Agenda

- Equity Forwards Fundamentals
- Equity Futures Fundamentals
- Equity Forwards and Futures Settlement
- Pricing of Equity Forwards and Futures
- Equity Forwards and Futures Arbitrage
- Equity Options Fundamentals
- Equity Option Payoffs
- Decomposing the Option Premium
- Equity Swaps
- Structured Products
- OTC vs Listed

2

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Equity Forwards - Fundamentals

A forward is a contract between two parties to trade a fixed quantity of a specified stock or index at a price fixed today on a fixed future date

Terminology

Underlying Asset	Long	Short
The asset or index specified in the contract	The party to the contract agreeing to buy the underlying asset	The party to the contract agreeing to sell the underlying asset

4

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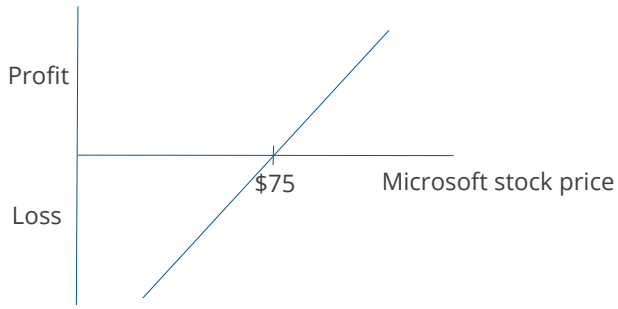
Equity Forwards – Long Position

A client has entered into an equity forward with a bank, in which the client agrees to buy 1000 Microsoft shares for $75 in one year.



5

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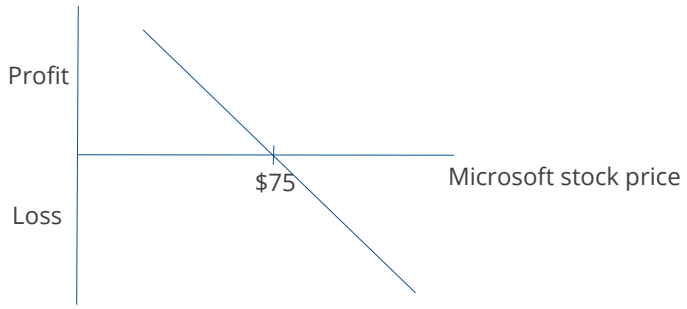
Equity Forwards – Short Position

For the same trade the bank's position is that it will have to deliver 1000 Microsoft shares and will receive $75 per share.



6

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Equity Futures

An equity future is a standardized contract between two parties to trade a specified quantity of a specified stock or index at a price fixed today on a fixed future date

Terminology

Long	Short
The party to the contract agreeing to buy the specified stock / index Benefits from an increase in the underlying stock / index	The party to the contract agreeing to sell the specified stock / index Benefits from a decrease in the underlying stock / index

8

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Equity Futures

- Traded on an exchange
- Contract terms determined by exchange
- Greater liquidity than forwards
- Futures are centrally cleared
  - A clearing house takes on the counterparty risk of both parties to the initial trade
  - Both parties have to pay initial margin to the clearing house as a good faith deposit
  - Gains / losses are received / paid on a daily basis

9

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Closing Out an Equity Futures Position

- Closing out involves trading a futures contract in the opposite direction from an initial trade.
  - Subsequent trade has to have same delivery date and underlying stock / index
- No exposure remains following the closing out trade
- Overall gain or loss calculated as:

Net gain / (loss) from closing out	=	Change in futures price (in index points)	x	$ value of one index point	x	Number of contracts traded

10

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Forwards and Futures Settlement

There are two alternatives for how a forward or future will settle. This will be specified within the contract at inception

Physical Delivery	Cash Settlement
• Short has to deliver underlying asset to long on delivery date	• Cash payment from loser under the contract to the winner, based on difference between cash price of underlying asset on delivery date and the forward or futures price

12

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Pricing of Equity Forwards and Futures

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Pricing of Equity Forwards and Futures

- The price that is agreed within a forward or futures contract is essentially based on an arbitrage free approach
- This price should result in:
  - There being no gain on loss made by either party as they enter into the trade
  - A long investor earning the same gain or loss in absolute terms if investing through the cash or forward market
- An equity forward price is calculated as follows:

Fair foward / futures price= Cash price − Dividends + Interest Cost

14

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Using Equity Futures for Arbitrage

If the quoted market price of a futures contract does not equal that of the fair futures price, there is a possibility of making a risk-free gain

Cash and carry arbitrage	Reverse cash and carry arbitrage
Market price > Fair price	Market price < Fair price
Buy cash and sell future today	Sell cash and buy future today
Borrow cash to set up long cash position	Borrow stock to set up short cash position

16

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Equity Options - Fundamentals

An equity option is a contract between two parties, where one of those parties has the right (long) to trade a fixed quantity of a specified stock or index at a price fixed today on (or before) a fixed future date.

The other party (short) does not have a choice as to whether the option is used or not

The side which has the choice is required to make an upfront payment referred to as the premium

18

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Option Terminology

Long	Also referred to as the 'buyer' or 'holder'
Short	Also referred to as the 'seller' or 'writer'
Strike (or exercise) price	The price specified within the option contract
Expiration (or maturity) date	The date on (or before) which the option can be exercised

19

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Types of Options

Call	Put
The owner of the option has the right to buy the underling stock	The owner of the option has the right to sell the underlying stock

American	European
The option can be exercised at any time until the expiry date	The option can only be exercised on the expiry date

20

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Equity Option Payoffs

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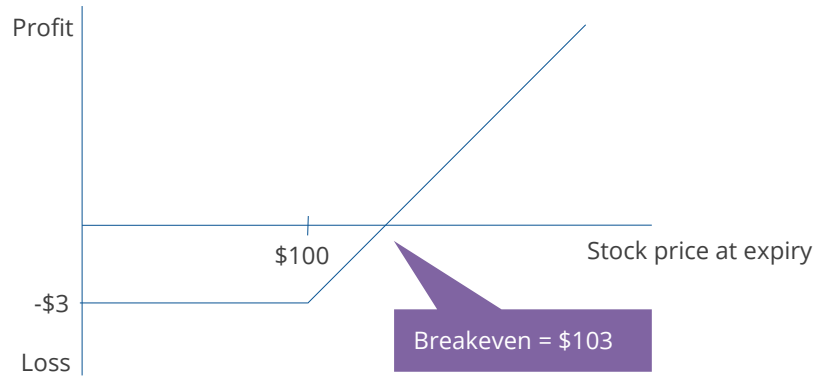
Long Call Option Payoff Diagram

European stock option: Strike price $100, premium $3



22

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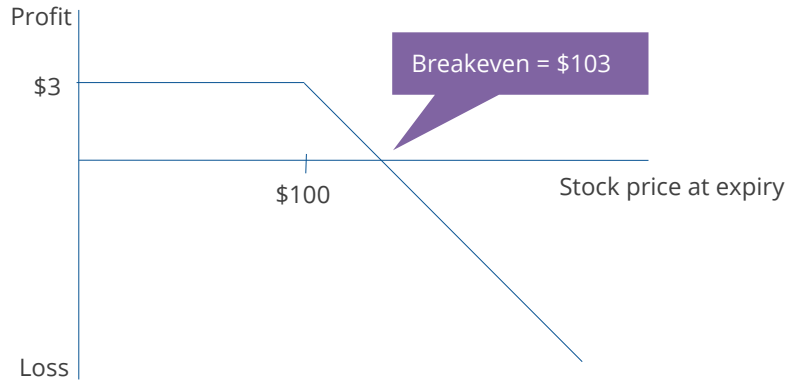
Short Call Option Payoff Diagram

European stock option: Strike price $100, premium $3



23

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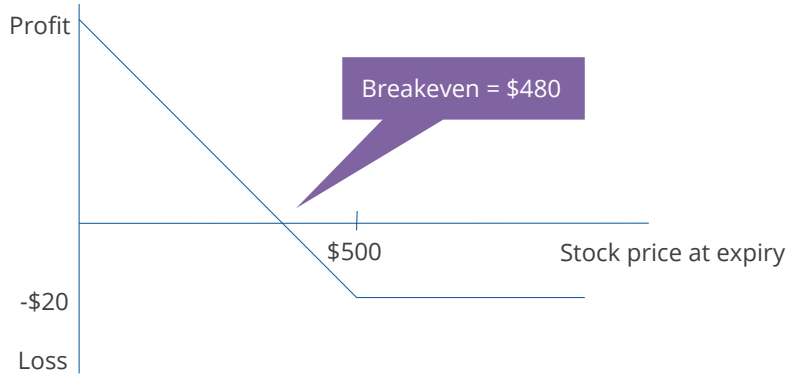
Long Put Option Payoff Diagram

European stock option: Strike price $500, premium $20



24

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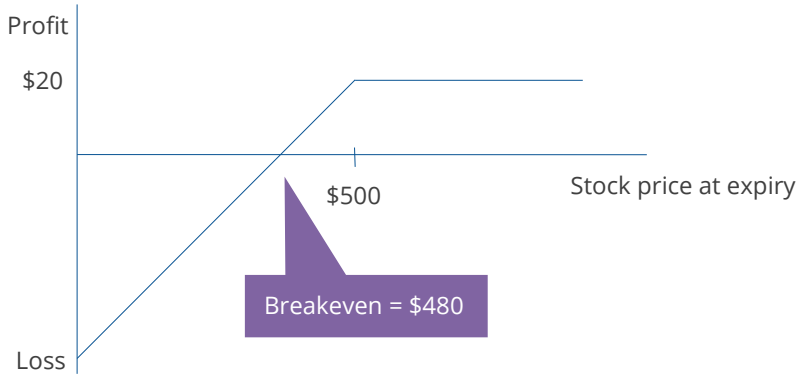
Short Put Option Payoff Diagram

European stock option: Strike price $500, premium $20



25

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Decomposing the Option Premium

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Decomposing the Equity Option Premium

The option premium (or price) can be broken down into 2 components, intrinsic value and time value:

Intrinsic Value	Time Value
The gain that would be made if the option were exercised now Can never be negative	Difference between the option premium and intrinsic value Highest when option is at-the-money Generally declines through the life of an option

27

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Factors Influencing Time Value

There are a number of factors which can influence time value, including:

- Time to expiry
- Volatility
- Relationship between stock and strike price
- Interest rates

28

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Equity Swaps

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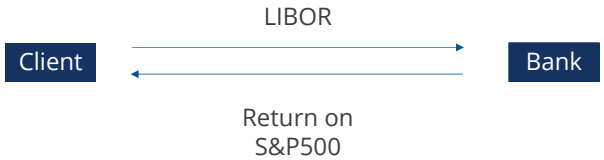
Equity Swaps

A derivative contract where one party agrees to pay the return on an equity index and the other agrees to pay a fixed or floating interest rate



Client has effectively borrowed funds to invest into the US equity market

30

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Equity Swaps Terminology

Notional principal	Amount on which rates (interest or equity return) are transformed into cash payments.
Payment frequency / reset period	How frequently return on the two legs of the swap are paid
Tenor	The total life of the swap
Netting	The payments between the two parties to the swap are not made in total, but are netted off

31

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Structured Products

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Structured Products

A package of investment products, typically including options

Highly customizable so can be tailored to meet a client's specific risk and return objectives

Often used within private wealth management to manage a client's tax exposure

33

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Structured Products

Can take many forms, but the simplest is a principal protected note

- Guaranteed to return principal
- If a specified stock or equity markets increases, the client will receive more than the initial investment

A bank is able to manage the risk of this trade by

- Buying a risk free zero coupon bond, whose par value matches the client's initial investment
- Using remainder of client's investment to buy an at-the-money call option

34

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Comparison of OTC vs. Listed Derivatives

	Over The Counter (OTC)	Listed
Quality, quantity and delivery dates	Tailored	Standardized
Liquidity	Low	High
Counterparty risk	High	Low
Transaction costs	High	Low
Margin	Possible	Required

36

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Equity Futures – Reasons for Trading

Speculation	Hedging	Arbitrage
• A long equity futures position will be profitable if equity markets rise • A short equity futures position will be profitable if equity markets fall	• Long equity position can be hedged with short equity futures position • Short equity position can be hedged with long equity futures position	• If a quoted futures price is higher than the arbitrage-free price a profit can be through a long position in the underlying market and a short position in the future

38

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Motivations for Trading Equity Options

These trades will deliver a profit in the following market trends

	Long	Short
Call option	Rising	Falling
Put option	Falling / Stable	Rising / Stable
Future	Rising	Falling

39

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Option Delta

As the underlying stock of an equity option changes, the option premium will also change, but not by the same amount

The extent to which the option premium changes is referred to as the delta

$$\text{Option delta} = \frac{\text{Change in option premium}}{\text{Change in underlying stock}}$$

Delta is positive for call options and negative for put options

40

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