

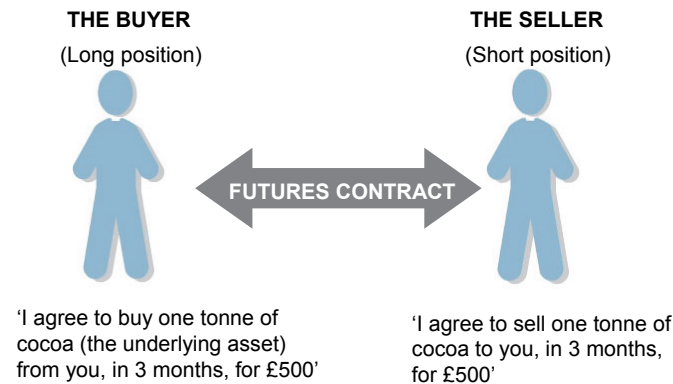


6-10 questions



## 2. Futures

### Basic futures



Note that in futures contracts nothing is bought (or sold) today. It is the terms and conditions that are fixed today regarding a transaction to be completed in the future.

## Further information

### *Futures contract*

A futures contract is an agreement to buy or sell a specified quantity of a specified asset on a specified future date at a price agreed today.

### *Forward contract*

An OTC future. Offers more flexibility than futures positions.

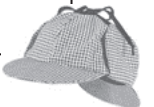
### *Contingent liability*

A contingent liability transaction describes a derivative position where the possibility of a future obligation is uncertain.



## Hints

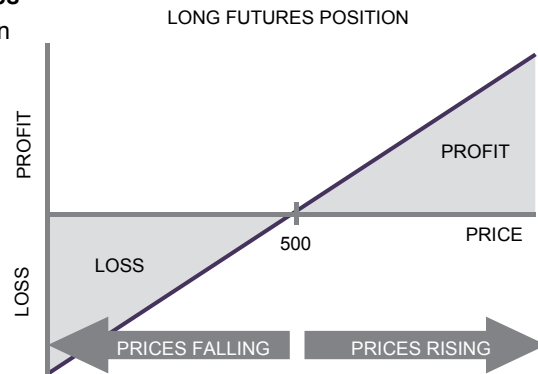
The Exchange sets all the terms of a futures contract **except** price.



## 2. Futures

### Basic futures

Long position



- The long futures position makes money in a rising market but loses money in a falling market

Short position

FitchLearning

www.fitchlearning.com

### Further information

Profit and loss profiles (or **payoffs**) show graphically the gains and losses that can be made by different derivative positions. They work on the following assumptions:

- Speculation – the investor neither has nor wants the asset
- No frictional costs – there are no transactional fees or taxes



### Hints

An investor can **close out** a derivative position by entering into the equal and opposite position to the one they hold.

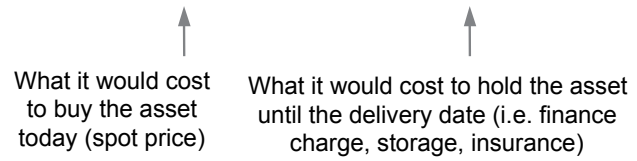


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## 2. Futures

### Fair value: Introduction

Fair value of future = Cash price of underlying + Costs of carry



## 2. Futures

### Index arbitrage

#### Example:

##### Today

1. Investor buys wheat at £65.00
2. Sells 3-month future at £70.00

##### Three months' time

1. Delivers wheat through future and receives £70.00
2. Pays storage costs (£0.97) and losses 3 months' interest (£2.40) totalling £3.37
3. Total net profit over 3 months:  
 $£70.00 - £65.00 - £3.37 = £1.63$

## Further information

If the fair value of the future is higher than the price of the future on the market, reverse cash and carry arbitrage is possible.



## Hints

What follows is a summary of how to recognise an arbitrage situation based on fair value, and what trades can profit from the situation.

### Future > fair value

Trade: Cash and carry arbitrage

Actions:

- Buy cash and hold
- Sell future

### Future < fair value

Trade: Reverse cash and carry arbitrage

Actions:

- Sell cash and deposit
- Buy future



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## 2. Futures

### Basis

$$\text{Basis} = \text{Cash price} - \text{Futures price}$$



Usually negative because the futures price is normally greater than the cash price (as it includes the costs of carry)

- Contango market: basis is negative
- Backwardation: basis is positive

### 3. Futures: hedging

#### Hedging with futures

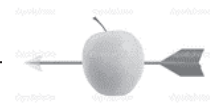
Example: A fund manager has a portfolio of FTSE100 equities valued at £10m when the index is valued at 4,000. The near month future is currently trading at 4,200, and has a tick value of £10 per index point. What should the fund manager do to carry out a basic hedge?

Now assume the fund has a beta of 1.2. What should the fund manager do to carry out a beta hedge?

### Keeping on target

A fund manager has a portfolio of FTSE100 equities valued at £15m and a  $\beta$  of 0.8. The index is valued at 6200 and the 3 month future is currently trading at 6,000. What should the fund manager do to hedge their position?

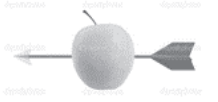
- A. Buy 2500
- B. Sell 200
- C. Sell 242
- D. Buy 250



### Keeping on target

A fund manager has a portfolio of FTSE100 equities valued at £20m and a  $\beta$  of 1.6 and the index is valued at 6200. How many 5900 futures would be needed to hedge?

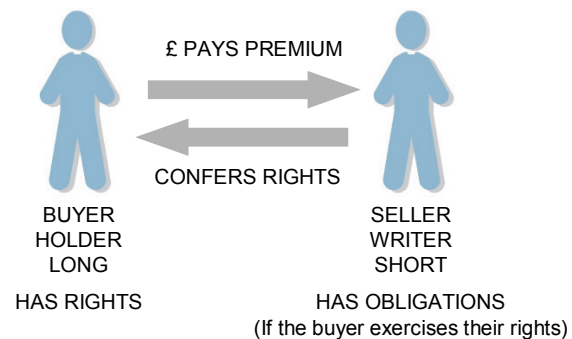
- A. Buy 542.37
- B. Sell 339
- C. Sell 542.37
- D. Sell 542





## 4. Options

### Options: features



### Further information

An option gives the buyer the right (but not the obligation) to buy or sell a specified quantity of a specified asset at a fixed price on, or before, a specified future date.



### Answers to the questions on the previous slide:

B

$$\frac{£15,000,000}{6,000 \times £10} \times 0.8 = 200$$

Sell 200 contracts

D

$$\frac{£20,000,000}{5,900 \times £10} \times 1.6 = 542.37$$

Sell 542 contracts

## 4. Options

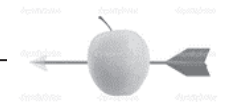
### Options: jargon

- Call
  - Holder has the right to buy
  - Writer has the potential obligation to sell
- Put
  - Holder has the right to sell
  - Writer has the potential obligation to buy
- Exercise/strike price
  - The price at which the asset will be bought or sold
- Expiry style
  - European
    - Rights can be exercised on expiry date only
  - American
    - Rights can be exercised on any date up to and including expiry

## Keeping on target

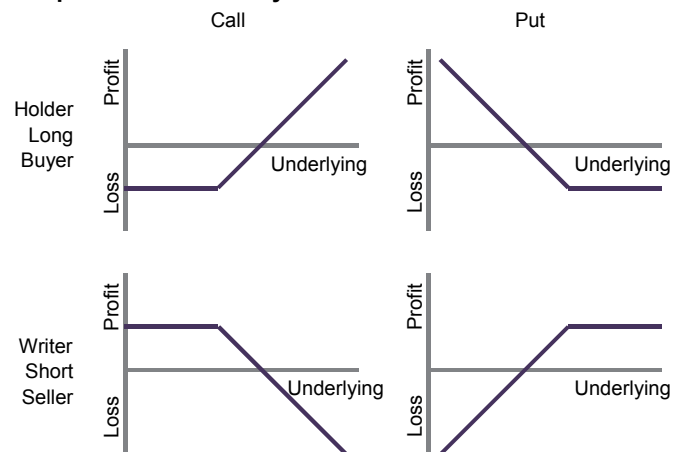
A fund manager has a portfolio of FTSE100 equities valued at £20m and a  $\beta$  of 1.1 and the index is valued at 6200. How many 6100 strike options would be needed to hedge?

- A. Buy 367 puts
- B. Sell 361 puts
- C. Buy 361 calls
- D. Buy 361 puts



## 4. Options

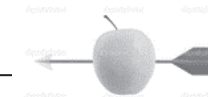
### Options positions: summary



## Keeping on target

You purchased a NYSE Liffe FTSE 100 index call option contract with an exercise price of 6,000 at a premium of £50. The index currently stands at 6,020. The maximum profit is:

- A. £60,000
- B. £6000
- C. Unlimited
- D. £60,200



**Answer to the question on the previous slide:**

D

Buy puts (a right to sell) to hedge a holding in the asset.

$$\frac{£20,000,000}{6,100 \times £10} \times 1.1 = 360.66$$

## 4. Options

### Options positions: summary

Position	Strategy	Max loss	Max gain	Breakeven
Long call	Bullish	Premium	Unlimited	Strike plus premium
Short call	Bearish/ neutral	Unlimited	Premium	Strike plus premium
Long put	Bearish	Premium	Strike minus premium	Strike minus premium
Short put	Bullish/ neutral	Strike minus premium	Premium	Strike minus premium

## Keeping on target

You sold a NYSE Liffe FTSE 100 index put option contract with an exercise price of 5,500 at a total premium of £300. The index currently stands at 5,900. The maximum loss is:

- A. £3700
- B. Unlimited
- C. £54,700
- D. £59,000



**Answer to the question on the previous slide:**

C

The profit on a long call is theoretically infinite.

## 4. Options

### Option premiums

Premium = Intrinsic value + Time value

Strike price	Share price	Intrinsic value (Call)	Moneyness (Call)	Intrinsic value (Put)	Moneyness (Put)
500	600	100	ITM	0	OTM
500	550	50	ITM	0	OTM
500	500	0	ATM	0	ATM
500	450	0	OTM	50	ITM
500	400	0	OTM	100	ITM

## Further information

### *Intrinsic value*

The intrinsic value is the in-built profit a particular option has were it to be exercised now.

Intrinsic value is the difference between the strike price of the option and the underlying asset price.

### *Time value*

Time value is the amount over and above the intrinsic value that an investor will pay to buy an option. This additional value is based on what might happen to the price of the underlying between now and the end of the life of the option.



## Links

Here is a summary of the 'moneyness' of an option:

Call	Moneyness	Put
Asset price < Strike price	<b>OTM</b>	Asset price > Strike price
Asset price = Strike price	<b>ATM</b>	Asset price = Strike price
Asset price > Strike price	<b>ITM</b>	Asset price < Strike price



**Answer to the question on the previous slide:**

C

$5500 \times £10 - £300 = £54,700$

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## 4. Options

Factors that determine an option's premium:

- Underlying price (Delta)
- Strike
- Remaining life (Theta)
- Volatility (Vega)
- Interest rates (Rho)

Factor	Call option premiums	Put option premiums	Sensitivity measure
Increase in underlying	↑	↓	Delta
Increase in time	↑	↑	Theta
Increase in volatility	↑	↑	Vega
Increase in interest rates	↑	↓	Rho

## 4. Options

### Delta: basics

$$\delta = \frac{\text{Change in value of option premium}}{\text{Change in value of underlying}}$$

### Keeping on target

If the underlying price increases by 40p and the option premium decreases by 26p, then the delta and option type are:

- A. 1.53 call
- B. 0.65 call
- C. (0.65) put
- D. (0.65) call



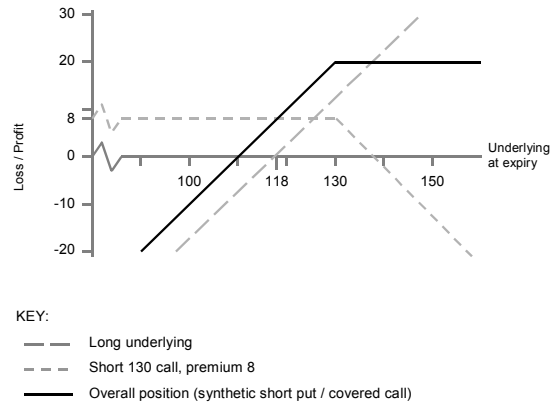
### Keeping on target

If the delta of an option is 0.28 and the underlying on which the option is based moves in price from 80p to 85p what would be impact on the premium of a call option and the premium of a put option?



## 6. Strategies

### Covered call



### Keeping on target

You have purchased shares in Company R at 120 and sold a call on these shares with a strike of 150 and a premium of 10. What is your maximum profit on this strategy?

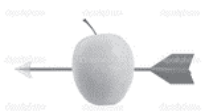
- A. 10
- B. 30
- C. 40
- D. Unlimited



### Keeping on target

You have purchased shares in Company R at 120 and sold a call on these shares with a strike of 150 and a premium of 10. What is your maximum loss on this strategy?

- A. 10
- B. 110
- C. 140
- D. 150



**Answer to the questions on the previous slide:**

C

$((0.26) / 40 = (0.65)$  Puts have a negative delta

The change in the option premium would be the change in the price of the underlying multiplied by the option's delta.

$5p \times 0.28 = 1.4p$

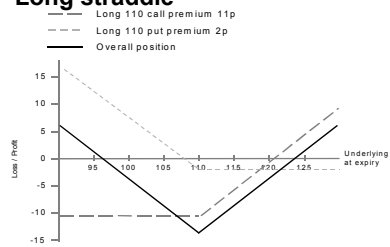
The call premium would increase by 1.4p

The put premium would fall by 1.4p

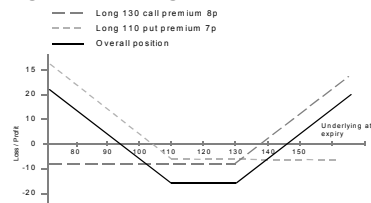


## 6. Strategies

### Long straddle

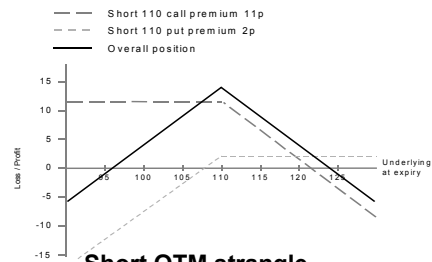


### Long OTM strangle

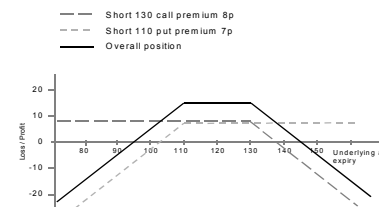


A strangle looks like a straddle, except the options have different strikes

### Short straddle



### Short OTM strangle



Answer to the questions on the previous slide:

C

$$150 - 120 + 10 = 40$$

B

$$120 - 10 = 110$$

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## 7. Derivatives: products

### **NYSE Liffe's FTSE 100 Future**

Features:

- Cash settled (£10 per index point)
- Delivery dates: March, June, September and December

### **NYSE Liffe's short term interest rate future**

Features:

- Cash settled
- Contract value £500,000
- Tick size 1 basis point (£50)
- Based on 3m LIBOR
- Tick value £12.50
- Priced at 100 - Interest rate

## 7. Derivatives: products

### NYSE Liffe's long gilt future

£100,000NV 6% gilt

- Quotation: £100NV
- Valuation: £10 per £0.01 per £100NV

Basket of deliverables

DELIVERABLE	COUPON	PRICE FACTOR (PF)	FUTURES x PF	The price the seller will deliver to the long for.	
				The price the seller will buy the gilt in the cash market for.	
				CASH	PROFIT (+) OR LOSS (-) IF DELIVERED
TREASURY	4.75%	0.91160203	103.01	£103	+0.01
TREASURY	5.25%	0.95592920	108.02	£108	+0.02
CONVERTIBLE	8.00%	1.15039921	129.99	£130	-0.01
TREASURY	8.00%	1.17721501	133.03	£133	+0.03
TREASURY	7.00%	1.12400013	127.01	£127	+0.01

This is the **CHEAPEST TO DELIVER (CTD)** gilt, the short will profit by £0.03 per £100 nominal if this gilt is delivered.

## Further information

### Bond futures

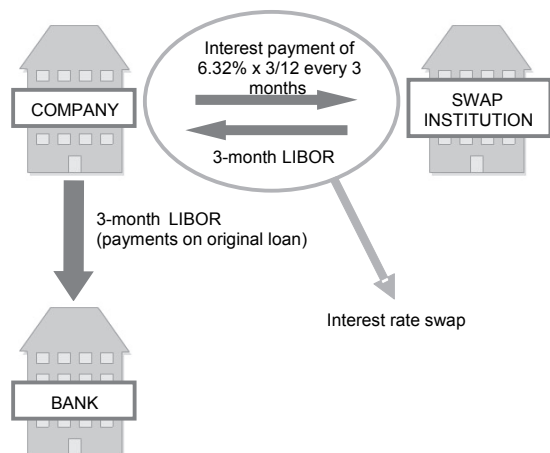
Key facts:

- The future is based on a notional gilt
- The gilt delivered is from a basket of deliverables
- The exchange chooses the basket
- The price of the deliverables are brought in line with the notional gilt using a price factor
- The price factor is set by the exchange
- The short chooses the gilt to deliver from the basket
- The gilt they choose is the cheapest to deliver
- The cheapest to deliver is the gilt with the highest implied repo rate



## 7. Derivatives: products

### Interest rate swap (IRS)



## Further information

### *Interest rate swap*

Vanilla swap – fixed for floating

Basis swap – floating for floating

Swaption – an option to enter into a swap

Payer swap – agreeing to pay a fixed rate of interest

Receiver swap – agreeing to receive a fixed rate of interest



## 7. Derivatives: products

### Equity swap

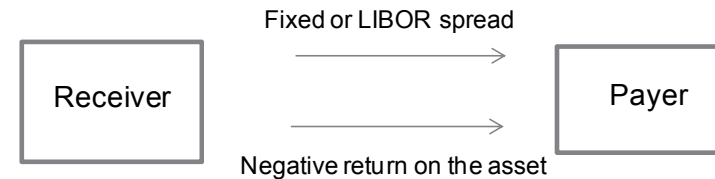
- Gaining exposure to an index/basket/individual equity without the costs
- One leg is the total return on equity
- One leg is based on a benchmark rate of interest, e.g. LIBOR

### Cross currency swaps

- Raise funds in one currency and convert them into another
- Each leg makes payments in a different currency

## Further information

In an equity swap, in the event of negative returns on the asset, the receiver is obligated not just to pass the benchmark rate to the payer but also any negative returns on the asset.



## Keeping on target

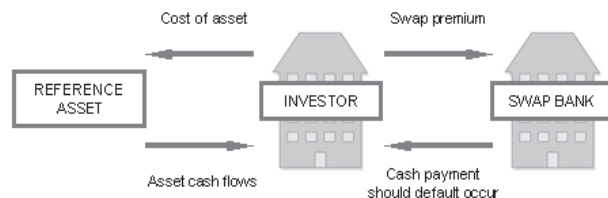
A fund manager believes the FTSE 100 will increase in value and enters into an equity index swap. During the term of the swap the index falls in value. Which of the following will the fund manager have to do?

- A. Make interest payments to the swap dealer
- B. Make interest payments to the swap dealer and additional payments for the decrease in the value of the index
- C. Make increased interest payments until the index increases in value
- D. Make payments based on the value of the index only to the swap dealer



## 7. Derivatives: products

### Credit default swap



- Credit event
  - Failure to pay (default)
  - Bankruptcy
  - Restructuring
- Payout
  - Physically delivered: bond exchanged for bond value
  - Cash settled: Investor receives bond value less recovery rate

### Further information

#### *Synthetic CDO*

A CDO that is secured against the premiums on the referenced debt, rather than the referenced debt itself.



### Further information

#### *Credit derivatives*

**Unfunded** – where the credit protection seller makes no upfront payment. For example a CDS.

**Funded** – where the credit protection seller makes an upfront payment. For example a CDO. Note the credit protection 'seller' in this case is the buyer of the CDO.



**Answer to question on the previous slide:**

B

Make interest payments to the swap dealer and additional payments for the decrease in the value of the index

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## 8. Commodity Derivatives

### Main commodities

- Softs and agriculturals
- Metals
- Energy products

### Exotics

- Weather
- Emissions
  - Caps
  - Credits

## Further information

### Commodity indices

S&PGSCI – Goldman Sachs Commodity Index  
Weighted in relation to global production levels

DJUBSCI – Dow Jones UBS Commodity Index  
Relies on liquidity data and dollar-adjusted worldwide production data, averaged over a five-year period to determine component weights

RICI – Rogers International Commodity Index  
A composite total return index based on 38 commodities

Thomson Reuters/Jefferies CRB index  
Equally weighted arithmetic average of 19 categories



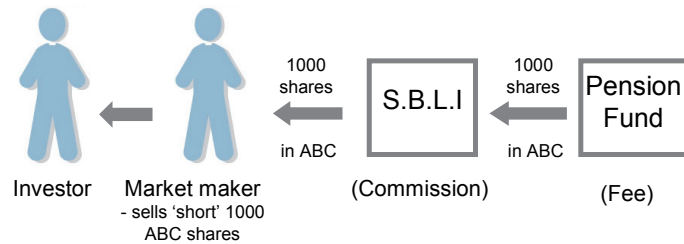
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## 9. Short selling

### Short selling

- Selling shares you do not own to take advantage of a falling market
- Involves borrowing the stock

### Stock borrowing and lending intermediary



After the market maker has sold the shares 'short', it will borrow stock via an SBLI so that it can settle its position with the investor.



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## 10. Clearing

### Margin

