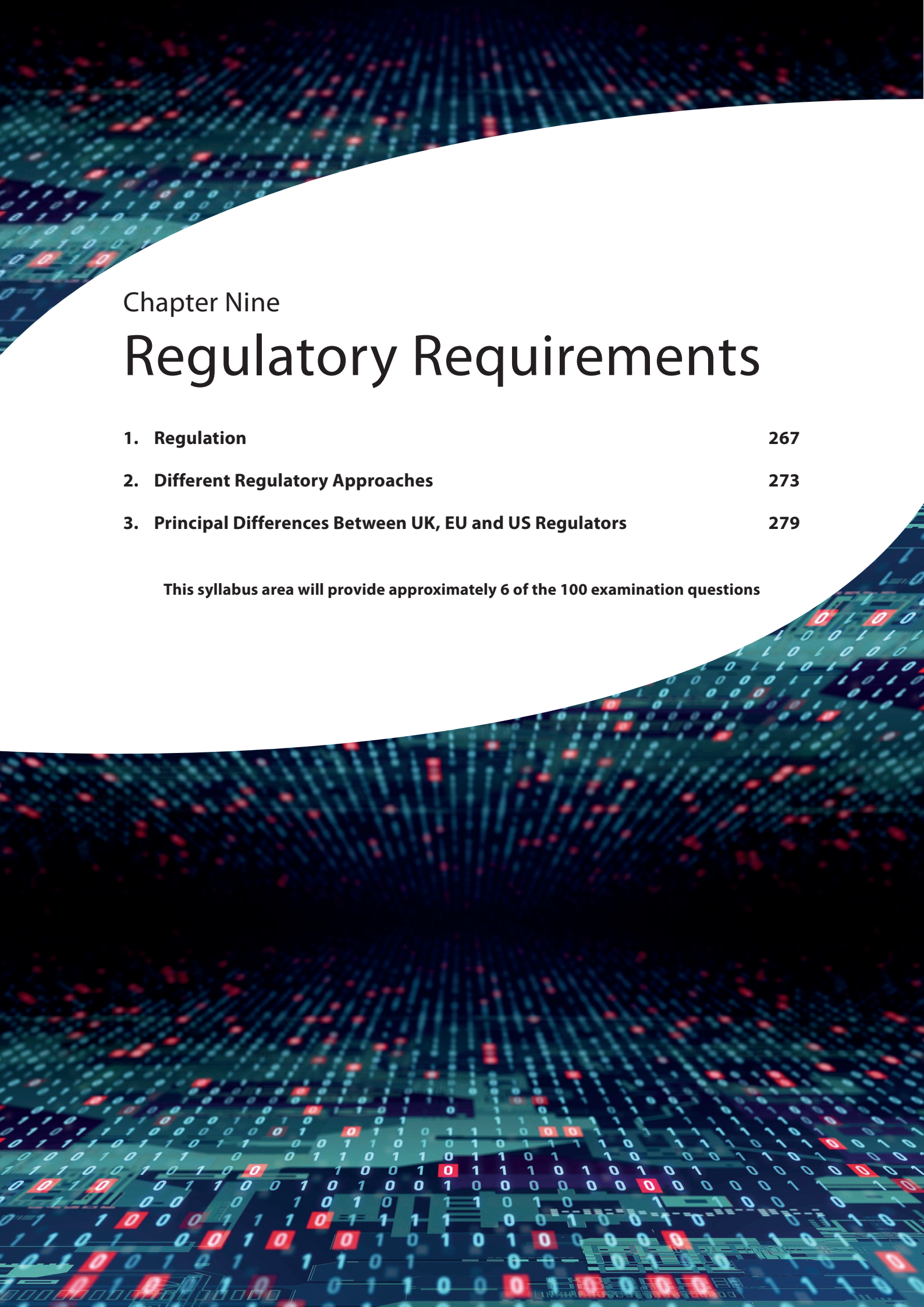
6. **How do straddles and strangles work?**
   Answer reference: Section 6

7. **What is the main reason for using synthetics?**
   Answer reference: Section 7

8. **Identify the key advantage of over-the-counter (OTC) derivatives hedges.**
   Answer reference: Section 8

9. **What are two main routes for most customers wanting to invest in derivatives?**
   Answer reference: Section 9

10. **Who are most likely to be the most conservative users of derivatives?**
    Answer reference: Section 10



Chapter Nine

Regulatory Requirements

1. **Regulation** 267

2. **Different Regulatory Approaches** 273

3. **Principal Differences Between UK, EU and US Regulators** 279

This syllabus area will provide approximately 6 of the 100 examination questions

1. Regulation

Learning Objective

9.1.1 Know in general terms the scope and purpose of regulation of derivatives and the main activities of regulators: UK/Europe/other; US (Fed, SEC and CFTC); Far East (Hong Kong, Singapore and Japan); MiFID II, ESMA, EMIR; orderly markets; consumer protection; education; combating financial crime; regulation of individuals, companies; supervision; sanction processes; passporting regulated status; classifications/exemption

9.1.2 Know the primary requirements of a regulated derivatives exchange

This chapter covers some of the key aspects and the role of market regulators in relation to derivatives in some of the main markets. It is followed by a review of UK, European Union (EU) and US regulations and a brief review of the international accounting rules that apply to derivatives.

1.1 Main Market Regulators

Europe	European Banking Authority (EBA) European Securities and Markets Authority (ESMA) and the European Insurance and Occupational Pensions Authority (EIOPA) UK – Prudential Regulation Authority (PRA) and Financial Policy Committee (FPC) (part of the Bank of England) and the Financial Conduct Authority (FCA)
Asia	China – China Securities Regulatory Commission (CSRC) Hong Kong – Securities and Futures Commission (SFC) India – Securities and Exchange Board of India (SEBI) Indonesia – Financial Services Authority (OJK) Japan – Financial Services Authority (FSA) Singapore – Monetary Authority of Singapore (MAS) South Korea – Financial Services Commission (FSC)
US	Commodity Futures Trading Commission (CFTC) Federal Reserve System (Federal Reserve or the Fed) Financial Industry Regulatory Authority (FINRA) National Futures Association (NFA) Securities and Exchange Commission (SEC)
Latin America	Argentina – Comisión Nacional de Valores (CNV) Brazil – Comissão de Valores Mobiliários (CVM) Mexico – Secretaría de Hacienda y Crédito Público (SHCP)

Middle East and Africa	Dubai – Dubai Financial Services Authority (DFSA) Saudi Arabia – Capital Markets Authority (CMA) South Africa – Financial Sector Conduct Authority (FSCA), Prudential Authority (PA), South African Reserve Bank (SARB) Nigeria – Securities and Exchange Commission (SEC), Central Bank of Nigeria (CBN) Kenya – Capital Markets Authority (CBA), Central Bank of Kenya (CBK)

The main purpose and aims of regulation, in all markets globally, are to:

- maintain and promote the fairness, efficiency, competitiveness, transparency and orderliness of the securities and futures industry
- promote understanding by the public of the functioning of the securities and futures industry. This includes defining the thresholds of knowledge required to participate in regulated markets, and providing educational services to fulfill this mandate directly or via third-party learning institutes
- provide protection for members of the public investing in or holding financial products, and
- minimise crime and misconduct in the securities and futures industry reduce systemic risks in the securities and futures industry.

Without these requirements, any market will not be considered by local and international investors as safe and fair and, therefore, will eventually disappear. An example here is Russia which, even prior to the conflict in Ukraine, had witnessed a stark decline in foreign direct investment (FDI), falling from a peak of approximately $75 billion in 2008 to $9.5 billion in 2020. Aside from the increase in geopolitical tensions during this period, the decline has been due also to regulatory instability, with President Vladimir Putin disbanding the markets regulator, the Federal Financial Markets Service in 2013, replacing it with direct control by the more politically active Central Bank of the Russian Federation. There have been multiple scandals that have depleted trust in Russian financial regulation, from the sovereign debt default in 1998, to the embezzlement of World Bank and IMF funds. Since February 2022, the situation has worsened, as it is widely expected that Russian markets will remain completely inaccessible to investors in the United States and Europe.

In addition to the governmental authorities listed in the earlier table, the securities and derivatives exchanges themselves are active regulators of their member firms and the trading which takes place on the exchange. Nationally-licensed exchanges are usually known as self-regulatory organisations (SROs). While not explicitly enforcing the regulations concerning securities and derivatives trading, as SROs, their duty is to maintain the integrity of their markets. In addition, while they are not recognised as official market regulators, two other organisations play a significant role in the development of financial market regulation.

- The **International Organization of Securities Commissions (IOSCO)** is an association of organisations that regulates the world's securities and futures markets. Its membership is made up of the main securities commissions and/or financial regulators from each country. IOSCO members currently regulate more than 95% of the global securities markets[1]. Its role is to assist its members to promote high standards of regulation and act as a forum for national regulators to cooperate with each other and other international organisations. Its three main goals are to:
  - promote high standards of regulation for the sake of orderly and efficient markets

1 https://www.iosco.org/about/?subsection=about_iosco

  - share information among exchanges and assist them with technical and operational issues, and
  - establish standards towards monitoring global investment transactions across borders and markets.
- The **International Swaps and Derivatives Association (ISDA)** is a trade organisation, whose members are the main participants in the global OTC derivatives markets. Some of its main accomplishments are the acceptance and use of a standardised contract (the ISDA master agreement) for a wide range of derivatives transactions. The ISDA also manages FpML, an XML message standard for the OTC derivatives industry (see chapter 5, section 7.5).

1.2 UK and the EU

While each country has its own financial regulator (such as the PRA and FCA in the UK, which sets out the rules for all the UK markets, including the derivatives markets), the EU has introduced more extensive rules and regulations regarding the conduct of business and operational and risk management requirements of firms within the financial sector through the Markets in Financial Instruments Directive (MiFID) II, the Markets in Financial Instruments Regulation (MiFIR) and EMIR.

The terms of the UK's exit from the EU were agreed and implemented beginning the end of the transition period ending in December 2020.

Pre-Brexit, via EU MiFID, a firm in the UK was authorised in a member state to provide investment services, and this single authorisation enabled the firm to provide investment services in other member states without requiring further authorisation. This is known as the 'passport'. The state providing authorisation is where the firm originates and is commonly referred to as the home state. States outside the home state where the firm offers investment services are known as host states. Following Brexit, barring very few exceptions, UK-based firms have been required to create EU subsidiaries to serve EU clients, and the overall regulatory and business environment for UK firms operating in the EU and vice versa continues to be in flux.

As of April 2023, the only exceptions the EU has granted have been known as limited passporting, or 'equivalence', in two narrow areas of financial services – clearing houses and securities depositories. This provides a level of continuity and regulatory protection for EU-based clients, as many still require what the EU describes as 'systemic' services that are domiciled in the UK. This temporary and limited equivalence was agreed in 2018 and renewed three times, most recently in 2025, until 30 June 2028.

A key step undertaken by the UK in ensuring the EU viewed UK regulation as sufficiently equivalent was the complete transposition of EU MiFID by a combination of the FCA's Handbook, Treasury rules and Parliamentary legislation – called UK MiFID. This was implemented beginning at the end of the Brexit transition period (11pm on 31 December 2020).

MiFID is a crucial regulation because it widens the range of passportable activities, for example, it includes:

- investment advice
- some underwriting activities
- operating a multilateral trading facility (MTF), organised trading facilities (OTF) and systematic internalisers (SI)

- investment activities relating to commodity derivatives, credit derivatives and contracts for difference (CFDs), and
- investment research, where it is an ancillary service to some other core service.

A key feature of MiFID is that it improves the passporting of regulated firms by clarifying any differences between the home and host markets' regulations. It also sets out the Capital Requirements Directive (CRD), which sets requirements for the regulatory capital a firm must hold. This is to ensure orderly markets and improve client protection.

In April 2014, the European Parliament voted through MiFID II and the measures were implemented in January 2018. The purpose was to repeal and replace the first iteration, in light of experiences since initial MiFID implementation in 2004. This was achieved through (note below is not an exhaustive list, but merely an overview of the main amendments from the first to second iterations of the directive):

- An expansion in scope, with more coverage over credit institutions, algorithmic trading, emissions contracts and custodians. Licensing exceptions are narrowed for proprietary trading and commodity-derivatives participants.
- Investment firms based in non-EU/EEA countries can benefit from a European passport, partly by establishment of a branch in the EU/EEA when offering services to non-professional clients.
- Client classification now defines local authorities as non-professional investors, and more obligations for services offered to eligible counterparties.
- Investors gain more protection, with clients receiving investment advice from firms now allowed more disclosure of sources, conflicts of interest and disaggregation of fees. More information must be provided for bundled products and order-execution policies. There are also tighter exceptions for know your customer (KYC) requirements in execution-only business.
- Additional corporate-governance requirements for investment firms, with tighter regulation of board appointees, administered through a firm's mandatory nomination committee, as well as diversity guidelines.
- Investment firms must record certain telephone conversations and electronic communications.
- In-scope trading venues now include OTFs, with further obligations for all regulated markets (MTFs, OTFs and SIs).
- Mandatory exchange trading of derivatives; in line with EMIR.
- Regulators now have the power to require any participant to reduce its derivatives position, or, with respect to commodity derivatives, limit the ability of entities or persons to enter into a commodity derivative. In addition, regulators will have the power to directly prohibit or restrict the marketing, distribution or sale of particular financial instruments or type of activity.
- Breach of international financial sanctions now have minimum requirements that member states must implement, including penalties of at least 10% of the total annual turnover in the case of a legal entity and €5,000,000 in the case of a natural person or twice the amount of benefit derived from the violation.

Not all firms authorised by the FCA are directly subject to the requirements of MiFID II: whether they are or not will depend on the nature of their activities. Broadly, the range of UK firms which are classified as MiFID firms is as follows:

- firms dealing and managing investments
- firms operating an MTF, OTF and/or SI
- venture capital firms that meet certain criteria.

1.3 The Operations Steering Committee (OSC)

The OSC of the ISDA has targets to improve the operational infrastructure and regulation of the OTC derivatives industry. The OSC (whose membership includes OTC broker-dealers, buy-side firms and industry associations such as the ISDA) has made a commitment to regulators to increase the number and types of OTC products that will be centrally cleared, such as single-name credit default swaps (CDSs) and overnight index swaps (OISs).

In addition, the OSC has increased its emphasis on collateral management. It has implemented daily reconciliation of all collateralised inter-dealer positions in excess of 500 positions.

The group has also set a goal that at least 50% of equity derivatives traded can be matched, processed and cleared electronically. Many equity derivatives can be some of the most non-standardised of all OTC derivatives, making operational standardisation the most difficult.

1.4 European Regulators

1.4.1 The European Banking Authority (EBA)

The EBA is one of the three European Supervisory Authorities (ESAs) – the other two are the European Securities and Markets Authority (ESMA), which is covered below, and the European Insurance and Occupational Pensions Authority (EIOPA).

The EBA is a regulatory agency whose activities include conducting stress tests on EU banks with the goal of increasing transparency within the European financial system, and identifying weaknesses in banks' capital structures. The EBA has the power to overrule any national regulators if they fail to properly regulate their banks, and it can prevent regulatory arbitrage, which should allow banks to compete fairly throughout the EU.

Other tasks set out in the EBA's mandate include investigating alleged incorrect or insufficient application of EU law by national authorities, mediating to resolve disagreements between competent authorities in cross-border situations, and promoting transparency, simplicity and fairness in the market.

1.4.2 The European Securities and Markets Authority (ESMA)

ESMA's main role is to establish an EU-wide financial markets overseer by first assessing risks to investors, markets and financial stability, and then composing a single rulebook for EU financial markets, promoting supervisory convergence among EU members and directly supervising credit rating agencies and trade repositories. A single rulebook enhances the EU's single market by creating a level playing field for investors and issuers across the EU.

ESMA is mandated to take an active role in building a common supervisory culture among national competent authorities to promote sound, efficient, and consistent supervision throughout the EU. This is known as supervisory convergence, and is the consistent implementation and application of the same rules using similar approaches across EU member states; it implies sharing best practices and realising efficiency gains across the financial sector.

ESMA's position in the European System of Financial Supervision (ESFS) also makes it qualified to conduct peer reviews, set up EU-wide market data reporting requirements, thematic studies and common work programmes, draft opinions, guidelines and Q&As.

1.5 Asia

1.5.1 China

The China Securities Regulatory Commission (CSRC) is a ministerial-level public institution that was created by China's first comprehensive securities law, which became effective in 1999, granting it the:

> *'authority to implement a centralised and unified regulation of the nationwide securities market in order to ensure their lawful operation'.*

The CSRC oversees China's centralised securities supervisory system.

The CSRC's powers include the regulation and supervision of securities issuers, as well as to investigate, and impose penalties for *'illegal activities related to securities and futures'*. It governs all securities exchanges and futures markets activity within the People's Republic of China, and its functions are similar to that of the SEC in the US.

The CSRC's responsibilities include:

- creating and reviewing securities legislation
- regulating the trading, issuing, and settlement of stocks, fixed income securities, and securities funds
- supervising the conduct of shareholders and securities brokers, and
- overseeing the issuance of non-Chinese company listings and offerings (such as H-Shares listed on the Hong Kong Exchange).

1.5.2 Hong Kong

The Securities and Futures Commission (SFC) of Hong Kong is the independent statutory body charged with regulating the securities and futures markets in Hong Kong. The SFC is responsible for ensuring the orderly functioning of Hong Kong's securities and futures markets, to protect investors and to promote Hong Kong as an international financial centre and a key financial market in China. Even though it is considered to be a branch of the government, it is run independently under the authorisation of laws relating to securities and futures.

The SFC is one of four regulatory organisations that make up the financial regulators in Hong Kong. The others are the Hong Kong Monetary Authority (HKMA), Office of the Commissioner of Insurance (OCI) and the Mandatory Provident Fund Schemes Authority (MPFA). The SFC is responsible for securities and futures markets including the Hong Kong Exchange and Clearing (HKEX).

1.5.3 Singapore

The Monetary Authority of Singapore (MAS) is Singapore's central bank as well as its financial regulatory authority. It administers all of the regulations that pertain to money, banking, insurance, securities and the financial sector in general, as well as currency issuance. MAS regulates market operators or venues under two categories – approved exchanges (AE) and recognised market operators (RMO). Systematically important market operators are regulated as AEs and are subject to a higher level of statutory obligations, while other market operators are regulated as RMOs.

Dealing in exchange-traded and/or OTC derivatives contracts, as well as spot foreign exchange contracts for the purposes of leveraged foreign exchange trading, is a regulated activity under Singapore's Securities and Futures Act, and financial institutions conducting this activity in Singapore must apply for the Capital Markets Services licence.

2. Different Regulatory Approaches

Learning Objective

9.1.3 Know, in general terms the importance of the principles-based approach to derivatives regulation: client classification; fair treatment of customers; suitability and appropriateness of the transaction/product; best execution

2.1 Principles-Based Regulation

Principles-based regulation means moving away from reliance on detailed, prescriptive rules and relying more on high-level principles to set the standards by which regulated firms must conduct business. In the UK, the FCA has continued an approach to market regulation that is similar to its predecessor, the FSA. Three key elements in the FCA's current approach are:

- broad-based standards in preference to detailed rules
- outcomes-based regulation, and
- increasing senior management responsibility.

Many proponents of the principles-based approach feel that it better fits today's changing financial markets, by allowing the flexibility that is required, given the fast development in technology and financial products in recent years. The key point of results- or outcomes-based regulation is such that its proponents state that it allows it to be applied to client-based services. They claim that if a firm does not treat customers fairly, or adhere to the best execution rules, or sells products to investors that are not appropriate or suitable, the poor results/performance that these clients will have will result in their using other firms, thereby damaging the firm's reputation and, in the long run, their overall performance.

Rules-based regulation is based on strict, clearly defined but inflexible one size fits all rules that must be followed. In contrast, principles-based regulation allows for flexibility and judgement, as broadly based guidelines/standards are the norm. While many feel that the latter can cause confusion and problems, its proponents claim that it is better suited for today's financial markets.

2.2 FCA Principles for Businesses

The FCA's Conduct of Business Sourcebook (COBS) includes 12 key Principles for Businesses ('the Principles'), which authorised firms must observe. If a firm breaches any of the Principles that apply to it, it will be liable to disciplinary sanctions.

The 11 Principles for Businesses are:

1. **Integrity** – a firm must conduct its business with integrity.
2. **Skill, care and diligence** – a firm must conduct its business with due skill, care and diligence.
3. **Management and control** – a firm must take reasonable care to organise and control its affairs responsibly and effectively, with adequate risk management systems.
4. **Financial prudence** – a firm must maintain adequate financial resources.
5. **Market conduct** – a firm must observe proper standards of market conduct.
6. **Customers' interests** – a firm must pay due regard to the interests of its customers and treat them fairly.
7. **Communication with clients** – a firm must pay due regard to the information needs of its clients and communicate information to them in a way which is clear, fair and not misleading.
8. **Conflicts of interest** – a firm must manage conflicts of interest fairly, both between itself and its customers, and between customers and other clients.
9. **Customers: relationships of trust** – a firm must take reasonable care to ensure the suitability of its advice and discretionary decisions for any customer who is entitled to rely upon its judgement.
10. **Clients' assets** – a firm must arrange adequate protection for clients' assets when it is responsible for them.
11. **Relations with regulators** – a firm must deal with its regulators in an open and cooperative way and must disclose to the FCA appropriately anything relating to the firm of which the FCA would reasonably expect notice.
12. **Consumer Duty** – a firm must act to deliver good outcomes for retail customers.

2.3 Fair Treatment of Customers (FTOC)

It should be apparent from reading COBS that there is a general theme of overriding fair play. This is coupled with a recognition that there is often an information imbalance between the firm and its customers (since the firm usually has a higher level of expertise in its products and services than its customers). This theme is reinforced through the FCA's Fair Treatment of Customers (FTOC) initiative.

Originally called Treating Customers Fairly (TCF), FTOC was launched by the FCA's predecessor, the FSA, to look at what a fair deal for customers should actually mean. The FCA defines six consumer outcomes to explain to firms what it believes FTOC should do for its consumers:

1. Consumers can be confident that they are dealing with firms where the fair treatment of customers is central to the corporate culture.
2. Products and services marketed and sold in the retail market are designed to meet the needs of identified consumer groups and are targeted accordingly.
3. Consumers are provided with clear information and are kept appropriately informed before, during and after the point of sale.
4. When consumers receive advice, the advice is suitable and takes account of their circumstances.

5. Consumers are provided with products that perform as firms have led them to expect, and the associated service is both of an acceptable standard and as they have been led to expect.
6. Consumers do not face unreasonable post-sale barriers imposed by firms to change product(s), switch provider, submit a claim or make a complaint.

A key part of the FCA's approach is that all advisers adhere to its 'good practice in your behaviour' policy with all advisers having to ensure that FTOC is a core part of their business by following these practices:

- Making sure the fair treatment of customers is a crucial part of the adviser's business philosophy.
- Remembering that FTOC is the adviser's responsibility and that it cannot be delegated away.
- If the adviser uses a compliance consultant, ensure their advice is evaluated and applied with the adviser's knowledge of their customers and the issues in their business.
- Ensure the adviser's own knowledge, training and competence are up to date.
- Making themselves aware of changes in the market.
- Being conscious of regulatory changes that may affect them or their business.

2.4 Client Categorisation

A firm is required to categorise its clients if it is carrying on designated investment business. This is to ensure the protections and rules appropriate for the specific category are applied by the firm, MiFID lays down rules as to how client categorisation has to be carried out for MiFID business.

The FCA's COBS defines a 'client' as someone to whom a firm provides, intends to provide or has provided a service in the course of carrying on a regulated activity; and, in the case of MiFID or equivalent third country business, anything which is an ancillary service. In addition, in relation to the financial promotions rules, 'client' includes a person to whom a financial promotion is communicated, or is likely to be communicated.

Under COBS, clients may be categorised as one of the following:

1. A **retail client** – any client who is not a professional client or an eligible counterparty. Note, the term 'customer' means retail clients and professional clients.
2. A **professional client** – may be either elective professional clients, or per se professional clients. An elective professional client is one who has chosen to be treated as such. Per se professional clients are, generally, those which fall into any of the following categories – unless they are an eligible counterparty, or are categorised differently under other specific provisions.
   The categories are:
   - an entity required to be authorised or regulated to operate in the financial markets
   - large undertakings – companies whose balance sheet, turnover or own funds meet certain levels
   - governments, certain public bodies, central banks, international/supranational institutions/ similar organisations, and
   - institutional investors whose main business is investment in financial instruments.
3. An **eligible counterparty (ECP)** – COBS contains a list of the types of clients that can be classified as eligible counterparties (ECPs). Examples include credit institutions, investment firms, pension funds, national governments and central banks. The list is, to a certain extent, identical to the per se professional client; however, the ECP category is narrower as it does not include large undertakings.

The categories are relevant principally in terms of the level of protection afforded them – retail clients receive the highest level of regulatory protection, while ECPs have no protection. Having said that, the majority of ECPs are large firms who are very familiar with the financial markets, or are themselves large players in the financial markets, and do not need such protections anyway.

New clients must be notified of how the firm has classified them. Also, before services are provided, the firm must advise clients of their rights to request recategorisation and of any limits in their protections that arise from this.

Policies, Procedures and Records

A firm must implement appropriate written internal policies and procedures to categorise its clients. A firm must make a record of the form of each notice provided and each agreement entered into – this record must be made at the time that the standardised form for onboarding all clients is first used, and retained for the relevant period (indefinitely for pensions, five years for insurance or MiFID business and three years for any other business) after the firm ceases to carry on business with clients who were provided with that form.

Recategorisation of Clients

Clients are sometimes reclassified by firms. A key instance is when regulation changes, changing the thresholds that define client categories. Clients can also elect to have their category changed, if they meet the requirements, to gain increased regulatory protection (by moving to retail or professional status), or increased access to financial instruments (by moving to professional or eligible counterparty status).

A retail client may be treated as an elective professional client both for MiFID and non-MiFID business only if:

- the firm has assessed its expertise, experience and knowledge and believes it can make its own investment decisions and understands the risks involved (this is called the qualitative test), and
- any two of the following are true (this is called the quantitative test):
    - the client carried out, on average, ten significantly sized transactions on the relevant market in each of the past four quarters
    - the size of the client's financial portfolio exceeds €500,000 (defined as including cash deposits and financial instruments)
    - the client works or has worked as a professional in the financial services sector for at least a year on a basis which requires knowledge of the transactions envisaged.

For MiFID business, a client may be treated as an elective professional client if they meet both the qualitative test and the quantitative test. If a firm becomes aware that a client no longer fulfils the initial conditions that were made for categorisation as an elective professional client, the firm must take appropriate action. Where the appropriate action involves recategorising the client as a retail client, the firm must notify that client of its new categorisation.

Alternatively, a professional client may be treated as an elective ECP if it is a company and it is:

- a per se professional client (other than one which is only a professional client because it is an institutional investor), or
- it asks to be treated as such and is already an elective professional client (but only for the services for which it could be treated as a professional client), and
- it expressly agrees with the firm to be treated as an ECP.

As noted above, ECPs do not benefit from regulatory protection: some ECPs will have rather more protection – they may do so by voluntarily asking to opt-down a client category and become an elective professional or even retail clients. Firms must allow eligible counterparties to request recategorisation, so as to benefit from the different protections afforded to retail clients or professional clients (as applicable).

Recategorisation may be carried out for a client on a general basis; or on more specific terms, for example in relation to a single transaction only. A firm can classify a client under a different client classification for different financial instruments in respect of which they may trade/undertake transactions. However, this will mean complex internal arrangements for firms.

2.5 Best Execution

The rules on best execution apply to MiFID and non-MiFID firms and business. The best execution rules under COBS require firms to execute orders on the terms that are most favourable to their client. Specifically, they require that firms take all reasonable steps to obtain, when executing orders, the best possible result for their clients taking into account the execution factors. These factors are price, cost, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of an order. Note from this that best execution is not merely how to achieve the best price!

Any of the other factors mentioned above should be considered and, depending on the criteria or characteristics, may be given precedence.

2.6 Suitability and Appropriateness

These assessments are separate. Suitability requires that a firm compile evidence of a prospective client's product knowledge, financial situation and investment objectives. This is a thorough evaluation of the client, which allows the firm to develop a full picture of the prospect and how a financial relationship might be structured to suit each client's circumstances. Appropriateness is a narrower assessment, where the firm must discover whether a client has sufficient knowledge and experience in specific financial instruments, in order to glean whether these products can actually be included in the firm's offering to the client.

The COBS rules on the suitability requirements apply when firms:

- make personal recommendations relating to designated investments, or
- manage investments.

There are specific rules relating to the provision of basic advice (personal recommendations on stakeholder products); firms may, if they choose, apply those rules instead of the more general rules on suitability when advising on stakeholder products. The suitability rules exist to ensure that firms take reasonable steps to ensure that personal recommendations (or decisions to trade) are suitable for their clients' needs. In order to make a suitability assessment, a firm should establish, and take account of, the client's:

- investment objectives
- knowledge and experience in the investment relevant to the specific type of designated investment or service, and
- level of investment risk they can bear financially that is consistent with their investment objectives.

In order to do so, a firm should gather enough information from its client to understand the essential facts about them. It must have a reasonable basis to believe that, bearing in mind its nature, the service or transaction:

- meets their investment objectives
- carries a level of investment risk that they can bear financially, and
- carries risks that they have the experience and knowledge to understand.

In terms of assessing the client's knowledge and experience, the firm should gather information on:

- the types of service/transaction/investment with which they are familiar
- the nature, volume, frequency and period of their involvement in such transactions/investments, and
- their level of education, profession or relevant former profession.

An appropriateness assessment will check whether a client has sufficient knowledge of the products that it wishes to transact, especially in cases where these products are not on the MiFID (and now FCA) list of 'particular financial instruments'. An example here is, if a client, who has demonstrated that they are generally suitable to open a trading account, wishes to trade CME wheat options – since this product is not on the MiFID list, the firm must separately assess whether the client has sufficient knowledge and experience in these options, before the firm can reasonably offer them this service.

Below is a list of financial instruments that are exempt from the appropriateness assessment. The list is designed to include the most simple and liquid investment products, to minimise the risk of serious financial harm to clients who may have a risk appetite or investment objective that is beyond their product knowledge:

- Shares listed on a regulated market or an equivalent third-country market.
- Money market instruments, bonds or other forms of securitised debt (providing that they do not have embedded derivatives).
- Holdings in UCITS funds.
- Other investments meeting a definition of non-complex investments.

A financial instrument is non-complex if:

- it is not a derivative
- there is sufficient liquidity in it
- it does not involve a liability for the client that exceeds the cost of acquiring the investment, and
- it is publicly available and comprehensive information is available on it.

In addition, firms are not required to ask clients to provide information or assess appropriateness if:

- the service is execution-only, or for the receipt and transmission of client orders, in relation to particular financial instruments and at the client's initiative, and
- if the client has been clearly informed that the firm is not required to do so in this particular case, and that they will, therefore, not get the benefit of the protection under the rules on assessing suitability, and
- the firm complies with its obligations regarding conflicts of interest.

In regard to derivatives, therefore, it can be seen that an assessment of suitability or appropriateness will always be necessary.

3. Principal Differences Between UK, EU and US Regulators

Learning Objective

9.1.4 Know the differences between rules-based and principles-based regulation

One of the key differences between EU/UK versus US regulations is their different regulatory approach. While EU and UK regulators very much follow principles-based approaches, such as MiFID, their US counterparts follow a rules-based approach:

- **Principles-based regulation** allows for flexibility and judgement, as broadly based guidelines/ standards are the norm; and it means less reliance on detailed, prescriptive rules, relying more on high-level principles and objectives to set the standards by which regulated firms must conduct business.
- In contrast, **rules-based regulation** is based on strict, clearly defined but, inflexible one-size-fits-all rules that must be followed.

A good example of this can be seen from the EU's introduction of MiFID, which allows individual member authorities to opt out of certain aspects of the regulations if they see fit. The introduction of the Sarbanes-Oxley Act in the US – which sets out strict regulations on how a company manages its derivatives use and exposure as well as reporting it, among other requirements – is very much in line with its more rules-based approach. The fallout from the Sarbanes-Oxley Act has seen US exchanges losing listings of international companies to UK and European exchanges, owing to their different regulatory environment.

3.1 UK Regulators

Learning Objective

9.1.5 Know the role of regulation on derivatives markets: MiFID II; client money; client accounts; margining practices; unregulated markets; access to overseas markets; access to overseas clients

In the UK, between 2001 and 2013, the Financial Services Authority (FSA) was responsible for the regulation of the financial services sector. While its board was appointed by the Treasury, it operated independently of government. It was a limited company and was fully funded by fees charged to the financial services sector. Due to the perceived regulatory failure of the banks during the global financial crisis, the UK government decided to restructure financial regulation and, under the Financial Services Act 2012, the FSA was abolished. Its responsibilities were split between two new agencies: the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA).

The FCA's main goal is to ensure that there is fair competition among financial firms and that they are all sound. While it reports to Parliament, it, like its predecessor the FSA, is funded by the firms that it regulates. In light of its structure and goals, it is more focused on maintaining a healthy and competitive retail financial sector.

The FCA focuses on:

- **conduct** – for the market to thrive, firms must behave ethically, stick to the rules and meet regulatory standards
- **competition** – it encourages healthy competition between firms to keep the market buoyant and help the economy grow, and
- **reducing market abuse** – firms need to have procedures to help them identify and stop market abuse practices, such as insider dealing and share price manipulation.

The FCA's responsibility covers all UK financial markets, including the derivatives markets and, therefore, works closely with its EU counterparts and is active in the implementation of MiFID II and all other international regulations.

The PRA is the UK's prudential regulator for deposit-takers (banks, building societies and credit unions), insurers and designated investment firms. It derives its responsibilities and its powers from the Financial Services and Markets Act (FSMA) 2000, as amended by the Financial Services Act 2012, and the relevant EU directives for which it is a competent authority.

The PRA's main focus is to ensure that all companies that are part of any aspect of the UK-based financial markets are financially sound. While it is not the PRA's role to ensure that no firms fail, it is its responsibility to ensure that, should this happen, it does so in a way that avoids any major disruption to the supply of critical financial services. Therefore, both its authority and involvement in the regulation of the derivatives markets is mainly on an indirect basis.

Since the UK has a major international financial market, the FCA works closely with other regulators to improve the market standards. Since the UK was part of the EU, and remains a key trading partner, approximately 70% of the FCA's policies are based on EU initiatives, particularly the Financial Services Action Plan. Two of the key parts of this are:

- MiFID II, which is discussed in section 1.2 of this chapter, and
- the Transparency Directive (TD), which is designed to enhance transparency on EU capital markets. It does so by establishing minimum requirements on periodic financial reporting and on the disclosure of major shareholdings for issuers whose securities are admitted to trading on a regulated market in the EU. The directive also deals with the mechanisms through which this information is to be stored and disseminated.

The TD distinguishes between the concepts of home and host member state regulation, allowing the issuer's home country regulator to impose more stringent disclosure requirements than those set out in the directive, but restricting the host competent authority from doing the same.

The TD establishes disclosure requirements on an ongoing basis about issuers who have securities admitted to trading on a regulated market situated or operated within the EU, for investors who invest in these securities.

There are three broad areas covered under the TD:

1. The minimum content of annual, half-yearly and interim management statements.
2. The notification requirements of both issuers and investors in relation to the acquisition and disposal of the major holdings in companies.
3. The method of disseminating and storing the information covered in 1 and 2 on a pan-European basis.

3.1.1 Client Money and Client Accounts

In the UK, FCA rules relating to the custody and safeguarding of client money and client assets are contained in the Client Assets Sourcebook (CASS). They exist to ensure that firms take adequate steps to protect those client assets for which they are responsible. Within CASS, the requirement to segregate client money from a firm's own money is aimed at ensuring that, if the firm fails, that money will not be used to repay its creditors. Usually this is done by ensuring that it is placed promptly in a separately designated client money account with a bank and that the bank treats it as separate from the firm's own.

CASS, in general, applies to every firm, with some specific exemptions, which we will cover below. CASS applies directly in respect of activities conducted with or for all categories of client (ie, retail clients, professional clients and eligible counterparties).

CASS 6 contains the custody rules that apply when a firm holds financial instruments of a client in the course of MiFID business and when it is safeguarding and administering investments in the course of non-MiFID business.

CASS 7 (client money and distribution rules) applies to a MiFID investment firm either when:

- it holds client money in the course of its MiFID business or in respect of any investment agreement entered into, or to be entered into, with or for a client, or
- in the course of non-MiFID business, it opts to comply with the MiFID client money rules.

There are several circumstances when the client money rules will not apply – for example, where money is held in connection with a delivery versus payment (DvP) transaction (unless the DvP does not occur by the close of business on the third business day following the date of payment of a delivery obligation) or where it becomes due and payable to the firm. Bank deposits are also exempted.

Firms that do not deposit client money with a central bank must exercise all due skill, care and diligence in the selection, appointment and periodic review of the credit institution, bank or qualifying money market fund where the money is deposited and the arrangements for the holding of this money.

Firms must make a record of the grounds upon which they satisfy themselves as to the appropriateness of their selection of a credit institution, bank or qualifying money market fund.

Reconciliation of Client Assets

Firms must keep such records and accounts as necessary to enable it at any time and without delay to distinguish safe custody assets held for one client from safe custody assets held for any other client, and from the firm's own assets.

CASS 6.5 and 7.6 set out the obligations of firms to perform internal and external reconciliations. Broadly, reconciliations should be made 'as often as necessary' to ensure the accuracy of a firm's records and accounts, between its internal accounts and records and those of any third parties by whom those safe custody assets are held. If possible, they should be done by someone who has not been involved in the production or maintenance of the records being reconciled.

If the reconciliation shows a discrepancy, the firm must make good (or provide the equivalent of) any shortfall for which it is responsible. If another person is responsible, the firm should take reasonable steps to resolve the position with that person.

Firms must inform the FCA without delay of any failure to comply with the reconciliation requirements, including reconciliation discrepancies and making good any such differences.

Reconciliation of Client Money

Firms must keep such records and accounts as necessary to enable it at any time and without delay to distinguish client money held for one client from client money held for any other client, and from its own money. CASS 7.6 sets out the obligations of firms to perform internal and external reconciliations:

- **Internal Reconciliations –** performing an internal reconciliation means cross-checking the records showing each client's entitlement to client money against the records of client money the firm holds in client bank accounts and client transaction accounts. Firms can choose how often they perform internal reconciliations, subject to the requirement that they do so as often as is necessary, and as soon as reasonably practicable after the date to which the reconciliation relates. A remittance made

up of client money and money intended to pay the firm's fees is classified as client money. The FCA has set a method of reconciliation of client money balances called the standard method of client reconciliation.

- **External Reconciliations** – this means cross-checking the internal client money accounts against the records of third parties (eg, banks) with whom client money is held. Firms must perform external reconciliations as often as is necessary and as soon as reasonably practicable after the date to which the reconciliation relates. If there is a discrepancy, the firm must investigate and correct it as soon as possible. If it cannot do so and the firm should be holding a greater amount of client money, it must pay its own money into the client bank account pending resolution of the discrepancy, which it must correct as soon as possible. If a firm has not complied with these requirements, or is for some reason unable to comply in a material aspect with a particular requirement, it must inform the FCA in writing 'without delay' as is the timeframe stipulated in CASS 7.15. The FCA believes that an adequate method of reconciling client money balances with external records is as follows:

    - A reconciliation of a client bank account as recorded by the firm with the statement issued by the bank (or other form of confirmation issued by the bank).
    - A reconciliation of the balance on each client transaction account as recorded by the firm, with the balance of that account as set out in the statement (or other form of confirmation) issued by the person with whom the account is held.

Exemptions from CASS

Among others, CASS does not apply to:

- incoming EEA firms other than insurers, for their passported activities
- money transferred under title transfer collateral arrangements
- money held in connection with a DvP transaction (unless payment does not occur after three business days)
- money due and payable to the firm, or
- where a firm carries on business in its name, but on behalf of the client when that is required by the very nature of the transaction and the client is in agreement.

CASS does not apply where a firm carries on business in its name but on behalf of the client when that is required by the very nature of the transaction and the client is in agreement. Further, the custody rules (CASS 6) do not apply if a client transfers full ownership of a safe custody asset to a firm for the purpose of securing or otherwise covering present or future, actual contingent or prospective obligations.

Specific rules within CASS may be disapplied depending on the nature of a firm's activities; the details are set out within the individual rules.

3.1.2 Margining Practices

The initial margin requirement is the amount required to be collateralised in order to open a position. Thereafter, the amount required to be kept in collateral until the position is closed is the maintenance requirement. The maintenance requirement is the minimum amount to be collateralised in order to keep an open position. It is generally lower than the initial requirement. This allows the price to move against the margin without forcing a margin call immediately after the initial transaction.

On instruments that have been determined to be especially risky, the regulators, exchange or broker may set the maintenance requirement higher than normal or equal to the initial requirement, in order to reduce their exposure to the risk accepted by the trader. The amount of variation margin is determined by the exchange and the clearing house where exchange-traded contracts are settled – such as LCH in the UK.

3.1.3 Access to International Markets

Investors can undertake derivative contracts on any regulated market, providing that they have suitable arrangements set up with agents in each country (ie, bank, securities account, broker-dealer).

Subject to meeting local regulatory requirements, investors are not prohibited from undertaking derivatives contracts just because they are not domiciled in that country.

3.1.4 Access to International Clients

UK-authorised and -regulated firms are permitted to engage with non-UK clients. However, what is key is where the legal agreement is signed and where the relationship exists. This will determine the extent of the conduct of business requirements of the host state.

There may, however, still be some local regulatory requirements that exist even though no business services are conducted in the home country, but rather are carried out in the UK. The firm will have to classify the client and also undertake the appropriate KYC requirements, adhere to the FCA's conduct of business rules on suitability and appropriateness, and also provide the client with relevant information about the firm, its charges and risk warnings.

3.2 EU Regulators

The basic details of EU regulation have been discussed in section 1.2 of this chapter.

The EU regulation on the OTC derivatives markets that established central counterparties and trade repositories (TRs) that operates in parallel with individual national regulatory authorities (NRAs), is covered by EMIR.

EMIR was introduced to improve the transparency and reduce some of the risk associated with the OTC derivative markets that contributed to the financial crisis of 2007–08. EMIR also establishes common organisational, conduct of business and prudential standards for all central counterparties and other trade repositories.

EMIR requires all those who enter into any form of derivative contract, including interest rate, FX, equity, credit and commodity derivatives, to:

- report every derivative contract that they enter to a trade repository
- implement new risk management standards, including operational processes and margining, for all bilateral OTC derivatives, ie, trades that are not cleared by a central counterparty, and
- clear, via a central counterparty, those OTC derivatives subject to a mandatory clearing obligation.

EMIR has tightened up various operational areas of OTC derivatives operations, including confirmations, collateral management, portability, reconciliations, dispute resolution and portfolio compression. ISDA terms and protocols continue to operate between transacting counterparties as they have done for over 35 years. The ISDA, therefore, operates in parallel with EMIR.

Crucially, EMIR introduced:

- **reporting obligation for OTC derivatives** – the aim is to establish greater transparency within the OTC derivatives market, since it requires that all trades are registered with a TR, and
- **central counterparties for all OTC derivative trades** – the aim is greater market safety by reducing both counterparty credit and operational risks.

The scope of EMIR is that it applies to all types of OTC derivatives. It applies both to financial firms who use OTC derivatives and also to non-financial firms that have large positions in OTC derivatives. It also applies to central counterparties and trade repositories.

An important aspect of EMIR is its ongoing focus on reducing the risks associated with OTC derivatives.

3.3 US Regulators

3.3.1 The Securities and Exchange Commission (SEC)

Learning Objective

9.1.6 Know the role of the Securities and Exchange Commission (SEC) in the regulation of derivatives: what is the SEC; regulated investments; regulated exchanges

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:

- Options on currencies undertaken on exchanges (eg, currency options on Philadelphia Stock Exchange), including electronic exchanges.
- Options on individual stocks.
- Options on stock indices.
- The Chicago Board Options Exchange (CBOE) – a major centre for equity-based options.
- The International Securities Exchange (ISE) – the world's largest equity options exchange and part of the Nasdaq Group.

Note that the SEC does not regulate any futures products or exchanges, which are instead regulated by the Commodity Futures Trading Commission (CFTC) and the National Futures Association (NFA).

3.3.2 The Commodity Futures Trading Commission (CFTC) and National Futures Association (NFA)

Learning Objective

9.1.7 Know the role of the Commodity Futures Trading Commission (CFTC) and the National Futures Association (NFA): what is the CFTC; what is the NFA; regulated investments; regulation of other entities; dispute resolution

9.1.8 Know the prohibitions of CFTC Part 30 (Foreign Futures and Segregation of Customer Funds)

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 Commodity Exchange Act (CEA).

The CFTC is also responsible for overseeing the National Futures Association (NFA), to which the CFTC has delegated powers to oversee firms operating in the derivatives industry. The NFA is a self-regulatory organisation registered by the CFTC and was formed in 1982.

The Commodity Futures Moderization Act 2000 (CFMA) was a major step forward in the creation of a flexible structure for the regulation of futures trading, by formalising an agreement between the CFTC and the SEC to repeal the 18-year-old ban on trading single stock futures, as well as providing legal guidelines for the OTC derivatives markets. The law, reauthorising the CFTC for five years, also clarifies the Treasury Amendment exclusion and specifically grants the CFTC authority over retail foreign exchange trading.

One of the key changes of this law was that it legalised trading in single stock and narrowly defined stock-index futures under the joint jurisdiction of the SEC and CFTC.

A single stock future (SSF) is a futures contract on an individual share. An SSF has a set maturity and amount of shares, and most of those traded in the US on the OneChicago exchange are settled through physical delivery.

In addition to those traded in the US, SSFs are also traded in India, Kenya, Spain, South Africa and the UK.

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 that conducts business with the public on any US futures exchange is required to be registered with the CFTC and be a member of the NFA. The key part of the process is the registration and clearing process that the NFA requires. As of 31 March 2023, the NFA has 3036 members and 42,163 associate members (salespersons employed by NFA member firms).

CFTC Part 30

According to 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. These restrictions are designed to give US customers an adequate level of protection.

CFTC Regulation 30.5 provides an exemption for registration for any person located outside of the US who is required to be registered with the CFTC under Part 30 other than a person required to be registered as a futures commission merchant (FCM).

CFTC Regulation 30.5 generally requires a firm seeking an exemption to file a petition for relief with the NFA through its Online Registration System. The petitioner must, among other things, provide background and fitness information, consent to the jurisdiction of the US courts and the CFTC with respect to its dealings with US customers, and engage in all transactions subject to regulation under Part 30 through a registered FCM or foreign broker who has received confirmation of exemption from registration as a FCM under CFTC Regulation 30.10.

Notwithstanding any relief granted pursuant to CFTC Regulation 30.5, all non-US persons acting in a manner similar to CTAs and CPOs must provide US customers with the risk disclosures set forth in CFTC Regulation 30.6.

Part 30 Exemption

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

For example, to obtain the exemption, UK firms regulated by the FCA 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 recognised investment exchange (RIE)/designated investment exchange (DIE) rules and FCA conduct of business rules.
- Must provide the FCA with information and access to records that may be required under Part 30. The FCA can then provide these to the CFTC.
- Must consent to join the NFA arbitration scheme.
- Must agree to jurisdiction in the US under the Commodity Exchange Act.

Note that, not all US citizens are automatically considered as US customers. While all US citizens living within the US are considered as US customers, those living abroad are not automatically classed as US customers under this rule.

3.3.3 Dodd-Frank Act

In 2010, the US Senate approved the Dodd-Frank Wall Street Reform and Consumer Protection Act (the Act). Title VII of the Act sets forth the new legislative framework for derivatives.

The Act contemplates mandatory clearing and trading on regulated facilities for many derivatives contracts, with an exception for non-financial end users. Swap dealers and major swap participants are subject, among other things, to capital and margin requirements, business conduct rules and special duties in their dealings with governmental entities, the Employee Retirement Income Security Act (ERISA) and governmental plans and endowments. While many end users will not be directly regulated, they will often be affected indirectly as their counterparties become subject to new requirements, in particular with respect to margin rules.

Other significant provisions include the swaps pushout rule, collateral segregation and real-time swap transaction reporting requirements, position limits and large trader reporting, and the application of the securities laws to security-based swaps.

Significant uncertainties remain to be clarified in rule-making proceedings.

As part of this ongoing process, as of May 2013, the SEC has adopted the following updates under Title VII:

- Joint rules with the CFTC regarding the definitions of swap and security-based swap dealers, and major swap and security-based swap participants.
- Rules relating to mandatory clearing of security-based swaps that establish a process for the clearing agencies to provide the SEC with detailed information covering the security-based swaps that the clearing agencies plan to accept for clearing.
- Joint rules with the CFTC regarding:
  - the definitions of the terms swap, security-based swap, and security-based swap agreement
  - the regulation of mixed swaps, and
  - security-based swap agreement record-keeping.
- Rules that establish standards for how clearing agencies should manage their risks and run their operations.

Swaps and Security-Based Swaps

The Act aims to sweep the universe of previously unregulated derivatives into the new regulatory framework and divides this universe into two broad categories:

1. **Swaps** – the term 'swap' is defined broadly and includes options, swaps and other transactions based on rates, commodities, securities, debt instruments, indices, quantitative measures and other financial or economic interests, subject to certain exceptions. FX swaps and forwards, which were the subject of considerable debate during the legislative process, will be considered swaps.
2. **Security-based swaps** – these are swaps based on individual securities or loans, on narrow-based securities indices, or on events affecting individual issuers of securities or issuers of securities in a narrow-based securities index. Security-based swaps are subject to SEC regulation. Swaps based on government securities (other than municipal securities) are excluded from the security-based swap definition and thus are subject to regulation by the CFTC.

The Act seeks to establish parallel rules for swaps and security-based swaps. Mixed swaps, which combine features of swaps and security-based swaps, are to be regulated jointly by the CFTC and SEC.

Clearing and Trade Execution

Mandatory clearing and exchange trading provisions have been controversial, in particular due to the increased margin requirements (and hence increased costs) associated with central clearing. Where the CFTC or SEC determines that a particular type of swap should be cleared but no clearing organisation accepts the swap for clearing, the CFTC or SEC is directed to investigate and take appropriate action. Mandatory clearing will not be applied to existing swap positions, so long as the positions are reported to swap data repositories in a timely fashion under rules to be promulgated by the CFTC and SEC. Clearing organisations will be required to offset swaps with the same terms and conditions on an economically equivalent basis within the clearing organisation, and to provide for non-discriminatory clearing of transactions executed bilaterally or on unaffiliated facilities.

End of Chapter Questions

Think of an answer for each question and refer to the appropriate section for confirmation.

1. **Who manages Financial products Markup Language (FpML)?**
   Answer reference: Section 1.1

2. **Which combination of UK authorities implemented the various elements of MiFID, post-Brexit?**
   Answer reference: Section 1.2

3. **List the three key elements in the Financial Conduct Authority's (FCA's) current approach.**
   Answer reference: Section 2.1

4. **Name the 12 Principles for Business.**
   Answer reference: Section 2.2

5. **According to the Conduct of Business Sourcebook (COBS), what are the three categories of client?**
   Answer reference: Section 2.4

6. **When considering best execution, what factors must be taken into account?**
   Answer reference: Section 2.5

7. **Where are the FCA rules relating to the custody and safeguarding of client money and client assets contained?**
   Answer reference: Section 3.1.1

8. **In the US, what does the Securities and Exchange Commission (SEC) regulate?**
   Answer reference: Section 3.3.1

9. **What is the Commodity Futures Trading Commission (CFTC) responsible for?**
   Answer reference: Section 3.3.2

10. **Name the two categories of previously unregulated derivatives that were addressed in the Dodd-Frank Act.**
    Answer reference: Section 3.3.3



Glossary

Abandon
The decision of the holder of an option not to exercise their rights, due to the fact that the option is either OTM or the transaction costs are greater than its IV.

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.

Aggregate Average Notional Amount (AANA)
A measure used to assess the size of a derivatives portfolio. Typically the average daily notional value of all outstanding derivative contracts over a year.

Allocation
Assigning a completed derivatives trade to its originator, including registration into the correct account.

American-Style Option
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.

Asian-Style Option
An option whose strike price is set at its expiration date. Its strike price is based on the average price of the underlying asset. The calculation is based on a pre-agreed fixing over the period.

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). Opposite of **Contango**.

Barrier Option
An option that is activated or deactivated once the underlying asset's price reaches a set level. There are two main types, knock-in and knock-out barrier style options.

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 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.

Bermudan-Style Option
An exercise style of an option, which lies between a European and American, in that it can be exercised on any various specified dates between the purchase date and the option's expiry.

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 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. Can also be done with put options.

Buy-Write
An investment strategy involving buying a security and, simultaneously, selling calls against it.

Calendar Spread
See Horizontal Spread.

Call
A type of option that gives the buyer the right, but not the obligation, to buy the underlying asset at an agreed price within a specific time for a set premium. Call sellers may be obliged to sell a specific asset at the set price if the call's holder chooses to exercise.

Cap
An option, which puts a ceiling to the interest rate at which a client borrows. A common term is quarterly over three years. If the reference rate (eg, SONIA) is above the cap, the writer pays compensation. Allows the borrower to manage interest rate risk. Also used in FX.

Capital Requirements Directive (CRD)
Reduce the probability of consumer loss or market disruption as a result of prudential failure. It does this by seeking to ensure that the financial resources held by a firm are commensurate with the risks associated with its business profile and control environment.

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 index futures are settled by cash payment rather than physical delivery.

Central Counterparty (CCP)
An entity that sits between the buyer and seller and acts as a guarantor of contracts, reducing counterparty risk.

Chooser Option
An option that gives the buyer a set time to decide whether the option is a European call or put.

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).

Compound Option
Is an option on another option. If the first option is exercised, either as a call or a put, the second option behaves as a standard vanilla option.

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 may move against them – they are in a contingent liability situation.

Contract for Difference (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.

Conversion
An arbitrage trade which seeks to profit from mispricing in options, whereby one simultaneously buys puts, sells calls (synthetic short position) and takes a long position in the cash or futures market.

Convertible Bond
A bond that is convertible into another instrument, sometimes another type of bond, but more commonly into a company's shares at the set price which usually is above the current share price at the time of its issue.

Cost of Carry
The cost of holding an asset over time. Comprises borrowing costs and, for physical commodities, storage/insurance costs. For equities, 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.

Credit Risk
The exposure to loss associated with the payment default or failure on a payment due from a transaction/trade by a counterparty. It is also known as counterparty risk.

Cryptocurrency
A digital asset or 'virtual currency' that is designed to work as a medium of exchange in which transactions are verified and records maintained by a decentralised system using cryptography, rather than by a centralised authority (ie, Central Bank).

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 ITM at expiry.

Derivative
Instruments whose price is derived from another asset. Examples include futures, options, FX forwards and swaps.

Electronic Communication Networks (ECNs)
Term used in financial circles for a type of computer system that facilitates trading of financial products on OTC markets. The main products that are traded on ECNs are equities and FX.

Equity Indices
Indices of blue-chip (ie, large) companies in various national or regional markets. Examples include S&P 500, FTSE 100, Euro Stoxx. Major indices are used as the basis for derivatives contracts.

Euronext
A European financial exchange which trades derivatives in Amsterdam, Brussels, Dublin, Lisbon, Oslo and Paris.

European-Style Option
An exercise style of 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 (an ICE and Euronext term).

Exchange for Physical (EFPs)
The exchange of a future's position for a physical position. (Also known as Against Actual.)

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.

Fair Value
The theoretical price of a future, ie, cash price plus cost of carry.

Financial Conduct Authority (FCA)
The UK financial regulator that has assumed most of the authority of the former regulator, the FSA.

Flex Option
Exchange-traded options, where the investor can specify within certain limits, the terms of the options, such as exercise price, expiration date, exercise type, and settlement calculation. Short for flexible option.

Floor
An OTC option which guarantees a minimum return. If the reference rate falls below the floor level, the buyer of the floor receives compensation. See also **Cap** and **Collar**.

Foreign Exchange (FX)
The name given to the general aspects of currency trading.

Forward
An OTC derivative on – eg, FX. Forward 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 OTC.

FTSE 100
The London Stock Exchange's main share index of the 100 largest listed companies.

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 the price of the underlying asset. Gamma is at its maximum for at-the-money (ATM) options.

Gap
Price gap is when there are no bids or offers for a certain set of prices, causing market orders to jump sharply up or down. It is a more extreme form of slippage and causes significant impact costs for a trade.

Gearing
As 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 from adverse price movements. For example, those owning assets can hedge by buying put options, protecting against a fall in value of that asset.

Horizontal Spread
An option strategy that involves buying and selling (calls or puts) that have the same strike price, but different maturities. The purpose is to profit from expected changes in volatility. Also referred to as a 'calendar spread'.

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 **IV**, eg, a call whose strike is below the underlying asset price.

Intrinsic Value (IV)
One of the two components that make up an option's value. Options which are in-the-money (ITM) have IV, and the IV indicates how much an option is ITM.

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 within the current delivery month. All contracts outstanding/open at the end of the last trading day must be settled by delivery or by cash settlement.

LMEsword
A secure electronic transfer system for LME warrants.

LMEX
A cash-settled index-based futures contract that is based on the weighted average of the price of the LME's six primary metals.

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 (MTM)
The process of adjusting the value of investments to reflect their current market price. See also **Variation Margin**.

Markets in Financial Instruments Directive (MiFID II)
The EU legislative instrument requiring firms to maintain and operate effective organisation and administrative arrangements to take all reasonable steps designed to prevent conflicts of interest from adversely affecting the interests of its clients. Replaces the original MiFID. UK authorities have implemented MiFID, post-Brexit, such that it applies in the UK.

Netting
A system or agreement whereby all outstanding contracts of the same specification maturing, on the same date, between two counterparties can be settled on a net basis. This is an efficient way of reducing both settlement and counterparty risks.

Nominal Value
The face value of a bond. Also called par value.

Non-Fungible Token (NFTs)
A non-fungible token (NFT) is a cryptographically secure digital asset which represents a unique item, such as a digital work of art. They are encoded to ensure they cannot be duplicated and their ownership is verified on a blockchain; therefore, they are non-fungible with other types of digital assets, such as cryptocurrencies.

Novation
The legal process whereby the exchange's clearing house becomes the counterparty to both the buyer and seller of futures contracts, substituting the original contract.

Omgeo OASYS
A US financial markets trade allocation and acceptance service that communicates trade and allocation details between investment managers and broker-dealers.

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.

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. An OTM option has no IV – a premium may well be payable, but it will comprise only time value.

Over-the-Counter (OTC)
Transactions between banks and their counterparties not on a recognised exchange.

Path-Dependent Option
An option whose value is determined/depends on a formula or sequence of prices based on the movements of the underlying asset over the option's life in setting its strike price.

Physical Delivery
Where the settlement of a futures contract is by delivery of the physical underlying asset. Certain futures (eg, gilt futures, copper) will run through to physical delivery for final settlement. Other futures (eg, stock index futures and short-term interest rates) are cash-settled.

Pip
A pip is the smallest change in price that a given exchange rate can make.

Premium
The money paid by option buyers to option sellers. The price paid for the option.

Prudential Regulation Authority (PRA)
The part of the UK financial regulator that is now part of the Bank of England.

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/Call Parity
The theoretical relationship between put premiums and call premiums for the same strike and expiry. It states that the simultaneous purchase and sale of a European-style call and put option of the same underlying asset, strike price and expiration date is identical to buying the underlying asset today.

Reversal
An arbitrage trade which seeks to profit from mispricing in options, whereby one simultaneously buys calls, sells puts (synthetic long position) and takes a short position in the cash or futures market.

Rho
The sensitivity of an option's price to changes in interest rates.

Series
Options of the same class (ie, calls or puts) with the same strike, date and underlying.

Settlement Risk
The risk that an expected payment of an asset/security or cash will not be made on time or at all. This type of risk can be significantly reduced by establishing a netting system.

Short
1. To be without an asset that is required.
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 contracts, based on the interest on a notional sum of money for three months.

Single Stock Futures (SSFs)
Futures contracts whose underlying assets are individual stocks/shares.

Slippage
Slippage is where an order is executed at a worse price than the market price at the time it was entered. Large orders may tend to push the market and cause slippage.

Secured Overnight Finance Rate (SOFR)
A broad measure of the cost of borrowing cash overnight which is collateralised by US Treasury securities.

Softs
Goods that are grown, rather than mined.

Sovereign Wealth Fund
A state-owned and state-funded investment company that invests in a wide variety of domestic and international assets.

Spot
A term used to describe the current price of an asset. Also known as underlying or cash. Also used in FX, 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 (intramarket spread) with a view about changes in basis.
2. In futures – buying and selling futures in different assets (intermarket spread).
3. In options – see **Vertical Spreads**.
4. The difference between the bid and offer price.

Standard Portfolio Analysis of Risk (SPAN)
A scenario-based risk program, designed by the CME, 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 change by set amounts.

Stop-Loss
An order placed by an investor to buy or sell a security when it reaches a certain price. A stop loss order is designed to limit an investor's loss on an existing position.

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 (or Exercise) 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.

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).

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 is a method used by the OCC and other clearing houses to determine the margin requirements for mixed portfolios of derivatives, particularly options.

Theta
The measure of the decline in an option's value compared with the continuous decrease in time to expiry.

Tick
The smallest permitted variation between prices quoted to buy and sell on derivatives exchanges.

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 (IV). The TV will be higher, the longer the option has to maturity. Sometimes, known as extrinsic value.

Treasury Inflation Protected Securities (TIPS)
A treasury security that is indexed to inflation in order to protect investors from the negative effects of inflation. TIPS are considered an extremely low-risk investment since they are backed by the US government and their par value rises with inflation, as measured by the consumer price index, while their interest rate remains fixed. The coupon on TIPS is paid semi-annually.

Uncleared Margin Rules (UMR)
A set of regulatory requirements established to mitigate systemic risk of OTC derivatives that ar e not cleared through a CCP. Entails collateral and/or margin exchange between counterparties to reduce default risk.

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.

Vega
The measure of how a 1% change in volatility affects an option's price/value.

Vertical Spreads
Calls (or puts) for the same month, but at different strikes. 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.

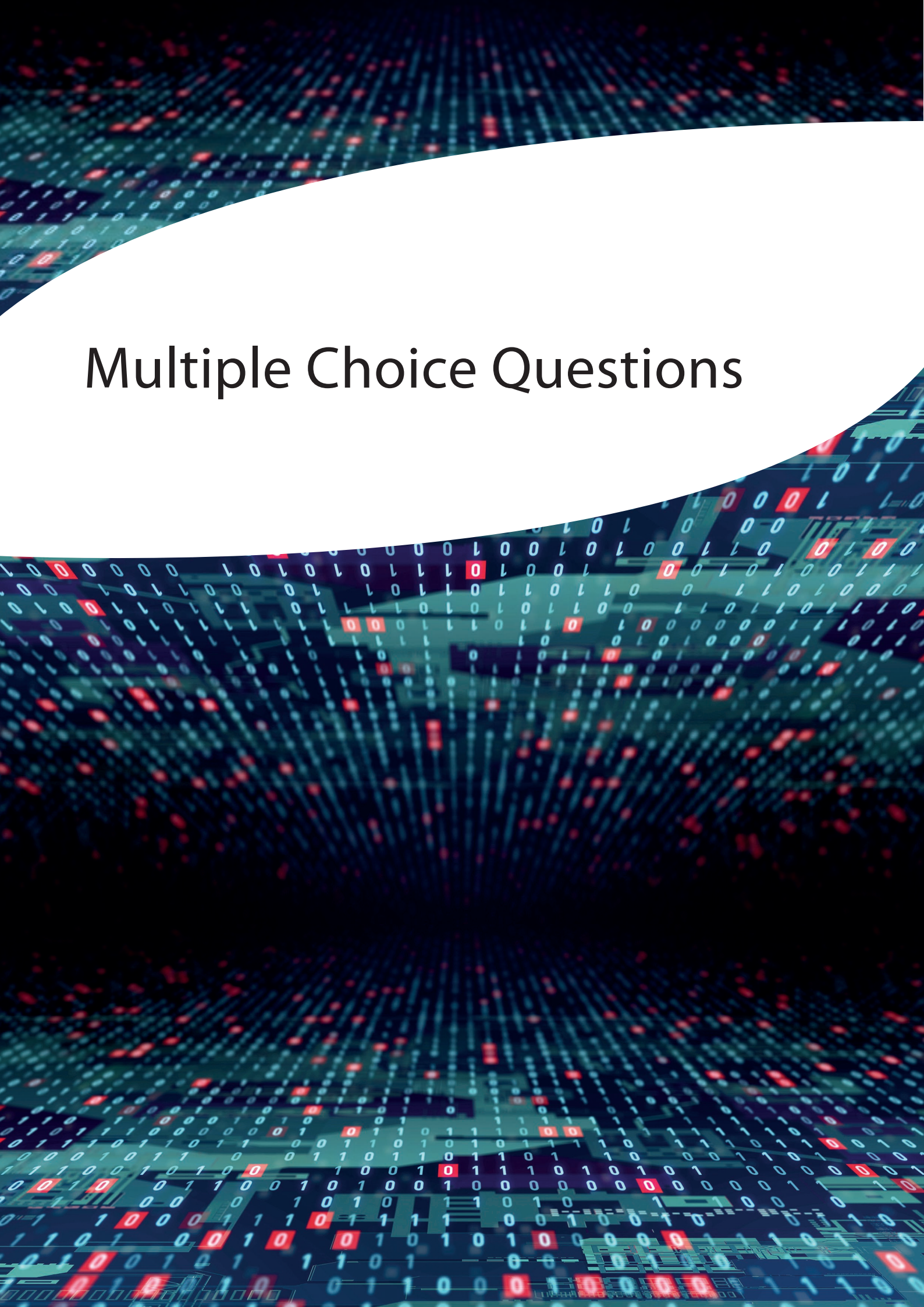
Warrant

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.

Yield Spread

Yield (or credit) spread is the difference between the quoted rates of return on two different bonds, which have the same or very similar maturities. It reflects the market's view and is based on the market's/investor's perception of the different credit quality between the two borrowers.

Multiple Choice Questions



The following questions have been compiled to reflect as closely as possible the standard that you will experience in your examination. Please note, however, they are not actual exam questions.

1. One of the differences between a contract for difference and a spread bet is that a:

A. spread bet does not have a specific maturity

B. contract for difference has a single price differential, while a spread bet has at least four

C. contract for difference is legally defined as gambling

D. contract for difference does not have a specific maturity

2. A speculator is anticipating an increase in lead prices and purchases 30 contracts for delivery in three months' time at $2,350 per tonne. The contract size is 25 tonnes. At expiry, the position is closed out when the price has risen to $2375 per tonne. What is the profit?

A. $6,250

B. $7,500

C. $12,500

D. $18,750

3. How are members' contributions to the member default fund determined?

A. According to the volume of clearing activity

B. As an annual flat fee

C. As a percentage of the firm's fees

D. According to the status of the firm

4. A shipping company is concerned that rising fuel prices will push up its costs and reduce profits. What should the company consider doing?

A. Sell an oil futures call

B. Sell oil futures

C. Go long oil futures

D. Buy an oil futures put

5. The automatic exercise by Intercontinental Exchange (ICE) Clear Europe of ICE Futures options is prevented by filing:

A. an assignment notice

B. a give-up notice

C. a registration notice

D. a suppression notice

6. Under the Financial Conduct Authority's (FCA's) Conduct of Business (COBS) rules, a firm's customers are defined as those clients:

A. that are considered to be retail clients only
B. that are considered to have a limited understanding of the markets
C. that are considered to be retail and professional clients, but not eligible counterparties
D. with assets of less than £1 million, no matter what their understanding of the market

7. Which 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

8. A call option has 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

9. Which of the following is a distinctive feature of cumulative preference shares?

A. Dividends are paid before other preference shares
B. Unpaid dividends from previous years must be paid before any dividends on ordinary shares
C. Dividends are accumulated and paid once every two years
D. Dividends received are equal to the cumulative dividends paid on other types of preference shares

10. The type of swap that allows an investor to exchange the returns on an equity-based investment for the return on another equity-based investment is known as:

A. a mark to market swap
B. an equity swaption
C. a commodity/equity swap
D. a volatility swap

11. An investor has purchased a cocoa futures option on ICE that can be exercised at any time. What kind of option do they have?

A. American
B. Asian
C. European
D. Exotic

12. 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

13. One of the reasons why a bank might apply a haircut to the collateral that a client has deposited with them is:

A. regulatory requirements that apply to certain types of derivative contracts
B. exchange-based regulations that apply to all clearing members
C. protection from movements in the market
D. provision for the client to exercise any options

14. If a futures contract is trading below its fair value, what strategy will an arbitrageur use?

A. Spread
B. Cash and carry arbitrage
C. Reverse cash and carry arbitrage
D. Reversal

15. A member default fund is funded by:

A. bank guarantees
B. cash contributions
C. margin deposits
D. collateral deposits

16. Which of these options will best hedge a short underlying position?

A. A short future
B. A long, deep-in-the-money put
C. Two long at-the-money puts
D. Two long at-the-money calls

17. Which of the following best describes the roles of ISDA and EMIR in relation to OTC derivatives markets?

A. ISDA – requiring OTC options to be cleared centrally on exchanges
EMIR – to standardise all documentation for European OTC derivatives contracts

B. ISDA – all OTC derivatives contracts must be regularly marked-to-market
EMIR – all OTC derivatives trades must be backed by sufficient capital from the two counterparties

C. ISDA – sets out a list of which types of OTC derivatives contracts can be traded
EMIR – creates a framework for firms in each country to report their trades to their respective domestic central bank

D. ISDA – to standardise the terms and documentation used in OTC derivatives trades
EMIR – requiring OTC derivatives trades to be reported and cleared centrally via a trade repository and central counterparty (CCP), respectively

18. An investor is long a coffee future at £17 a tonne and ideally wants to make a profit of at least £10 and limit any loss to £7. What instructions should be given to the 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 limit £27, sell at £10 stop

19. When do UK Treasury bills typically mature?

A. 15 days
B. 31 days
C. 91 days
D. 121 days

20. Who has the choice of where to deliver soft commodity products?

A. The buyer
B. The clearing house
C. The exchange
D. The seller

21. What type of option gives the holder the right to sell?

A. Put option
B. Call option
C. Long option
D. Short option

22. Which 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. Which of the following would be accepted as collateral by a broker to take against a written GlaxoSmithKline put option?

A. GlaxoSmithKline shares
B. Undated bonds
C. Certificate of deposit
D. Swiss bonds

24. What action will an investor take if they expect 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

25. Which of the following option positions is MOST likely to 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

26. What function does a pit observer have in relation 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

27. What sum should a client's portfolio exceed before they can be treated as an elective professional client?

A. €250,000
B. €200,000
C. €400,000
D. €500,000

28. If the price of a future rises out of the arbitrage channel, what will 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

29. What are the Theoretical Intermarket Margining System (TIMS) and Standard Portfolio Analysis of Risk (SPAN) used to calculate?

A. Daily settlement prices
B. Initial margins
C. Maintenance margin
D. Value of collateral

30. 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

31. Which of the following government bonds has an annual coupon?

A. Buoni del Tesoro Poliennali (BTPs)
B. Japanese Government Bonds (JGBs)
C. Obligations Assimilables du Trésor (OATs)
D. Treasury bonds

32. Which 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

33. Which of the following statements most accurately defines the arbitrage channel?

A. The range of prices within which transaction costs outweigh any potential arbitrage profits
B. The range of prices within which arbitrage can be carried out profitably
C. The range of prices within which the derivative is trading at less than its fair value
D. The range of prices within which the derivative is trading at more than its fair value

34. How many bond futures must be traded to hedge an anticipated holding of €50 million nominal of the cheapest to deliver (CTD) bond assuming 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

35. Which organisation regulates options on stock indices in the US?

A. Chicago Board Options Exchange
B. Commodity Futures Trading Commission
C. National Futures Association
D. Securities and Exchange Commission

36. What is a key element of principles-based regulation?

A. Well-defined rules that all regulated firms can easily apply
B. Well-defined rules that all firms can tailor according to the scope of their business
C. Broad-based guidelines that are applied by each regulated firm according to the scope and nature of their business
D. Broad-based guidelines that each EU member state translates into its own well-defined rules

37. If you sell a 240 put option for 17, what is your maximum profit?

A. 17
B. 233
C. 240
D. Unlimited

38. What is a European-style option?

A. An option traded only 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

39. To liquidate a long position when the price falls below the prevailing market price requires which of the following orders?

A. Sell stop
B. Buy stop
C. Sell limit
D. Buy limit

40. A member firm executes, confirms and matches a trade, which it pre-registers to allocate the trade to another member firm. What is the term for this action?

A. Assign to
B. Call-up
C. Give-in
D. Give-up

41. Which of the following is TRUE of exchange of futures for physicals (EFP) trades?

A. Counterparty credit risk increases when an EFP replaces an existing over-the-counter (OTC) trade
B. EFP transactions can be negotiated and registered on a round-the-clock basis
C. OTC and futures positions can be swapped even if they differ substantially in value
D. Margin and credit limits can be reduced by netting OTC and futures positions

42. By which method does a clearing house become the counterparty to every trade?

A. Assignment
B. Novation
C. Offsetting
D. Registration

43. Which of the following are typically the most conservative users of derivative products?

A. Hedge funds
B. Pension funds
C. Corporate treasurers
D. High net worth individuals

44. Which of the following types of margin covers the risk of default during the delivery process?

A. Intra-day margin
B. Maintenance margin
C. Spot month margin
D. Variation margin

45. The benefit of a mark to market swap is:

A. its regular payments reduce any market risk from the underlying asset
B. after each settlement date, any credit risk that has built up is removed
C. it allows the value of the underlying principal to fluctuate after every settlement date
D. the regular principal repayments fit its use as a hedge for bonds

46. Which category of member is restricted to trading only for third parties?

A. Brokers
B. Broker-dealers
C. Dealers
D. General clearing member

47. Which is TRUE of price-takers?

A. They are buyers of financial securities only
B. They always have to pay away the market spread
C. They determine and deal on their own price
D. They always get to deal on their own price

48. How is a yield curve described when short-term rates are the same as long-term rates?

A. Concave
B. Flat
C. Inverted
D. Normal

49. If volatility rises, what will this do to options prices?

A. Call and put premiums will rise
B. Call and put premiums will fall
C. Call premiums will rise, put premiums will fall
D. Call premiums will fall, put premiums will rise

50. An option that can be exercised by its holder at any time up to its expiration date is known as:

A. American
B. Asian
C. Bermudan
D. European

51. If an investor buys a call with a higher strike and a put with a lower strike on an oil future, what is this strategy called?

A. Short straddle
B. Long strangle
C. Bear spread
D. Bull spread

52. Which of the following is involved in a long hedge?

A. A stop order
B. Selling short
C. Buying futures
D. An intra-market spread

53. Which of the following is the main regulator of futures exchanges in the US?

A. Commodity Futures Trading Commission
B. National Futures Association
C. Securities and Exchange Commission
D. Treasury and Exchange Department

54. A collateralised bond obligation (CBO) is considered investment grade and a portfolio of junk bonds is not, because the CBO:

A. offers an extremely attractive yield
B. has a Moody's rating of BBB or higher
C. includes a pool of several types of credit-quality bonds
D. includes a pool of bonds with different maturities

55. A Japanese investor expects to receive USD income from their portfolio of US government bond investments in three months' time. How might they hedge currency risk relating to this income?

A. Buy yen spot value
B. Sell a yen call/USD put option with a three-month expiration
C. Buy yen versus the USD forward, with a three-month maturity
D. Sell the US Treasury bonds

56. If you buy an option, what is the effect, if any, 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. None

57. Which order type on ICE Futures Europe is to be executed at the best price available?

A. Basis order
B. Market on open order
C. Market order
D. Normal limit order

58. An investor is short a future and buys a put. To achieve delta neutrality, what should the investor do?

A. Buy calls
B. Sell calls
C. Buy puts
D. Sell futures

59. According to the two most widely used option pricing models, an option's value will fall when the underlying asset's:

A. volatility rises faster than market volatility
B. price moves below the call's strike price
C. price moves below the put's strike price
D. price moves above the call's strike price

60. 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

61. Which of the following applies to broker margins?

A. They can be greater than those of the corresponding clearing house
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 the clearing house

62. What is the main purpose of the Capital Requirements Directive (CRD) introduced as part of the Markets in Financial Instruments Directive (MiFID)?

A. To ensure orderly markets and improve client protection
B. To make it easier for firms wishing to take advantage of passporting opportunities
C. To implement tougher sanctions against firms
D. To improve trading liquidity across the EU

63. What is a gilt strip?

A. The tax element of a coupon payment
B. The separation of the interest payments and the principal amount
C. The best bid-offer spread shown on a gilt dealing screen
D. A tap issue of gilts by the Debt Management Office (DMO)

64. Which of these describes 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

65. An investor buys a January £5 call option at 25p. At the expiry, the stock is at £4.75. How much will the investor lose per share?

A. 25p
B. 50p
C. £4.75
D. £5.00

66. If an investor goes long a call on three S&P 500 index futures where the premium is $1,500, what additional margin needs to be paid (if any)?

A. $1,500
B. $3,500
C. $4,500
D. Nothing

67. Flexible exchange (FLEX) options are hybrid products in what way?

A. OTC-traded, but with standardised contract specifications
B. Exchange-traded, but with choice of two exercise styles
C. Exchange-traded, but with freely negotiable terms
D. Options that can freely trade either on- or off-exchange

68. Where permitted, what does a credit line cover?

A. Margin requirements of members' clients
B. Tax liabilities when in default
C. Purchase of the underlying asset on exercise
D. Settlement payments of members

69. A dealer buys £10 million nominal of gilts, and sells gilt futures to the same value. What type of trade have they just executed?

A. A FLEX trade
B. A basis trade
C. An exchange for physical
D. A block trade

70. Certificates of deposit are issued:

A. at deep discount to their face value
B. with maturities typically between six and 12 months
C. at a slightly lower rate of interest compared with Treasury Bills
D. with the possibility of withdrawal prior to maturity, but usually at a cost

71. Which of the following government bonds is settled on a T+1 basis?

A. BTP
B. Bund
C. OAT
D. Treasury bonds

72. A sugar refiner bought 15 white sugar futures contracts on ICE Futures Europe at $275 per tonne. The contract size was 50 tonnes. The position was later closed out when the price was $270 per tonne. What was the loss?

A. $750
B. $1,875
C. $3,750
D. $4,125

73. Which of the following is accepted by ICE Clear Europe as collateral?

A. Australian dollars in cash
B. Equities that are traded on the Alternative Investment Market (AIM)
C. Japanese bonds
D. US dollar certificates of deposit

74. ICE Clear Europe calculates the amount of initial margin required to cover all contracts for each member by using the:

A. difference between the settlement price and variation margin
B. gross value of all positions
C. marked to market value of net positions
D. net liquidation values

75. MarkitWire is an:

A. industry-backed straight-through processing system for OTC derivatives
B. exchange-based derivatives clearing and margin system
C. industry-backed straight-through netting and payments system for OTC derivatives
D. exchange-based derivative netting and payments system

76. What use, if any, will 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. None

77. What term describes a trader closing out a position for a nominal amount to crystallise a loss?

A. Abandonment

B. Assignment

C. Cabinet trade

D. Basis trade

78. 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 go down while cash prices remain unchanged

79. Under which of the following circumstances will the FCA or an exchange set a maintenance margin higher than a position's initial margin?

A. When the broker is dealing with an offshore client, to ensure that they have sufficient funds to meet any margin calls

B. When the contract is considered to have a higher than normal risk or is very volatile

C. If the broker is actively managing the client's portfolio and, therefore, does not maintain a separate client account

D. When the client plans to hold the position to or close to its maturity, to avoid any additional margin calls

80. The current exchange rate is $1.35 = £1 and the interest rates in the US and UK for the next year are 3% and 4% respectively. What is the one-year forward rate of exchange using interest rate parity?

A. $1.337 = £1

B. $1.354 = £1

C. $1.379 = £1

D. $1.405 = £1

81. A call option has 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

82. If a borrower wants to hedge the risk that the floating rate on their loan will rise above a certain level, they will buy a:

A. floor
B. collar
C. swaption
D. cap

83. Which of these statements is most accurate in relation to trading in options?

A. The buyer buys the underlying from the seller of the option
B. The seller sells the buyer the right to buy the underlying
C. The buyer buys the right either to buy or sell the underlying
D. The buyer buys the right to either buy or sell a single option

84. Which of the following best describes 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 mispricings between markets
D. Mainly trading contracts on the same underlying, but different maturities

85. How does ICE Clear Europe 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

86. Which of the following is normally used to settle a contract for difference?

A. Exchange of documents
B. Exchange of financial futures
C. Exchange of the underlying
D. Cash

87. What action will an investor take if they are 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

88. What did the Commodity Futures Modernization Act 2000 permit?

A. FLEX options
B. Single stock futures
C. Swap futures
D. Synthetic futures

89. What is a block trade?

A. A large transaction between an exchange member and a wholesale client, negotiated away from the central order book and reported after completion
B. A large transaction between an exchange member and a wholesale client, according to the terms of the central order book and reported after completion
C. An off-market transaction that involves the swapping of an OTC position with a futures position
D. An off-market transaction that involves the swapping of an OTC position with a series of futures contracts

90. If you buy a 100 put for a premium of 13, what will your maximum potential profit be?

A. 13
B. 87
C. 100
D. Unlimited

91. An increase in which of the following factors will cause all option premiums to increase?

A. Time to maturity
B. Risk-free interest rate
C. Lower strike price
D. Price of the underlying

92. Which of the following applies to segregated accounts?

A. The customer has the same protection as non-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. Assets are held in a single portfolio

93. 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

94. Which of the following is TRUE when comparing the price of an ETD with an OTC derivative?

A. The OTC price will always have a tighter bid/offer spread

B. Both are usually the same, since both are reported to the market

C. The ETD price spread is wider, since it includes the initial margin

D. The ETD price is more transparent, since it is quoted via the market

95. 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

96. An investor bought 1 June 100 call for 22 and sold 1 June 120 call for 6. What market expectation did they have?

A. Neutral

B. Volatile

C. Moderately bullish

D. Bearish

97. Assume that S&P 500 index futures are currently priced at $1,600 and the contract size is $250. How many index futures contracts will be required to hedge a $15 million portfolio of US equities that has a beta of 1.12?

A. 15

B. 19

C. 38

D. 42

98. If tick size is half a point for a future on the FTSE 100 index and is valued at £5, what is the profit for an investor who goes long with the index at 9260 and then settles at expiry with the index at 9300?

A. £20

B. £200

C. £400

D. £4,260

99. Which of the following services does SWIFTNet FpML provide?

A. A payments netting system across a range of OTC contracts
B. A real-time matching system for a range of OTC confirmations
C. A straight-through payment system for foreign exchange (FX) and swap transactions
D. A real-time position and credit limit monitoring system

100. Although the exact limit varies by exchange and product, what time period following verbal agreement must a block trade be reported?

A. 30 seconds
B. Five minutes
C. One day
D. By market close

101. If a UK exporter wants to hedge the risk associated with the euro-denominated receipts for its products, which of the following will provide an effective hedge?

A. EUR FRA
B. GBP swaption
C. EUR/GBP forward contract
D. EUR/GBP swap

102. If you buy a 100 call for a premium of 13, what is your maximum potential profit?

A. 13
B. 87
C. 100
D. Unlimited

103. A speculator can avoid taking delivery of an underlying asset in their long futures position by:

A. selling an option on the underlying
B. extending the terms of the future
C. selling an equivalent future
D. renegotiating the contract

104. Which formula is generally used to calculate the invoice amount on a physically delivered contract?

A. Exchange delivery settlement price (EDSP) x scale factor x number of contracts
B. (EDSP/scale factor) x number of contracts
C. (Settlement price/scale factor) x number of contracts
D. Traded price x scale factor x number of contracts

105. The most effective way to change the interest rate and/or the currency exposure of a specific investment is to enter into:

A. an asset swap
B. a currency swaption
C. a collar
D. an interest rate swap

106. 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

107. A UK, FCA-authorised firm is approached by a US resident. Which of the following is the firm allowed or required to do?

A. Trade all contracts whether UK or US
B. Trade UK contracts if the firm does not have Commodity Futures Trading Commission (CFTC) Part 30 exemption
C. Provide a segregated account
D. Trade US contracts if the firm has CFTC Part 30 exemption

108. 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

109. Which 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 anticipates a rise in bond yields following an interest rate change

110. Which of the following is a type of calendar spread?

A. Vertical spread
B. Temporal option
C. Directional spread
D. Horizontal spread

111. If a dealer wants to open a position by buying at the best available price, once a limit has been reached, what kind of order should be given?

A. Limit stop order
B. Limit order
C. Market if touched order
D. Spread order

112. 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

113. When might the price of emissions contracts be expected to rise?

A. When heavy polluters restructure their operations to reduce emissions and no longer need to buy as many contracts for offset, thus creating oversupply
B. If emissions in a specific pollutant increase
C. As regulation tightens and pollution targets are reduced
D. As pollution targets are reached

114. An investor has bought 25 Brent Crude Oil futures contracts on ICE Futures at $63.25 per barrel and later closes out when the price is $64.30 per barrel. The contract size is 1,000 barrels. What is the profit?

A. $6,250
B. $10,050
C. $16,075
D. $26,250

115. A long put option is normally considered to have the potential for:

A. unlimited profit and unlimited loss
B. limited profit and limited loss
C. unlimited profit and limited loss
D. limited profit and unlimited loss

116. Which 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

117. 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

118. Which 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

119. Which of the following distinguishes ICE Clear Europe as operating a mutual guarantee system?

A. A collective default fund
B. Financial Services Compensation Scheme (FSCS) eligibility
C. Insurance cover
D. Balance sheet reserves

120. A basis trade is agreed on ICE Futures Europe at 11.00am. By what time must the trade have been reported?

A. 11.03am
B. 11.05am
C. 11.15am
D. 11.30am

121. 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

122. Which of these statements is TRUE in relation to time value?

A. Time value is based on the length of an option's risk period
B. Time is value measured by gamma
C. Time value is negative for puts and positive for calls
D. Time value can fall to zero as expirations get longer

123. What classification is given to a UK government bond that an investor has held from issue five years ago and which is due to be redeemed in six years' time?

A. Short-dated
B. Medium-dated
C. Long-dated
D. Dual-dated

124. Which of the following is an example of an intramarket 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

125. An advantage of exchange price feeds is to:

A. allocate limit orders
B. display clearing information
C. match trading parties
D. provide real-time prices

126. What are the key advantages of a FLEX facility?

A. Standardised terms with customised settlement, between wholesale counterparties
B. Standardised terms with OTC delivery, between retail and wholesale counterparties
C. Customised terms with standard exchange settlement, between wholesale counterparties
D. Customised terms with standard exchange settlement, between retail or wholesale counterparties

127. What method is used by London SPAN to assess volatility in options positions?

A. Basis
B. Deltas
C. Gammas
D. Net liquidation values

128. What measurement of an option is also known as the hedge ratio?

A. Beta
B. Delta
C. Gamma
D. Vega

129. What type of margin represents daily movements on open positions in derivatives?

A. Variation
B. Realised
C. Initial
D. Spread

130. How do 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

131. The only credit risk associated with OTC options trading exists for a:

A. bank that has sold an in-the-money put to a client
B. customer who has sold an at-the-money call to its broker
C. bank that has sold an in-the-money call to another bank
D. broker who has bought an out-of-the-money call from a client

132. An important feature of a master agreement is that it:

A. enables banks to swap offsetting contracts to reduce their total exposure
B. allows the netting of all amounts due between two parties upon early termination of contracts covered by the agreement to one single payment
C. allows two parties to share information and net any outstanding contracts with a common third party
D. provides a set and accepted framework that allows several parties to measure their risk to a specific type of contract

133. What type of option gives the holder the right to buy?

A. Put option
B. Call option
C. Long option
D. Short option

134. Which of the following is a type of wholesale trade recognised by ICE Trading Platform?

A. Basis trade
B. Stop trade
C. Cross trade
D. Limit trade

135. The interest rate parity theorem states that:

A. in FX forward rates, the higher interest rate currency commands a premium in the FX forward market

B. in FX swaptions, the lower interest rate currency commands a lower premium payment

C. in FX forward rates, the lower interest rate currency commands a premium in the FX forward market

D. Forward rate agreement (FRA) rates are determined by the relative swap rates of the two currencies involved in an FX FRA

136. An option's vega is useful in that it is a measure of:

A. the relationship between an option's time decay and market sentiment

B. an option's sensitivity to changes in volatility

C. an option's hedge ratio and how it changes relative to price movements

D. an option's sensitivity to market interest rates

137. Which of the following best describes when a put option is out-of-the-money (OTM)?

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

138. What is the approximate delta of a deep in-the-money short call position?

A. –0.5

B. +0.5

C. –1.0

D. +1.0

139. The type of option that combines the benefits of customisation of an OTC product with the advantages of being listed on an exchange is known as:

A. an average rate option

B. a Bermudan option

C. a FLEX option

D. a lookback option

140. The writer of an option who agrees to buy the underlying at a given date and price has gone:

A. short a call option

B. long a call option

C. long a put option

D. short a put option

141. The strike price of a put option is £2.00 and the current price is £2.20. The premium when this option was purchased was 15p and it is now 12p. What is the time value of this option today?

A. 3p
B. 12p
C. 20p
D. 32p

142. All of the following are true with respect to exchange traded funds (ETFs) and derivatives, except:

A. ETF shares could be the underlying asset for options contracts
B. The investment manager of the ETF may use derivatives to replicate a long position in a physical commodity
C. The investment manager of the ETF could utilise derivatives to replicate the leveraged short performance of a benchmark index
D. The ETF shares could be part of a swap with retail investors, exchanging their investment for a floating rate payment.

143. The trade which creates a synthetic short position by buying a put and selling a call, then buying the futures or shares in order to take advantage of mispriced options is called a:

A. conversion
B. reversal
C. covered call
D. cabinet trade

144. Which of the following describes a Eurobond?

A. A French company issuing corporate bonds in EUR to investors in the local market
B. The UK DMO selling sterling-denominated gilts to Australian investors
C. The Federal Government (FG) of Nigeria selling USD-denominated bonds to global investors
D. The US Treasury selling inflation protected bonds (TIPS) to investors in Asia

145. After 2023, all of the following will likely remain key benchmarks interest rates for OTC derivatives, except:

A. Sterling LIBOR
B. USD SOFR
C. SONIA (GBP)
D. Euro Short-Term Rate (€STR)

Answers to Multiple Choice Questions

1. D Chapter 1, Section 4

Contracts for difference do not have a fixed maturity.

2. D Chapter 2, Section 6.2

The speculator has made a profit of $25 per tonne after buying at $2,350 and selling at $2,375. The total profit = $25 x 25 tonnes x 30 contracts = $18,750.

3. A Chapter 6, Section 1.3

Every clearing member contributes in cash to the member default fund according to the volume of its clearing activities.

4. C Chapter 1, Introduction

This is a hedge: rising oil prices mean rising fuel prices. The company should therefore go long oil futures, locking into the cheaper oil price.

5. D Chapter 7, Section 2.5

If an ICE Futures option is not to be automatically exercised by ICE Clear Europe, a suppression notice must be filed.

6. C Chapter 9, Section 2.4

The FCA's COBS rules define a client as someone to whom a firm provides, intends to provide, or has provided a service in the course of carrying on a regulated activity; and, in the case of MiFID or equivalent third country business, anything which is an ancillary service. For COBS, this does not include eligible counterparties, although for the Client Assets Sourcebook (CASS) it means all clients.

7. B Chapter 1, Section 2.1

The futures exchange sets contract terms at specific quantities of the underlying, so investors can buy multiples of that amount but not fractions – investors cannot buy part of a contract.

8. B Chapter 4, Section 4.1.1

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.

9. B Chapter 2, Section 5.2.1

A cumulative preference shareholder will not only be paid this year's dividend before any ordinary shareholders' dividends, but also any unpaid dividends from previous years.

10. D Chapter 1, Section 5.4

Volatility or equity swaps are the most popular method of switching the returns on equity or equity index-based investments.

11. A Chapter 1, Section 2

An American option may be exercised at any time. Cocoa futures options on ICE are American-style.

12. B Chapter 8, Section 6.2

Straddles are volatility trades, and an investor selling a straddle will profit if the underlying price is stable.

13. C Chapter 5, Section 5.2

A haircut is applied to any type of collateral, to ensure that the broker/bank is fully covered as the value of the collateral changes. Therefore the more volatile the collateral, the larger the haircut.

14. C Chapter 4, Section 3.7.2

He will buy the future as it is relatively cheap and sell the cash asset – a reverse cash and carry arbitrage.

15. B Chapter 6, Section 1.3

Every clearing member contributes in cash to the member default fund according to the volume of their clearing activities.

16. D Chapter 8, Section 4

A short underlying position has a delta of –1, so can be hedged by two long at-the-money (ATM) calls (+0.5 x 2 = +1).

17. D Chapter 5, Section 5, Chapter 9, Section 3.2 and Chapter 6, Section 1

The International Swaps and Derivatives Association (ISDA)'s key role was introducing standardised documentation to support OTC product trading. The European Market Infrastructure Regulation (EMIR) attempts to improve transparency and market stability and therefore introduced requirements for reporting OTC derivatives trades to data repositories for wide distribution and requiring OTC trades to be centrally cleared to reduce counterparty risk.

18. D Chapter 3, Section 2.2

'Sell at £27 limit' is an instruction to sell at no less than that figure, and 'sell at £10 stop' indicates that the investor wants to sell as soon as the price goes to or drops below £10.

19. C Chapter 2, Section 2.5

UK Treasury bills are issued by the Debt Management Office (DMO) and have a maturity of 91 days.

20. D Chapter 2, Section 6.1

For soft commodity products, the sellers choose where to deliver based on the exchange's specified delivery points.

21. A Chapter 1, Section 2.2

A put option is an option to sell an asset for a specified price at a specified date or range of dates.

22. D Chapter 4, Section 4.1

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).

23. C Chapter 6, Section 4

The writer of a GlaxoSmithKline 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 GSK shares is falling. Neither undated bonds nor Swiss bonds are acceptable.

24. D Chapter 8, Section 6.1

Calls and puts are bought in combination if volatility is expected to rise, creating a long straddle or long strangle.

25. C Chapter 7, 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.

26. D Chapter 3, Section 4.2

Cross trades in an open outcry market must be verified and signed off by pit observers when the order is executed.

27. D Chapter 9, Section 2.4

A retail client may only be treated as an elective professional client if the size of their portfolio exceeds €500,000.

28. B Chapter 4, Section 3.7.3

Arbitrage works by buying whichever thing is cheaper and selling the other to generate a risk-free profit.

29. B Chapter 6, Section 3.2.1

They are both scenario-based risk programs used for calculating initial margins.

30. A Chapter 1, Section 2.2

The buyer (holder) of any kind of option must pay the premium to the writer (seller) of the option.

31. C Chapter 2, Section 4.1

OATs and Bunds have annual coupons whereas BTPs, JGBs and T-bonds have semi-annual coupons.

32. C Chapter 4, Section 3.4

The market is said to be in backwardation when the futures prices are lower than the cash prices. If futures prices are higher than cash prices the market is said to be in contango.

33. A Chapter 4, Section 3.7.3

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 will be incurred. This creates an arbitrage channel – a range of prices within which there will be no possibility for arbitrage owing to transaction costs outweighing any potential benefits.

34. C Chapter 8, Section 3.1

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, in this case, 1.112233 x (€50m/ €250,000) = 222.

35. D Chapter 9, Section 3.3.1

The Securities and Exchange Commission (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.

36. C Chapter 9, Section 2.1

While each member state is permitted to implement MiFID according to parameters that are agreed between the EU and each home state, the approach of having broad-based guidelines must be preserved.

37. A Chapter 1, Section 5.3.4

The maximum profit for the writer of a put option is the premium.

38. C Chapter 1, Section 2.2

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.

39. A Chapter 3, Section 1.2

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.

40. D Chapter 3, Section 5.2

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'.

41. D Chapter 1, Section 6.1

Margin and credit limits can be reduced by netting out OTC and futures positions; similarly, counterparty credit risk decreases as a result of an EFP trade. They can be negotiated on a 24-hour basis but must be registered during explicit times set down by the exchange. OTC and futures positions can be swapped only if they are substantially similar in value and/or quantity.

42. B Chapter 6, Section 1.2

Novation is the legal process whereby the clearing house becomes the counterparty to all trades.

43. C Chapter 8, Section 10

Hedge funds and high net worth individuals (HNWIs) tend to have a greater appetite for risk than pension funds, which may also be constrained in their investment activities either through legislation or the client mandate. Corporate treasurers are the most risk-averse and will typically use derivatives to hedge price or currency risk associated with normal business activities.

44. C Chapter 6, Section 3.2.1

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.

45. B Chapter 5, Section 5.2

The payment of any changes in market value removes any credit risk between the two swap counterparties on a regular basis.

46. A Chapter 3, Section 1.2

Brokers 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.

47. B Chapter 1, Section 6.4.1

A price-taker is a market participant who either requests the price, or deals through an intermediary on another participant's price. Thus, they do not set the price themselves. Many market participants including market makers may find themselves as price-takers in some circumstances, and price-makers or price-givers in others.

48. B Chapter 2, Section 4.2

If short-term interest rates are the same as long-term rates, the yield curve is said to be flat.

49. A Chapter 4, Section 4.1.5

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.

50. A Chapter 1, Section 2.2

There are three popular exercise styles for options. The American-style allows its owner to exercise it at any time, up to its expiration date.

51. B Chapter 8, Section 6.3

Strangles are constructed using calls and puts with different exercise prices. Here, the options are bought, so it is a long strangle.

52. C Chapter 8, Section 3

'Long' means 'buy' in derivatives jargon. Hedgers will offset risk by taking an opposite position in the futures market.

53. A Chapter 9, Section 3.3.2

Although a major regulator of US securities markets, the SEC has a limited role in the regulation of derivatives markets. The CFTC regulates all on-exchange derivatives transactions that are not covered by the SEC. It regulates all futures products and exchanges (including the Philadelphia Stock Exchange (PHLX)) and all of the options not covered by the SEC (including currency options on the Chicago Mercantile Exchange (CME)).

54. C Chapter 5, Section 3.2

A collateralised bond obligation (CBO) is a derivative security that creates an investment-grade bond from a pool of junk bonds (high risk). These junk bonds are typically not investment grade, but because a CBO includes a pool of several types of credit quality bonds together, they offer enough diversification to be considered investment grade.

55. C Chapter 2, Section 3

If USD were to weaken against JPY over the three months, the amount of yen that the investor would receive would fall. Therefore, it would make sense to fix the exchange rate as soon as possible, to hedge any exchange rate risk. This is best done using a three-month forward contract.

56. B Chapter 1, Section 1.3

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.

57. C Chapter 3, Section 1.2

Market orders are to be executed at the best price available. Normal limit orders are to be executed at the stated price or better.

58. A Chapter 4, Section 4.3

Short future and buy put are negative delta positions. Therefore, a positive delta trade is required, so buy calls is the right choice.

59. B Chapter 5, Section 4.1

According to any option pricing model, a call's price will fall as the price of its underlying asset falls below its strike price, thus making it further out-of-the-money.

60. B Chapter 6, Section 3.2.2

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.

61. A Chapter 6, Section 3.2.1

Broker margin must be at least equal to the margin required by the clearing house. As long as they meet this requirement, all other aspects are determined by the broker.

62. A Chapter 9, Section 1.2

The main purpose of the Capital Requirements Directive (CRD) is to set out regulatory requirements for capital that a firm must hold. This ensures orderly markets and improves client protection.

63. B Chapter 2, Section 4.1.7

Stripping a gilt involves trading the interest (each individual coupon) and the principal (the nominal value) separately.

64. A Chapter 4, Section 3.6

Positive basis describes a situation in which the futures price is in backwardation, ie, 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.

65. A Chapter 1, Section 2.3.1

Rather than exercise the option, the investor abandons it and loses his premium: 25p.

66. D Chapter 4, Section 4.5

There is no initial margin payment on the purchase of an option because the counterparty's risk is covered by the premium.

67. C Chapter 1, Section 6.1

FLEX options are exchange traded, but the key parameters such as exercise price, expiry date and exercise style are customised. Compared with OTC options, they have lower credit risk due to the exchange's use of a central clearing house.

68. A Chapter 6, Section 4.2

Some exchanges allow their members to extend credit to their clients to cover margin requirements. These credit lines are subject to regulatory rules.

69. B Chapter 3, Section 2

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.

70. D Chapter 2, Section 2.5

CDs are issued at face value at maturities usually between three and six months, and they pay a slightly higher rate of interest over government-issued T-bills to compensate for the additional risk. Because CDs are a form of time deposit, withdrawals are subject to a penalty.

71. D Chapter 2, Section 4.1

US T-bonds are settled on a T+1 basis. OATs, Bunds, JGBs and BTPs are settled on a T+2 or T+3 basis.

72. C Chapter 2, Section 6.1

There is a loss of $5 per tonne after buying at $275 and selling at $270. Each contract represents 50 tonnes. Therefore $5 x 50 tonnes x 15 contracts = $3,750.

73. D Chapter 6, Section 4.1

Certificates of deposit (CDs) denominated in sterling or US dollars are acceptable. Cash must be in one of eight approved currencies.

74. D Chapter 6, Section 3.2.3

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 NLVs of the constituent parts of the portfolio.

75. A Chapter 5, Section 7.1

MarkitWire is an industry-backed straight-through processing (STP) system for OTC derivatives, which enables the affirmation of direct transactions and brokered deals between counterparties.

76. D Chapter 4, Section 3.7.3

When a future is in the arbitrage channel it is either at its fair value, or transaction costs cancel out any gains that can be made from engaging in arbitrage.

77. C Chapter 7, 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.

78. D Chapter 8, Section 3.3

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 while still getting the same cash price for the underlying physical asset.

79. B Chapter 5, Section 6.2

The maintenance requirement is the minimum amount to be collateralised in order to keep an open position. It is generally lower than the initial requirement. This allows the price to move against the margin without forcing a margin call immediately after the initial transaction. On instruments determined to be especially risky, however, the regulators, the exchange or the broker may set the maintenance requirement higher than normal or equal to the initial requirement to reduce their exposure to the risk accepted by the trader.

80. **A** **Chapter 2, Section 3.2.1**

The forward rate in one year's time will be based on the spot rate adjusted by the relative interest rates. So US$1.35 x 1.03 will be equivalent to £1 x 1.04. The one-year forward rate will be based on: $F = 1.35 \times ((1 + 0.041)/(1 + 0.03)) = 1.35 \times (1.03 / 1.034) = 1.35 \times 0.99038 \approx 1.337$

81. **C** **Chapter 4, Section 4.1.1**

The intrinsic value is the difference between the current share price and the strike price. Therefore, the intrinsic value is 330p – 300p = 30p.

82. **D** **Chapter 5, Section 2**

Caps are a type of option that allow the buyer to set a maximum rate on an underlying borrowing/loan.

83. **C** **Chapter 1, Section 2.1**

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.

84. **C** **Chapter 4, Section 1.7**

Arbitrage involves spotting mispricings between any two markets, including derivative markets and profiting from the price differential.

85. **D** **Chapter 6, Section 3.1**

ICE Clear Europe calls on members for margin payments as necessary and these are paid through the Protected Payments System, an automatic debit from members' bank accounts.

86. **D** **Chapter 1, Section 4**

A contract for difference can only be settled in cash.

87. **B** **Chapter 8, Section 3.3**

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.

88. **B** **Chapter 9, Section 3.3.2**

In the US, single stock futures were permitted under the Commodity Futures Modernization Act 2000.

89. **A** **Chapter 3, Section 2**

Block trades offer the opportunity to negotiate terms privately, providing that the order is reported into the exchange once completed. C and D relate to exchange of futures for physical (EFP) and exchange of futures for swaps (EFS) transactions.

90. **B** **Chapter 1, Section 2.4**

The maximum gain on a long put = strike price – premium (100 – 13 = 87).

91. **A** **Chapter 4, Section 4.1**

An increase in interest rates and the price of the underlying will cause call premiums to rise, and put premiums to fall. For all options, an increase in the time to maturity means that the option has a longer life and therefore will increase its value/premium.

92. **C** **Chapter 3, Section 5.1**

Customers 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.

93. **B** **Chapter 1, Section 6.3**

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.

94. **D** **Chapter 3, Section 6**

The prices of all exchange-traded contracts are highly transparent, since they are listed by the exchange and have full public dissemination. All exchange members have access to all prices quotes at any given time.

95. **A** **Chapter 8, Section 4.3.1**

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.

96. **C** **Chapter 8, Section 5.1**

The investor has bought the call with the lower strike price and sold the call with the higher strike price, creating a bull spread.

97. **D** **Chapter 8, Section 3**

The correct formula is (portfolio value / (futures price x contract size)) x portfolio beta. Therefore, the correct answer is ($15m / (1600 x $250)) x 1.12 = 42 contracts.

98. **C** **Chapter 7, Section 1.2.1**

The profit is the tick value (£5) times the number of ticks moved. Because the tick size is half a point, the number of ticks moved is twice the number of points moved (40). So the equation is £5 x 40 x 2 = £400.

99. **D** **Chapter 5, Section 6.7**

SWIFTNet FpML is a real-time confirmation and exception monitoring system for FX, money market and OTC derivative confirmations, whose main goal is to increase the efficiency of users' straight-through processing of OTC derivative confirmations.

100. **B** **Chapter 3, Section 6**

Block trades must be reported to the exchange within five minutes and an hour of verbal agreement being reached.

101. **C** **Chapter 2, Section 3.2**

Forward FX contracts are a good means of hedging currency risk.

102. **D** **Chapter 1, Section 2.3**

Loss is limited to the premium paid, but for the buyer of a call, profit is potentially unlimited.

103. **C** **Chapter 1, Section 3.1.3**

A trader can remove any delivery obligations by taking an equal and opposite position before the expiry. This will crystallise any gains or losses.

104. **A** **Chapter 7, 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.

105. **A** **Chapter 1, Section 5.5.1**

An asset swap is the most effective way to change the total exposure of an asset.

106. **A** **Chapter 6, Section 3.2.2**

Variation margining helps protect against default by settling the profit or loss on a position daily.

107. **C** **Chapter 9, Section 3.3.2**

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.

108. **C** **Chapter 8, Section 5.1**

For a bear spread you buy the high strike and sell the low strike.

109. **C** **Chapter 8, 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.

110. **D** **Chapter 8, Section 5.2**

A horizontal spread is one type of calendar spread, involving buying and selling the same option across different expiry months.

111. **C** **Chapter 3, Section 1.2**

A market-if-touched (MIT) order is an order to open a position that becomes a market order once the limit has been reached.

112. **B** **Chapter 1, Section 2.3.3**

At expiry, the put has no value, as the strike price is below the underlying price.

113. C Chapter 2, Section 6.5

Emissions contracts are initially bought by companies in order to offset levels of emissions that exceed set targets such as those established in the Kyoto Protocol. The contracts will become more valuable when these pollution targets are reduced, eg, as emmissions regulation becomes more strict.

114. D Chapter 7, Section 1.3.1

The investor has made a profit of $1.05 per barrel after buying at $63.25 and selling at $64.30 and each contract represents 1,000 barrels. $1.05 x 1,000 barrels x 25 contracts = $26,250.

115. B Chapter 1, Section 5.3.3

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).

116. B Chapter 7, Section 1.3.1

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.

117. A Chapter 8, Section 5.1

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.

118. D Chapter 7, Section 1.4

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.

119. A Chapter 6, Section 1.3

All members of ICE Clear Europe 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.

120. C Chapter 3, Section 6

On ICE Futures, basis trades are to be reported within 15 minutes of the time the trade was organised.

121. C Chapter 4, Section 2

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.

122. A Chapter 4, Section 4.1.1

Time value increases in proportion to the length of time the writer is at risk from the buyer exercising.

123. A Chapter 2, Section 4.1

A UK gilt with less than seven years to redemption is classified as short-dated.

124. A Chapter 8, Section 2.1

Spreads require buy and sell transactions on the same underlying asset. Intramarket spreads are trades based on the simultaneous buying and selling of futures with different expiry dates on the same underlying asset.

125. D Chapter 3, Section 6.2

Exchanges disseminate the trade reporting information through a price feed. Real-time prices and trade information are included in the feed that is available to exchange members through quote vendors.

126. C Chapter 1, Section 6.1

The FLEX facility combines the flexibility of the OTC market in customising a transaction, with the clearing and other advantages of exchange trading. This reduces some of the risks normally associated with OTC trading. Typically, this facility is only open to exchange members, ie, for wholesale business.

127. B Chapter 6, Section 3.1

Options positions will be affected by volatility, and London SPAN uses deltas to calculate the equivalent number of futures to quantify any potential offset.

128. B Chapter 5, Section 4.1

Delta is the Greek measure or ratio that measures how the change in the underlying asset's value changes the option's value. It has a range of zero to one, positive or negative.

129. A Chapter 6, Section 3.2.2

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.

130. B Chapter 8, Section 7

A synthetic long future results where matching short put and long call options positions are taken on a future. An investor will buy a call and sell a put with the same strike price and expiry.

131. D Chapter 1, Section 2.4

Since an option buyer usually buys the premium upfront, the only credit risk lies with any option buyer, no matter what type of option has been purchased.

132. B Chapter 5, Section 5.1

One of the main advantages of a master agreement is the fact that is has two netting features, which helps to reduce credit risk.

133. B Chapter 1, Section 2.2

A call option is an option to buy an asset for a specified price at a specified date or range of dates.

134. A Chapter 3, Section 2

A basis trade is one of two types of wholesale trade recognised by ICE Clear Europe. 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.

135. C Chapter 2, Section 3.2.1

The interest rate parity theorem is the basis for the FX forward market, to ensure that arbitrage opportunities do not exist.

136. B Chapter 4, Section 4.4.2

Vega is the measure of how a 1% change in volatility affects an option's value relative to changes in both expected or implied volatility and current market conditions.

137. D Chapter 4, Section 4.1.1

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. If the strike price is less than the current market price, a put option is out-of-the-money.

138. C Chapter 4, Section 4.3

Delta equals the change in option premium divided by the change in price of the underlying. Therefore, delta = –1 x 1 = –1.0.

139. C Chapter 1, Section 6.1

FLEX options are exchange-traded options that allow buyers to customise key contract terms.

140. D Chapter 1, Section 2.3.4

The writer sells (goes short) the option for the buyer to sell them the underlying at a fixed price in the future, hoping the price will rise and the buyer will abandon the option, leaving the writer with the premium.

141. B Chapter 4, Section 4.1.2

The premium is calculated as intrinsic value plus the time value. Because the premium is 12p and the intrinsic value is nothing (because the option is out-of-the-money) the time value must be 12p.

142. D Chapter 8, Section 9.2

Options on ETF shares have become popular and many ETFs use derivatives to generate the returns of their target asset – such as a physical commodity like crude oil, or a 3x leveraged short equity index. An ETF would not enter into a swap with its investors due to the regulations around ETFs (which must be extremely transparent and provide daily liquidity), but also because retail investors generally cannot access OTC markets.

143. A Chapter 4, Section 4.2, Chapter 8, Section 7

Using Put-Call Parity Theorem, a conversion (buy put, sell call and buy the futures or shares) would be used to create a riskless trade to take advantage of mispriced options, in the case where the put is cheap and the call is expensive.

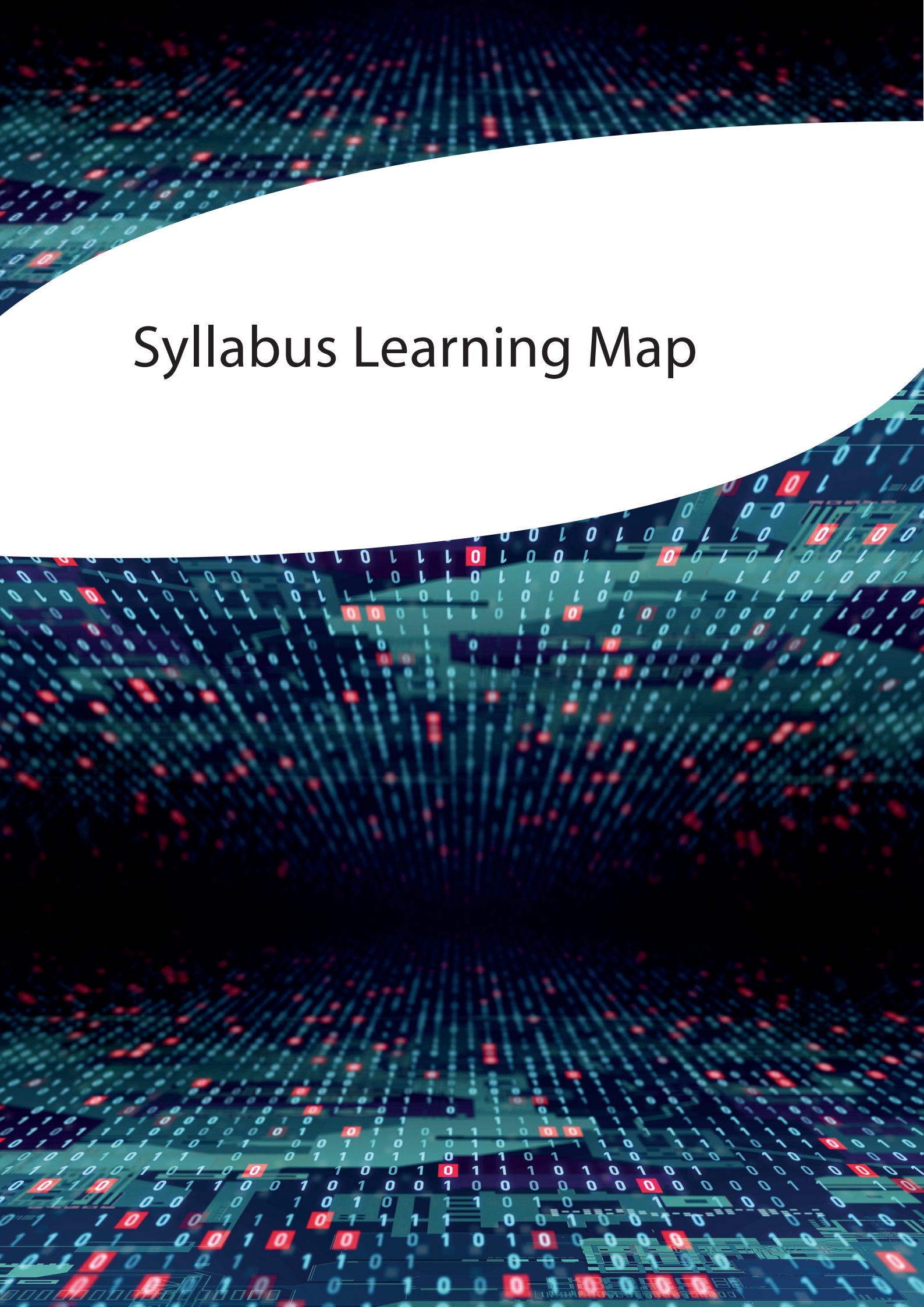
144. C Chapter 2, Section 4.1

A Eurobond is a bond issued offshore in a currency (usually USD or EUR) other than the home currency of the issuer. All the choices are examples of bonds issued in the local currency of the issuer except for C.

145. A Chapter 2, Section 2

Following the global financial crisis, investigations into LIBOR concluded that the set of benchmark interest rates which were determined by surveying banks were open to manipulation. Subsequently, there has been a move toward alternative rates which are based on actual market activity, thereby providing a more accurate indication of financial conditions. ICE and many national financial regulators are in the process of phasing out LIBOR for use as a benchmark for both exchange-traded and OTC derivatives, and by 2023, LIBOR in various currencies will no longer be calculated.

Syllabus Learning Map



Syllabus Unit/ Element		Chapter/ Section
Element 1	**Introduction to Derivatives**	**Chapter 1**
1.1	**Risk and Reward** On completion, the candidate should:	
1.1.1	understand the risks and rewards associated with derivatives: • rewards • counterparty risk • market risk • liquidity risk • operational risk	1.1
1.1.2	understand the significance of gearing to derivatives: • how trading on margin facilitates gearing • effect on derivative positions • reward versus outlay • reward versus risk	1.3
1.2	**Options** On completion, the candidate should:	
1.2.1	know the basic concepts and fundamental characteristics of options contracts, including: • basic puts and calls • options on cash and derivative products • American, European, Asian • exotics	2
1.2.2	understand how to interpret basic options diagrams (long call, long put, short call, short put)	2.3
1.3	**Futures and Forwards** On completion, the candidate should:	
1.3.1	understand the basic concepts and fundamental characteristics of: • forwards • futures contracts	3
1.4	**Contracts for difference (CFDs)** On completion, the candidate should:	
1.4.1	know the basic concepts and fundamental characteristics of contracts for difference (CFDs)	4
1.4.2	know how spread betting differs from other CFDs	4

Syllabus Unit/ Element		Chapter/ Section
1.5	**Swaps** On completion, the candidate should:	
1.5.1	know the basic concepts and fundamental characteristics of swaps	5
1.5.2	know the basic concepts and fundamental characteristics of interest rate swaps: • underlying (fixed/fixed, fixed/floating, floating/floating) • interest calculation (compared to bond markets)	5.1
1.5.3	know the purpose of inflation swaps	5.2
1.5.4	know the basic concepts and fundamental characteristics of zero-coupon inflation products	5.2.1
1.5.5	know the basic concepts and fundamental characteristics of foreign exchange and currency forwards and swaps: • FX forward (outrights quotes versus pips) • currency swaps	5.3
1.5.6	know the basic concepts and fundamental characteristics of equity forwards, swaps and swaptions: • equity baskets/index • equity forwards • equity swaps	5.4
1.5.7	know the common equity swap instruments and their relationship to other markets and products: • total return • volatility • variance • dividend swaps	5.4
1.5.8	know the basic concepts of total return and asset swaps	5.5
1.5.9	know the basic concepts and fundamental characteristics of commodity forwards, swaps	5.7
1.5.10	know the basic purpose of commodity swaps	5.7
1.5.11	know the common interest rate swap features and their relationships to other markets: • amortising • accreting • rollercoaster • forward start	5.8

Syllabus Unit/ Element		Chapter/ Section
1.6	**Derivatives Trading** On completion, the candidate should:	
1.6.1	know the trading mechanisms by which OTC and exchange-traded markets meet: • EFPs (Exchange for Physical)	6.1
1.6.2	understand the principles and differences between the two major measures of exchange-traded liquidity (open interest and volume)	6.2
1.6.3	know the main features and differences of OTC traded products in contrast to exchange-traded products: • how an OTC traded product is traded • standard versus bespoke OTC contracts • set maturity or expiry dates versus bespoke OTC contracts • margin requirements versus collateral • counterparty risk • liquidity • market transparency versus confidential transactions	6.3
1.6.4	know the essential details of the trading environment: • open outcry, telephone and electronic platforms • whether quote or order driven • how the trading host matches orders • the order types accepted by the markets • recognised trading strategies	6.4
1.6.5	know the exchange membership structures (brokers, dealers and broker-dealers) and their main activities: • executing trades for third parties • executing trades for their own account • executing trades for other members • capacity as broker • capacity as dealer	6.5

Element 2	Underlying Markets	Chapter 2
2.1	**Money Market Instruments** On completion, the candidate should:	
2.1.1	know the uses and requirements of inter-bank deposits: • characteristics of inter-bank deposits • their purpose • determination and role of benchmark rates • major benchmark rates	2

Syllabus Unit/ Element		Chapter/ Section
2.1.2	understand the risk implications of trading in money market contracts: • as a depositor • as a source of funding	2.4
2.1.3	know the basic characteristics of treasury bills: • term • issuance/redemption • promissory note	2.5
2.1.4	know the basic characteristics of certificates of deposit and commercial paper: • term • how and when issued • issued/redemption • differences in terminology between UK and USA	2.6
2.2	**Foreign Exchange** On completion, the candidate should:	
2.2.1	know the nature of the spot market and the trading and settlement of spot transactions: • purpose of the market • contract value dates • settlement periods and timescales	3.1
2.2.2	understand the nature, characteristics, markets and uses of FX forward contracts: • FX forward contracts including non-deliverable forwards • commercial, speculative and hedging	3.2
2.2.3	understand the factors that determine forward rates and how forward rates are quoted: • effect of interest rate differentials • the relationship between the spot market and the forward market • using forward points • how prices are quoted (may be tested by the use of simple calculations)	3.2
2.2.4	be able to calculate forward foreign exchange rates using interest rate differentials	3.2

Syllabus Unit/ Element		Chapter/ Section
2.3	**Bonds** On completion, the candidate should:	
2.3.1	know the main characteristics of bonds: • coupon (fixed, floating, zero) • redemption • accrued interest • quoted price vs transaction price	4.1
2.3.2	understand the reasons for government bond issuances: • public sector finance requirements • finance long term debt • role of national debt in government finances	4.1
2.3.3	know the main government bond markets and their main features: • UK government bonds (gilts) • US treasury notes and bonds • Japanese government bonds (JGBs) • German government bonds • French government bonds • settlement • spreads between different government bonds	4.1
2.3.4	understand the relationship between return and maturity shown by yield curves: • normal yield curves • inverted yield curves • flat yield curves	4.2
2.3.5	know the main features of the corporate bond market	4.3
2.3.6	understand the relationship between government and corporate bonds: • yield spread over government bonds • high-grade and high-yield bonds • bond ratings, transition and default	4.3
2.4	**Equities** On completion, the candidate should:	
2.4.1	know the principal features and characteristics of ordinary shares and non-voting shares	5.1

Syllabus Unit/ Element		Chapter/ Section
2.4.2	know corporate actions: • rights issues • bonus issues • stock splits • mergers and acquisitions • share buybacks	5.2
2.5	**Commodities** On completion, the candidate should:	
2.5.1	know the main softs and agriculturals and the influences on price: • coffee, cocoa, white sugar, soya bean, frozen concentrated orange juice (FCOJ), grains, livestock • change in demand • change in production, weather • holding and delivery costs • political or strategic	6.1
2.5.2	know the main base and precious metals and the influences on price: • copper, nickel, aluminium, zinc, tin, lead, gold, silver, platinum and palladium • change in demand • change in production • marginal costs of mining • political or strategic • holding and delivery costs	6.2
2.5.3	know the main energy products and the influences on price (crude oil, electricity and natural gas): • change in demand • change in production • marginal costs of production • holding and delivery costs • political or strategic	6.3
2.6	**Other Markets** On completion, the candidate should:	
2.6.1	know the principal features and characteristics of cryptocurrencies and digital assets: • currencies, coins, non-fungible tokens • central control • use of distributed ledger technologies • risks (regulatory risks, volatility risks, ESG risks)	6.4

Syllabus Unit/ Element		Chapter/ Section
2.6.2	know features of markets in: • freight • emissions • weather • volatility	6.5

Element 3	Market Structure	Chapter 3
3.1	**Derivatives** On completion, the candidate should:	
3.1.1	know the main products of the main derivatives exchanges	1.1
3.2	**Order Types**	
3.2.1	understand the range of types of orders, their uses and effects: • market order • limit order • market if touched order • opening and closing orders • good 'til cancelled • immediate or cancel/fill or kill order • stop order • stop limit order • day order	1.2
3.3	**Wholesale Trading Facilities** On completion, the candidate should:	
3.3.1	know the essential details of wholesale trading facilities: • block trades • basis trades	2
3.3.2	understand the significance, implications and uses of wholesale trading facilities	2
3.4	**Over the counter (OTC) Markets** On completion, the candidate should:	
3.4.1	understand the reasons for using OTC markets	3
3.5	**Market Conventions** On completion, the candidate should:	

Syllabus Unit/ Element		Chapter/ Section
3.5.1	know the principles of order flow: • how clients, brokers and exchange members are linked • electronic and open outcry markets • audit trail	4
3.5.2	know the definition, significance and differences between principal and agency orders (ie, of dual capacity versus agency orders): • dealing as a principal • cross trading • advantages to the client	4
3.5.3	know the processes involved in trade registration, trade input and trade matching and differing requirements of electronic and open outcry markets	4
3.6	**Account Types** On completion, the candidate should:	
3.6.1	understand the use of different types of accounts: • use of house accounts • customer accounts – segregated and non-segregated	5.1
3.6.2	understand the purpose and importance of give-ups/allocations: • reasons to allocate a trade to an account • use of give-up agreements • risk implications	5.2
3.7	**Trade Reporting** On completion, the candidate should:	
3.7.1	know the purpose and requirements of trade reporting in markets: • information to be reported • process and timelines of reporting • responsibility for reporting	6
3.7.2	know the advantages and main sources for Exchange Price Feeds: • price transparency • current bids and offers • trade prices • high/low prices • last night closing price • traded volume	6.1

Syllabus Unit/ Element		Chapter/ Section
3.7.3	understand the importance of monitoring volume and open interest: • purpose of monitoring open interest • breach of credit limit • guarantee in the event of settlement failure	6.2

Element 4	Principles of Pricing and Valuation	Chapter 4
4.1	**Approaches to Valuation** On completion, the candidate should:	
4.1.1	understand the concept of arbitrage free pricing	1.1
4.1.2	understand the concept of cash flow pricing	1.2
4.2	**Calculating Forward Prices** On completion, the candidate should:	
4.2.1	understand the mechanisms for OTC derivative pricing and the relationship with the underlying cash prices together with the significance of contributing factors: • forward and forward/forward rates • cash flow analysis and the zero curve • the role of interest rates and yields • other factors affecting pricing	2.1
4.2.2	be able to calculate forward foreign exchange rates using interest rate differentials	2.2
4.3	**Futures Pricing** On completion, the candidate should:	
4.3.1	understand the mechanisms for futures pricing and the relationship with the underlying cash prices together with the significance of contributing factors: • contango and backwardation • price convergence at maturity • the concept of fair value	3
4.3.2	understand the implications of the cost or benefit of carry and what may be included in these: • what is cost of carry • storage costs, insurance and interest costs • asset yields	3
4.3.3	be able to calculate the fair value of a future from relevant cash market prices, yields and interest rates	3.3
4.3.4	understand the importance of basis risk	3.6

Syllabus Unit/ Element		Chapter/ Section
4.3.5	understand the principles of cash/futures arbitrage: • what should be included in arbitrage calculations • when arbitrage opportunities exist • cash and carry arbitrage • arbitrage risk	3.7
4.4	**Options Pricing** On completion, the candidate should:	
4.4.1	understand basic option pricing concepts: • option premium • intrinsic and time value • in-the-money, out-of-the-money and at-the-money	4
4.4.2	understand the basic mechanisms of option pricing and the relationship with the underlying cash prices together with the significance of contributing factors: • volatility • interest rates • strike or exercise price • time to expiry • the underlying price • dividends/coupons (where relevant) • structure • valuation inputs	4.1.3
4.4.3	be able to calculate the put/call parity theorem: • what is the put/call parity theorem • identifying arbitrage opportunities • risk-free interest rate	4.2
4.4.4	be able to calculate the approximate change in option price due to a change in the underlying price • what is delta • uses of delta	4.3

Syllabus Unit/ Element		Chapter/ Section
4.4.5	understand the qualitative characteristics of the following Greeks and their uses: • delta • gamma • theta • vega • rho	4.4
4.4.6	know the requirements of, and process for, premium payment: • when paid, immediately or marking to market • the roles of the clearing house and broker • what the seller receives	4.5

Element 5	OTC Derivatives	Chapter 5
5.1	**Derivative Instruments** On completion, the candidate should:	
5.1.1	understand the basic concepts and fundamental characteristics of: • forwards • caps • floors • collars • swaps • swaptions (options on swaps)	2
5.1.2	understand the basic concepts and fundamental characteristics of credit derivatives and the main credit events for single entity and index contracts: • default events • ratings transitions	3
5.1.3	know the common credit derivative instruments and their relationships to other markets and products: • credit default swaps • credit-linked notes • collateralised debt obligations (CDOs)	3.1
5.1.4	understand the mechanisms for pricing credit derivatives and the relationships with asset swap prices	3.1

Syllabus Unit/ Element		Chapter/ Section
5.1.5	know the common OTC option products and features: • European, American, Asian • barrier products • lookbacks and variants	4.1
5.1.6	know the basic requirements of, and process for, premium payment: • when paid • credit exposure • the collateral process	4.1
5.1.7	understand the basic concepts and fundamental characteristics of flex options: • how they differ from standard exchange-traded options • how they differ from OTC options	4.1.1
5.1.8	understand how structured products utilise embedded derivatives to achieve a risk/return profile: • convertible bonds • index linked notes • capital protected products • callable/puttable bonds	4.2
5.1.9	know the main ISDA documents supporting OTC derivative activities: • master agreements • credit support annex documentation • confirmations • ISDA protocols	5.1
5.1.10	understand the potential impact of credit exposures on OTC positions: • nature of OTC contracts • mark to market and potential exposures • term of OTC derivatives • acceptable forms of collateral (certainty and currency of asset) • the margin/collateral process (upfront margin, mark to market, hurdle, minimum cashflow, parties involved)	5.2

Syllabus Unit/ Element		Chapter/ Section
Element 6	**Principles of Clearing and Margin**	**Chapter 6**
6.1	**Definition and Purpose of Clearing** On completion, the candidate should:	
6.1.1	understand the purpose of clearing and the function of novation: • mutual offset system • principal to principal • broker's position	1.1
6.1.2	understand the risks mitigated through the clearing process: • settlement risk • counterparty risk	1.1
6.1.3	understand the role played by the clearing house in the clearing process: • margin process • clearing house relationship with members in settlement • transfer of payments	1.2
6.1.4	understand the relationship between clearing members and non-clearing members: • clearing versus non-clearing member • use of general clearing members to clear trades	1.2
6.1.5	understand the principles and backing arrangements in place in the event of a member default: • novation • guarantee of performance of the contract • default fund • members' contributions • principal to buyer and seller • control of funds to clearing members' accounts • requirement for members to use an approved bank	1.3

Syllabus Unit/ Element		Chapter/ Section
6.2	**Prime Brokers** On completion, the candidate should:	
6.2.1	understand the services offered by prime brokers as they relate to derivatives: • borrowing and lending securities • financing positions • providing custody and safekeeping of assets • clearing and settling trades • administering onshore and offshore funds • corporate actions • capital introductions • risk management	2.1
6.2.2	understand how OTC products can be centrally cleared: • eligibility and credit standing of counterparts • constraints placed upon contract terms • advantages and uses of centralised clearing of OTC products	2.2
6.2.3	understand price limits/circuit breakers and position limits and the effects of their application: • price limits • who imposes limits • purpose of price and position limits • action in the event of breach	2.3
6.3	**Margin** On completion, the candidate should:	
6.3.1	understand how a firm deals with margin payments for its own positions and for its clients' positions through its books: • use of house accounts • use of client segregated accounts • use of client non-segregated/pooled accounts	3.1
6.3.2	understand the difference between the clearing house's margin and that of the broker and the collection/payment process: • amounts paid by clearing member and its clients • flow of margin	3.1
6.3.3	understand the differences between initial and variation margin: • marking to market • offsetting long and short positions • when paid	3.2

Syllabus Unit/ Element		Chapter/ Section
6.3.4	know methods of margining for centrally cleared OTC products and their implications: • how exposure is calculated • what margins are applied • how and when margin payments are made	3.2
6.3.5	understand the nature and use of offsets for spread/spot month margining: • purpose of offsets • what is spot month margin • purpose of spot month margins • purpose of spread margins	3.2
6.3.6	understand why the clearing house might call intra-day margin: • purpose of intra-day margin • when is intra-day margin paid	3.2
6.3.7	know methods of initial margining including SPAN: • use of delta • use of SPAN	3.2
6.3.8	know the means by which exchanges establish settlement prices: • what are settlement prices • closing ranges/prices	3.2.2
6.3.9	know the definition, purpose and uses of collateral and the major types of acceptable collateral (cash versus non-cash)	4.1
6.3.10	understand the significance of credit and initial margin lines	4.2
6.3.11	understand the mechanisms of collateral management: • valuation and pricing • credit support annex (CSA) • One-way CSAs • threshold amounts • haircuts • minimum transfer amount	4.3
6.3.12	understand the impact of uncleared margin rules (UMR): • what does UMR stand for? • what are UMR rules? • what is the purpose of UMR? • what are the UMR phase 6 thresholds? • what is the ANNA calculation? • what derivatives are in scope? • what is the standardised initial margin schedule? • UMR collateral thresholds	4.4

Syllabus Unit/ Element		Chapter/ Section
Element 7	**Delivery and Settlement**	**Chapter 7**
7.1	**Clearing Houses** On completion, the candidate should:	
7.1.1	know the role of the clearing house as counterparty in delivery: when the clearing house becomes the counterparty; role of the clearing house as counterparty; role of the clearing house as guarantor; counterparty risk; assignment; use of warrants in delivery	1.1
7.2	**Settlement** On completion, the candidate should:	
7.2.1	be able to calculate the profit/loss on delivery/expiry of futures and options	1.2.1
7.2.2	understand the differences between cash settlement and physically delivered contracts and the final payment process: • what is cash settlement • what is physical delivery • factors used in ascertaining the invoice amount • who calculates the invoice amount • differences between financial and commodity products	1.3
7.3	**Delivery** On completion, the candidate should:	
7.3.1	understand the importance and implications of the delivery of open contracts at expiry and the significance of the short position: • physical versus cash delivery • financials versus commodities • avoidance of delivery – reasons and methods • advantages and disadvantages of cash delivery • asset delivery via the clearing house • relevance of first notice day, last notice day and delivery day or period	1.3
7.3.2	understand the purpose of the exchange delivery settlement price (EDSP) and the factors affecting it: • purpose of EDSP • auction process • factors included in calculating the EDSP value • reasons for the exchange to set the EDSP	1.4

Syllabus Unit/ Element		Chapter/ Section
7.4	**Options Exercise** On completion, the candidate should:	
7.4.1	understand the significance and implications of the exercise of options, the assignment of obligations, abandonment and expiry: • purpose of assignment of obligations • instigating an assignment notice • receiving an assignment notice • abandonment • which options are most likely to be exercised before expiry • exercise at expiry • European, American and Asian options • action upon exercise • assignment	2
7.4.2	understand the significance of automatic exercise: • purpose of automatic exercise • options that may be subject to automatic exercise • reasons for clearing houses to adopt automatic exercise • benefits to members and holders of long positions • prevention of automatic exercise	2.5
7.5	**Effective Process Control** On completion, the candidate should:	
7.5.1	know the importance of accurate and timely settlement processes: • deal tickets and term sheets • trade confirmations • reconciliation processes (internal and external) • cashflow/asset movement instructions and control processes • close out or maturity instructions	3
7.5.2	understand the main control process: • front to back-office reconciliation • trade validation • profit and loss reporting	3

Syllabus Unit/ Element		Chapter/ Section
Element 8	**Trading, Hedging and Investment Strategies**	**Chapter 8**
8.1	**Users** On completion, the candidate should:	
8.1.1	understand the categories of users of derivatives and structured products and their respective use of derivative products: • hedger • speculator • arbitrageur	1
8.2	**Spreads** On completion, the candidate should:	
8.2.1	know the distinctions between intramarket spreads and intermarket spreads and the scenarios in which they may be appropriate: • use in differing market conditions • situations resulting in profitability/loss	2
8.3	**Long/Short Positions** On completion, the candidate should:	
8.3.1	know the characteristics and implications of long and short positions	3
8.4	**Hedging** On completion, the candidate should:	
8.4.1	understand the importance of hedging ratios in cheapest to deliver (CTD) bonds: • price factors • highest implied repo rate • number of contracts to hedge an exposure to the CTD bond • duration-based hedge ratios for non-CTD bonds	3.1
8.4.2	understand hedge ratio calculation for other short-term interest rate futures: • basis point value • number of contracts to hedge an interest rate exposure	3.2
8.4.3	understand hedge ratio calculation for equity futures: • stock and portfolio beta • number of contracts to hedge an equity exposure	3.2

Syllabus Unit/ Element		Chapter/ Section
8.4.4	understand basis, basis trading and basis risk: • problems caused by changes in basis • how changes in basis can be used to advantage by an investor	3.3
8.4.5	understand the application and effects of delta hedging and be able to establish an investor's net long/short position	4
8.4.6	understand the use of derivatives for speculation and hedging: • speculation: long calls, short puts (bullish) • speculation: short call, long puts (bearish) • covered calls and protective puts • recognise diagrammatic representation of each strategy • maximise upside and downside for each strategy	4, 4.3
8.5	**Trading Strategies** On completion, the candidate should:	
8.5.1	understand the uses and advantages of covered calls and protective puts: • motivation for the writer of a covered call • motivation for the buyer of a protective put • risks/maximum losses • use in different market conditions	4.3
8.5.2	be able to calculate (through the knowledge gained above), a derivatives position with an underlying market equivalency, either to establish or to hedge a required exposure: • long/short through futures • long/short through single options • long/short through option combinations • limits to upside and/or downside exposures • (Sufficient contract/product information will be provided to candidates in the exam to enable the required calculations)	5, 6
8.5.3	understand the characteristics and effects of vertical spreads: • bull call and bear call spreads • bull put and bear put spreads • use in differing market conditions • anticipating modest market rises/falls (bull/bear markets) • risks	5.1
8.5.4	be able to calculate maximum profits/losses in simple examples of the above strategies	5.1, 6, 7

Syllabus Unit/ Element		Chapter/ Section
8.5.5	understand the uses, characteristics and effects of horizontal and diagonal spreads: • use in differing market conditions • anticipating modest market rises/falls (bull/bear markets) • risks	5.2
8.5.6	know the distinctions between intramarket spreads and intermarket spreads and the scenarios in which they may be appropriate: • use in differing market conditions • situations resulting in profitability/loss	6
8.5.7	understand how to create basic synthetic options and futures: • synthetic long/short • synthetic put/call	7
8.5.8	understand the advantages and disadvantages of using exchange-traded versus OTC products: • exposure flexibility versus contract specification • ease/cost of closing OTC transactions versus exchange-traded positions • price transparency • best execution • documentation • clearing and settlement mechanisms	8
8.5.9	understand the relative attractiveness of derivative positions or investments to specific client circumstances: • private client investment portfolios • individual/portfolios • institutional asset managers • corporate treasurers • hedge funds • sovereign wealth funds • pension funds	9,10

Syllabus Unit/ Element		Chapter/ Section
Element 9	**Regulatory Requirements**	**Chapter 9**
9.1	**Regulation** On completion, the candidate should:	
9.1.1	know in general terms the scope and purposes of regulation of derivatives and the main activities of regulators: • UK/Europe/other • US (Fed, SEC and CFTC) • Far East (Hong Kong, Singapore and Japan) • MiFID II, ESMA, EMIR • orderly markets • consumer protection • education • combating financial crime • regulation of individuals, companies • supervision • sanction processes • passporting regulated status • classifications/exemptions	1
9.1.2	know the primary requirements of a regulated derivatives exchange	1
9.1.3	know in general terms the importance of the principles-based approach to derivatives regulation: • client classification • fair treatment of customers • suitability and appropriateness of the transaction/product • best execution	2
9.1.4	know the differences between rules-based and principles-based regulation	3
9.1.5	know the role of regulation on derivative markets: • MiFID II • client money • client accounts • margining practices • unregulated markets • access to overseas markets • access to overseas clients	3.1

Syllabus Unit/ Element		Chapter/ Section
9.1.6	know the role of the Securities and Exchange Commission (SEC) in the regulation of derivatives: • what is the SEC • regulated investments • regulated exchanges	3.3.1
9.1.7	know the role of the Commodity Futures Trading Commission (CFTC) and the National Futures Association (NFA): • what is the CFTC • what is the NFA • regulated investments • regulation of other entities • dispute resolution	3.3.2
9.1.8	know the prohibitions of CFTC Part 30 (Foreign Futures and Segregation of Customer Funds)	3.3.2

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.

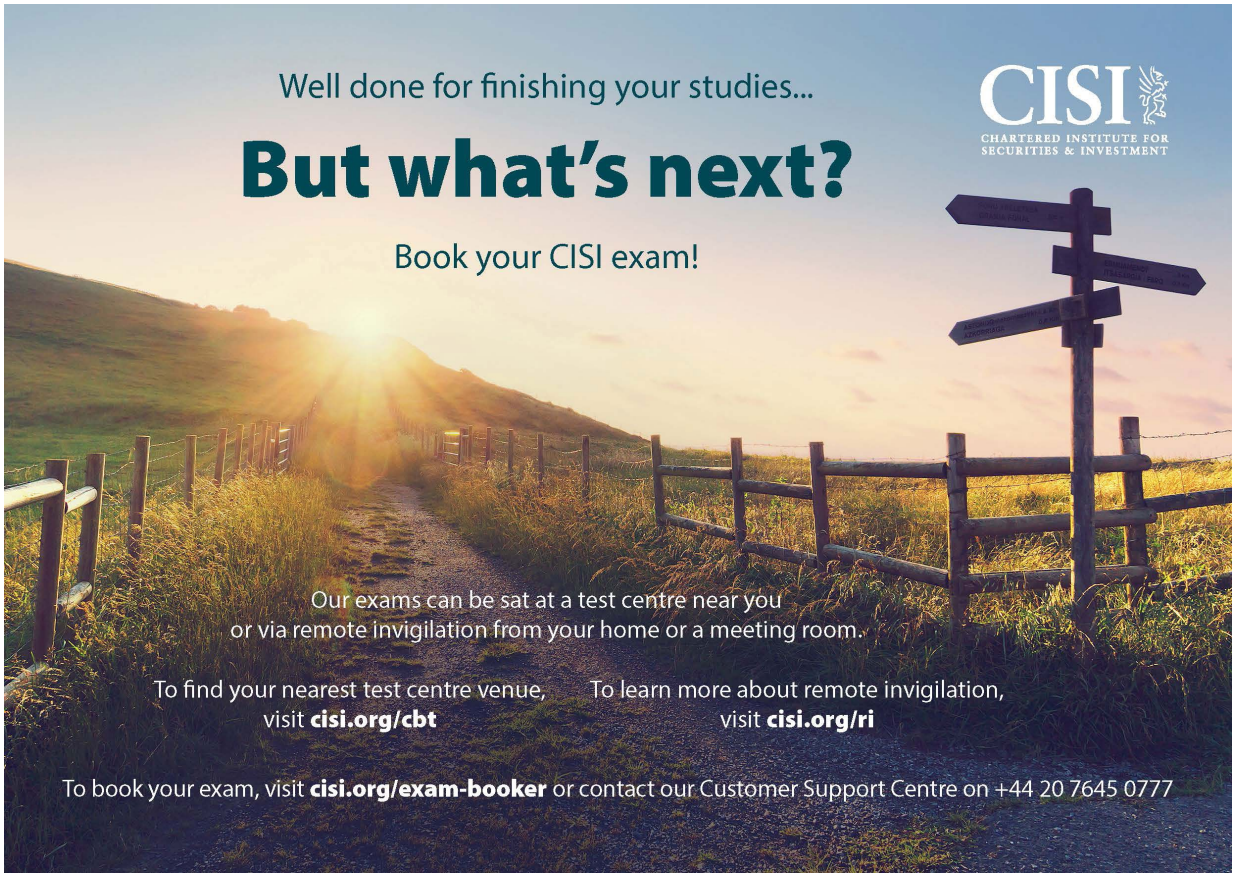
It is important to note that the numbers quoted may vary slightly from examination to examination as there is some flexibility to ensure that each examination has a consistent level of difficulty. However, the number of questions tested in each unit should not change by more than two.

Element number	Element	Questions
1	Introduction to Derivatives	17
2	Underlying Markets	16
3	Market Structure	9
4	Principles of Pricing and Valuation	11
5	OTC Derivatives	7
6	Principles of Clearing and Margin	14
7	Delivery and Settlement	6
8	Trading, Hedging and Investment Strategies	14
9	Regulatory Requirements	6
Total		**100**

Assessment Structure

A two-hour examination of 100 multiple choice questions.

Candidates sitting the exam by computer-based testing will have, in addition, up to 10% additional questions as trial questions that will not be separately identified and do not contribute to the result. Candidates will be given proportionately more time to complete the test.


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Our in-person and virtual programme offers the hottest topics, expert insight and networking opportunities.

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24
UK Branches and 9 National Advisory Councils who represent local members and guide our offering



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Our Professional Refresher series offers cutting edge analysis and insight for financial services professionals in bite-sized elearning modules.

200+ unique modules

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Our award-winning members magazine incorporates the latest news, insight and thought leadership affecting your profession, available both online and in print.

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Our YPN was created to help young professionals aged 18-35 harness their competitive edge and professional development skills with a dedicated range of tailored events, resources and guides.



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Cutting edge analysis and insight for financial services professionals, available anytime, anywhere

We offer **over 200** elearning modules to help you meet your CPD requirements. Here are some of the modules available. These CISI Professional Refreshers are free to CISI members and accessible to CISI student members.

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Anti-Money Laundering
Understand AML legislation and regulation, the role of the MLRO, and the sanctions and penalties.



Client Assets and Client Money Essentials
Gain an overview of the principles and high-level rules associated with holding and protecting client assets.



Conflicts of Interest
Consider examples of conflicts of interest, tools, policies and procedures, enforcement action, and good practice.



Data Science
Digitisation of business operations has accelerated the speed of data capture. Harness the value of your data.



Diversity and Inclusion
Targeted at those responsible for diversity, equality and anti-discrimination, and those recruiting and managing.



Financial Crime
Gain an overview of insider dealing, market abuse, money laundering, terrorist finance and financial sanctions.



Financial Planning
Gain an overview of the financial planning process, key terms and the regulatory framework that governs it.



Greenwashing
This module explores the key concepts surrounding greenwashing, the wider implications, and the measures being taken to fight it.



Impact Investing
Aim to take ethical and sustainable investment principles a step further through intentional investment.



Integrity and Ethics
Understand ethics in finance, the importance of trust and trustworthiness, and compliance versus ethics.



Market Abuse
Examine offences, penalties, safe harbours, reporting obligations and the relationship with other offences.



Neuroscience at Work
Learn how to work optimally without harming your health when faced with increased workloads and deadlines.



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