

# AF4 2023/2024

## Investment Products

### Part 4: Derivatives

The milestones for this part are to understand:

- What is a derivative
- The main types of derivative products
- The basic principles of options and futures.
- How options can be used
- The basic principles of contracts for difference and spread betting.

#### What is a derivative?

Generically a derivative is an investment based on the performance of another investment without owning the underlying investment.

It is a financial contract between two parties that relates to something in the future

- If A sells shares to B, the price is set and the shares are transferred at the same time.
- If though A offers to sell B shares in a company at a set price in three months' time, then it starts to take on some of the characteristics of a derivative.

The basis of the derivative market started in agriculture where a farmer agreed a price for the crop to a wholesaler or manufacturer whilst it was still in the ground. The wholesaler has to pay money to the farmer for this right. This is key element of all derivatives. There is always a price to pay for buying a derivative

The benefit to both parties is that they have agreed a fixed price. The farmer knows what he will receive and the buyer knows what must be paid. If the market price of the crop falls the buyer must still pay the agreed price even though it is higher than the market price. The farmer carries the risk that if the market price rises above the agreed price he will still only get the agreed price.

However, either party can sell on the agreement. If the price of the crop has risen the manufacturer may elect to sell the right to buy to someone else. If the price has fallen the farmer may elect to sell the right to someone else. Alternatively, the farmer could offer to buy out the deal for a sum of money.

Today there are recognised exchanges for issuing and trading derivatives. Derivatives are usually either

- Futures
- Options
- Swaps

A **future** gives the holder the **obligation** to buy or sell an asset at a fixed price at some date in the future. It is used in commodities trading as it enables, for example, a chocolate manufacturer to buy sugar at a fixed price at some point in the future.

An option gives the holder the **right but not the obligation** to buy or sell an asset at a fixed price at some point in the future. Unlike a future the holder does not have to buy or sell at expiry, if the option is not worth exercising then it simply expires.

This difference has a major impact on derivative investors. With an option their loss is limited to the cost of the option. With a future the investor must close the deal by physically purchasing the underlying investment or paying the other party to close the deal. Their liability is therefore much greater. Moreover, most future trading is done "on margin". This means that if the deal is to buy a commodity for £100K in three months' time they only need to put up 5% or 10% of the money up front. This is fine if the deal works in their favour but if it doesn't then they will need to put in more money to complete the deal.

A swap is an agreement between two parties to exchange a series of cash flows over a given period of time. For example with an interest rate swap A agrees to pay B a fixed rate of interest based on a notional amount of capital and B agrees to pay A a variable rate (usually LIBOR + a set number of base points). These are the province of institutions rather than individual investors.

## Option terminology and practice

There are two parties to an option (or future), the **writer**, the person or organisation that offers the option and the **buoption holder**, the person who buys the option from the writer.

The **strike price** is the price at which the option will be exercised, for example the right to buy shares at the strike price of 420p.

The **expiry date** is the date at which the option comes to end and is the final date when it can be traded or exercised. Writers will offer a range of contracts with different expiry dates for the same company's share. In the UK equity options expire on the third Friday of the month.

The **premium** is the price of the option. This will change throughout the whole life of the option.

A **call option** gives the right to buy shares at the strike price. A **put option** gives the right to sell shares at the strike price.

An **American style** option can be exercised at any time before the expiry date. A **European style** option can only be exercised at expiry date. Most UK equity options are American style.

The standard UK equity option is for 1000 shares so if a call option to buy shares at 170p in March 2019 is priced at 13p, then an investor would have to pay £130 to buy one option. (premium x 1000)

The following is a simplified example, based on a real case of how a **call option** would work.

Acme Widgets PLC shares were trading at **416p** on 31 October. The following options were available at that date.

Strike Price	Expiry date		
	January 21st	April 21st	July 21st
390p	41.5p	48.5p	54.5p
440p	24.5p	32.5p	39.5p

The 390p option is **in the money**, because the current trading price is higher than the strike price. (the option is giving the holder the right to buy shares at 390p)

The 440p option is **out of the money** because the current trading price is lower than the strike price. (if the shares were still trading at 416p at expiry the holder would not exercise the option)

Before looking at the factors that will influence the premium let's look at how buying the January 390p call option might work out.

Price of shares at expiry	500p	416p	300p
Value of shares	£5,000	£4,160	£3,000
Cost to exercise	£3,900	£3,900	£3,900
Gain	£1,100	£260	£0
Option price	£415	£415	£415
Profit/Loss	£685	(£155)	(£415)
Return on investment	57.8%	-37%	-100%

If the investor had bought shares rather than an option, the following would have happened.

- It would have cost £4,160 to buy 1000 shares (excluding dealing costs)
- If shares had risen to 500p and then sold the gain would have been £840 a return on investment of 20.19%
- If they had fallen to 300p there would be a paper loss of £1,160 but the shares can be held in the hope that the price will recover.

## Pricing an option

Working out the fair price of an option is the preserve of mathematicians. Thankfully that is outside the scope of AF4 but you still need to know the basic principles.

The price of an option is made up of two elements:

- Its intrinsic value
- Its time value

An option's intrinsic value is the difference between the current share price and the option's strike price.

A call option has a strike price of 200p. The current share price is 230p so its intrinsic value is 30p.

If the share price is 180p it is out of the money and has no intrinsic value.

A put option has a strike price of 300p. The current share price is 260p so its intrinsic value is 40p

If the share price was 320p it would be out of the money and have no intrinsic value.

An options' time value is the difference between its market price and its intrinsic value. Put another way:

### **Market price of an option is Intrinsic Value + Time Value.**

Even if an option has no intrinsic value it will still have a time value because the share price could move above the strike price before the expiry date. It follows that an option with six months to expiry will have a higher time value than one with three months to expiry. This also means the price of an options will tend fall as expiry date approaches.

Another basic rule is:

- The price of call options increases when share price goes up and falls when the share price goes down
- The price of put options increases when the share price falls and falls when the share price increases.

There is an option market in most major UK companies. It is also possible to buy options on an index. The most common UK option is based on the FTSE 100.

- If you think the index is going to go up, you BUY the index (also referred to as taking a long position).
- If you think the index is going to fall you SELL the index (also referred to as going short.)

The investor will pay a premium and the strike price is the level of the index at the expiry date. The standard FTSE option is based on each point being worth £10. If the option is based on

the FTSE being 6,400 at expiry and at that date it is 6,800 the gain is £4,000 (400 x £10), less the premium paid for the option.

Put or sell options work in reverse so a fall of 600 points would produce a gain of £6,000.

The FTSE is 6,600 and Luis is concerned that there could be a fall in the market. His portfolio's value is £150,000.

A put option with a strike price of 6,300 is available at £720. He buys two options at a cost of £1,440. As each point is worth £10,  $7,300 \times 10 \times 2$  (options) = £146,000 which is close to the value of his holding

Luis was correct in his prediction and at expiry the FTSE has fallen by 1,000 points to 5,600.

The value of his portfolio has fallen to £130,000

The index is 700 points below the strike price so it pays out  $700 \times 10$  = £7,000

He had two options so he collects £14,000 and after deducting the premium of £1,440 his "profit" is £12,560. This helps offset the £20,000 loss on the portfolio.

### Covered Options

Writing options is a high risk activity and not normally open to individual investors. However it is possible for individuals to write covered options to give an additional return. They are termed "covered" because the individual already owns the asset.

Tom owns 10,000 shares in ABC plc which are currently trading at 200p a share.

He offers a three month **call option** with a strike price of 220p at a price of 15p a share. They are call options because if the buyer exercises the option Tom will have to sell the shares at 220p a share in order to deliver the shares to the buyer. Tom sells 10 options so receives £1,500.

Now if the share price at maturity is less than 220p, the exercise won't be exercised and Tom keeps the £1,500 premium

If the price is higher than 220p then they buyer will exercise the option. Tom will have to transfer the shares to the buyer but will receive £2,200 and of course retain the premium.

## Use of options

They can be used for:

- Pure speculation
- Hedging market movements

### Speculation

As we saw in the example of options in Acme Widgets it is possible to get a high return for a small initial outlay. On the other hand it is also possible to lose the entire investment. Options allow active aggressive investors to invest modest amounts of money with a limited downside but unlimited upside.

Options can also be used to gain exposure to commodities in a portfolio by buying options based on the future price of a commodity.

### Hedging

Options can be used as a type of insurance against a fall in the market.

Fund managers will usually tend to be long term investors in their chosen shares. However they know that the price of the shares will fluctuate and may wish to hedge to avoid the worst consequences of this.

If the manager believes a particular share is going to fall they could buy put options. These would show a profit if the share falls that would offset the fall in the price of the share itself. Should the share price rise then the only cost to the manager is the cost of the option.

The whole fund can be hedged by going short by using index options. If the index falls the option will show a profit thereby hedging the risk of a fall.

### Warrants

These may be issued by companies as part of their share structure. They give the holder the right to buy further shares at a fixed price at a fixed date in the future. They are traded in their own right alongside the company's ordinary shares. As with a call option they have no value if the strike price is lower than the share price at expiry.

An investor may have the choice of buying either warrants or shares in the same company. The formula to assess which offers the best deal is as follows:

A warrant gives the right to buy one share at 100p in five years time. It is currently priced at 20p. If the current share price is 90p the conversion premium or discount is calculated as follows:

$$\frac{(\text{cost of subscribing for one ordinary share} - \text{price of warrant} - 1) \times 100}{\text{Ordinary share Price}}$$

$$\frac{(100 - 20 - 1) \times 100}{90} = 33.3\%$$

This shows buying the warrant is a third more expensive than buying the shares directly

**Covered warrants** are issued by investment banks and are listed on the Stock market. They give the holder the right but not the obligation to buy (or sell) the underlying investments at a fixed price in the future. They are described as covered because the issuer has purchased the underlying assets.

### Contracts for Difference

This is a contract between an individual and a CFD writer. At the end of the contract the parties exchange the difference between the opening and closing values. They can be on the movement of shares, indices, currency or interest rates. A CFD can be held for any period of time, even for a few hours.

If the buyer thinks the price will rise they "buy" the CFD (going long), if they think it's going to fall they "sell" (go short)

A CFD writer offers a CFD on a share which is trading at 281p(sell)/281.1p (buy)

A CFD for 2,000 shares is purchased @ 281.10 a share.

The total cost is £5,622 but the writer sells at a 5% margin so the cost is £281.10 although there would be other charges.

The share price rises to 295/295.1 and the buyer shuts down the CFD

The gross profit is 295 less 281.1 which is 13.9p a share so with 2,000 shares the buyer receives £278

If the share price had fallen to 266p the gross loss would be 15.1p a share giving a total loss of £302

One benefit of a CFD is that no stamp duty is payable. The gain is subject to CGT. Potential gains and losses are uncapped but buyers can build in a stop loss that will close the position if losses hit a fixed amount.

Because you trade on margin, if losses exceed the initial investment the CFD may demand further money is put up.

It's worth noting that in the adverts of one CFD provider includes a statement that over 60% of its clients lose money.

## Spread betting

This is a bet with a financial bookmaker. The buyer decides whether to go long or short and select a £ per point. If it is £5 a point, every 1p change in price the buyer wins, or loses £5

The spread offered by the bookmaker is 100p/102p

The buyer goes long and bets £2 a point. The initial position is 102p x £2 = £204 but the deal is on margin and pays 5% or £10.20

The price rises to 152/154 a gain of 50 points so the profit is 50 x £2 = £100

If the price had fallen to 72/74 that would be a drop of 30 points so the loss is £60

As this is a bet the gains are tax free.

That concludes this part so you should now understand:

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- The main types of derivative products
- The basic principles of options and futures.
- How options can be used
- The basic principles of contracts for difference and spread betting.

### Further reading

<http://www.learnmoney.co.uk/options/introduction.html>

<https://www.ig.com/uk/cfd-trading/what-is-cfd-trading-how-does-it-work>

<https://www.cityindex.co.uk/spread-betting/what-is-spread-betting/>