

Liffe's Harmonised Corporate Actions Policy

Issued: 18 December 2007
Effective: 20 December 2007

Version: 3.0

Web site: www.nyseeuronext.com/liffe

The **Euronext Derivatives Markets ("Liffe")** comprise the markets for derivatives operated by Euronext Amsterdam, Euronext Brussels, Euronext Lisbon, Euronext Paris and LIFFE Administration and Management, referred to respectively as the Amsterdam, Brussels, Lisbon, Paris and London markets. Euronext is part of the NYSE Euronext group.

Euronext N.V. | PO Box 19163 | 1000 GD Amsterdam | The Netherlands

Table of Contents

Table of Contents	2
1. Introduction.....	3
2. Definitions.....	4
3. Background	7
4. Policy and Conventions	8
4.1 Application of Adjustments	8
4.2 Rounding	8
4.3 O-class Option Contracts.....	8
4.4 Equalisation Payments.....	9
4.5 Notification of Corporate Actions.....	9
5. Adjustment Methodologies	10
5.1 Ratio Method	10
5.2 Package Method.....	11
6. Corporate Action Types	12
6.1 Bonus Issues, Stock Splits, Reverse Stock Splits and Subdivisions or Consolidations of Share Capital	12
6.2 Rights Issue and Open Offers.....	13
6.3 Dividends.....	14
6.4 Demergers	14
6.5 Liquidation.....	15
6.6 Mergers and Takeovers.....	15
6.7 Share Repurchases	17
Appendix 1: Calculation of Fair Value	18
A 1.1 Option Contracts	18
A 1.2 Calculation of the theoretical value for futures	21
Appendix 2: Equalisation Payments	22
A 2.1 Equalisation payment and the Ratio Method	22
A 2.2 Equalisation payment calculation	22
Disclaimer	23

1. Introduction

- 1.1** This Policy Document details the policy of NYSE Euronext Derivative Markets (“Liffe”) in relation to Corporate Actions. It is issued pursuant to, and should be read in conjunction with, the terms of the relevant formal Contract Specifications and Trading Procedures.
- 1.2** This Policy Document explains Liffe’s policy in relation to Corporate Actions in respect of:
- (a) Option Contracts (as defined in section 2.1); and
 - (b) Futures Contracts (as defined in section 2.1).
- 1.3** This Policy Document is structured as follows:
- (a) section 2 defines terms used throughout this Policy Document;
 - (b) section 3 provides background information;
 - (c) section 4 describes Liffe’s policies and conventions in respect of Corporate Actions;
 - (d) section 5 outlines the methodology to be used to formulate adjustments in respect of Option Contracts and Futures Contracts; and
 - (e) the Appendices provide further information on the calculation of Fair Value and Equalisation Payments for Option Contracts and Futures Contracts.

2. Definitions

The following provisions apply to, or should be noted in connection with, the interpretation of this Policy Document:

Adjustment Ratio	means the ratio that will be multiplied by the Daily Settlement Prices and/or Exercise Prices, and by which Lot Sizes will be divided, in order to adjust contract terms to cater for a Corporate Action
Amsterdam Option Contracts	means Option Contracts that are listed on Euronext Amsterdam
Corporate Action Notice	means a Notice issued to the market containing information concerning contract adjustments
Corporate Action	means (a) a cash and/or scrip dividend, a bonus or scrip issue, a rights issue, a share split, subdivision or consolidation, a demerger or any other event affecting or giving rise to a right or entitlement attaching or accruing to the shares of, or ownership of shares in, a company; or (b) a takeover, merger or any arrangement, transaction or series of transactions which will or may result in the acquisition by any person or persons or any associated person or persons of a substantial proportion of the shares of a company; or (c) any other event which, in the opinion of Liffe, necessitates an amendment to be made to terms of an Option Contract and/or Futures Contract in respect of the shares of a company
Cum entitlement	Means, in respect of a share, with the right, before a date determined and published from time to time by the Relevant Stock Exchange, to any Relevant Entitlement relating thereto
Daily Settlement Price	means the price calculated and published by Liffe and which is used by the Clearing House to perform daily margin calculations
Delivery Buyer	means the person who is obliged to take delivery of one lot pursuant to the exercise or assignment of an option
Delivery Seller	means the person who is obliged to make delivery of one lot pursuant to the exercise or assignment of an option
EDSP	means the Exchange Delivery Settlement Price, as defined in the relevant Contract Specifications
Ex entitlement	means, in respect of a share, without the entitlement, on or after a date determined and published from time to time by the Relevant Stock Exchange, to any Relevant Entitlement relating thereto
Exercise	means to use the right one has as the holder of an option
Fair Value	means the price calculated by Liffe when Option Contracts and/or Futures Contracts are closed out for a cash amount, after a merger or takeover

Futures Contracts	means collectively the term for Universal Stock Futures Contracts (cash settlement and physical delivery) and Portuguese futures on individual shares
Last Trading Day	means the last market day on which a contract is available for trading
Liffe	means, as the context requires, one or all of the following Relevant Euronext Market Undertakings where Option Contracts and Futures Contracts are made available for trading, including Amsterdam, Brussels, Lisbon, London, and Paris
London Contract	means Options Contracts and Futures Contracts that are listed on LIFFE Administration & Management
Lot Size	means the number of underlying shares or baskets of shares of one Option Contract or Futures Contract
Minimum Price Movement	means the tick size of a contract, as defined in the relevant Contract Specifications or Trading Procedures
Open Interest	means the number of positions held at the close of any one business day
Option Contracts	means Option Contracts (cash settlement & physical delivery), listed on Liffe, on individual equity shares
Package Method	means a method of adjusting contract specifications for existing contracts to cater for Corporate Actions, in which the original underlying deliverable is substituted by a package of other shares or deliverable security
Paris Option Contracts	means Option Contracts that are listed on Euronext Paris, including both the contracts that have a Standard Lot Size of 10 underlying shares and contracts that have a Standard Lot Size of 100 underlying shares
Policy Document	means this document
Ratio Method	means a method of adjusting contract specifications for existing contracts to cater for Corporate Actions, where the relationship between the contract before and after the event is altered using a ratio specified by Liffe
Reference Price	means the price specified by Liffe and which shall be used as a reference price to determine the adjustments to be made further to a Corporate Action
Relevant Entitlement	means any one or more of a cash dividend, scrip dividend, bonus issue, scrip issue, rights issue, or any other right or entitlement, attaching or accruing to, or otherwise affecting, from time to time, a share or ownership of a share
Relevant Interbank Rates	means the rates as specified by the BBA or the ECB (for Euro) as the case may be

Relevant Stock Exchange	means the primary stock exchange on which such shares are available for trading
Shares	means, as the context requires, the relevant security, depository receipt or other such instrument which is the subject of the underlying of the relevant contract
Standard Lot Size	means the number of underlying shares in a contract, other than an O-class contract, as specified in the relevant Contract Specifications
Trading Code	means the code under which the contract or class of contracts is trading on LIFFE CONNECT [®]
Underlying Currency Unit	means the currency of denomination of the underlying deliverable which is the subject of a lot

3. Background

- 3.1** The publication of this Policy Document is intended to minimise uncertainty over the method of contract adjustment to be adopted by Liffe when a company announces a Corporate Action and, consequently, to limit any unanticipated effect on contract prices when Liffe thereafter announces its specific intentions on the contract adjustment.
- 3.2** Liffe envisages that, in most situations, contracts will be adjusted in accordance with this Policy Document. However, it should be noted that in certain circumstances this may not be possible or appropriate, and Liffe retains the right to determine how contracts should best be adjusted (if at all).
- 3.3** Liffe will issue one or more Corporate Action Notices in respect of each Corporate Action where adjustment to an Option Contract or Futures Contract is required or expected under the terms of this Policy Document.

4. Policy and Conventions

4.1 Application of Adjustments

The methodology detailed in this Policy Document is based on the principle that, when the shares underlying an Option Contract (which has not been exercised) or a Futures Contract become ex entitlement, contracts on such shares should be amended to reflect in economic terms (as far as practicable) a holding equivalent to the ex entitlement shares and the Relevant Entitlement, and may be effected as follows:

- by altering the exercise prices of Option Contracts, creating Reference Prices for use as the basis for the determination of variation margin flow for Futures Contracts; and the Lot Size of the respective contracts; or
- by substituting the underlying shares in a proportion determined by the ex entitlement holding with the new underlying shares; or
- by settling (closing) Option Contracts and Futures Contracts at their respective Fair Value.

Where the timing of a Corporate Action requires an adjustment to be made to Option Contracts or Futures Contracts prior to authorisation from shareholders, regulatory bodies or any other such party that has power to disqualify the Corporate Action, such adjustments will be made in order to maintain the contract's relationship with the underlying shares. Adjustments made in the above manner are irrevocable, irrespective of whether approval is or is not obtained.

4.2 Rounding

Where application of the Ratio Method results in an adjusted exercise price that is not equal to an eligible exercise price in accordance with the relevant contract terms and/or trading procedures the exercise price will be rounded to the nearest eligible exercise price, and in the event that the unrounded exercise price is exactly halfway between two eligible exercise prices, then it shall be rounded up to the next eligible exercise price.

When the Ratio Method is applied, the resultant Reference Price will be rounded to the nearest increment of the Minimum Price Movement, or to such number of decimal places determined and advised by Liffe, and in the event that the unrounded Reference Price is exactly halfway between two eligible Reference Prices, then it shall be rounded up to the next eligible Reference Price.

Where the application of the Ratio Method results in a Lot Size which is not equal to an increment of one share, the adjusted Lot Size will be rounded, to the nearest whole share, and in the event that the unrounded Lot Size is exactly halfway between two eligible Lot Sizes, then it shall be rounded up to the next eligible Lot Size.

4.3 O-class Option Contracts

With respect to Amsterdam Option Contracts, where application of the Ratio Method results in a Lot Size that is greater than the Standard Lot Size, Liffe will introduce an additional contract that will contain those shares which are in excess of the Standard Lot Size (the O-class). Apart from the different Lot Size, the O-class will have the same specifications as the adjusted original contract. Therefore, option holders will still hold existing contracts with a Standard Lot Size and receive one additional contract for every existing contract held, that will contain shares in excess of the Standard Lot Size. The additional contracts introduced will be designated with a Trading Code that usually has an "O" placed at the end of the Trading Code (hence "O-class"), and where this is not possible, with another letter.

If application of the Ratio Method results in a Lot Size that is less than the Standard Lot Size, Liffe will change the Trading Code of the contract, to become an O-class. At Liffe's discretion, contracts with the same expiry months as the affected contracts may be introduced at a Standard Lot Size, and will be designated with the original Trading Codes as the existing contract prior to adjustment.

New strike prices and expiry months will only be introduced for contracts having a Standard Lot Size.

4.4 Equalisation Payments

For Paris Option Contracts, an equalisation payment will be made to neutralise the error observed due to rounding of the contract or to the maintenance of the contract size as mentioned in section 5.1.

The equalisation payment amount will be determined by Liffe and its transfer between clearing members arranged by LCH.Clearnet.

4.5 Notification of Corporate Actions

Liffe will inform participants of Corporate Actions via publication of a Corporate Action Notice. A Corporate Action Notice will be published in respect of a Corporate Action when information made public by the company gives sufficient certainty of that company's intention to effect a Corporate Action. A Corporate Action Notice will detail the adjustment methodology Liffe intends to apply, and the subsequent application of such adjustment, *ceteris paribus*.

Where necessary, at the close of business on the last day that a company's shares are trading cum entitlement, Liffe will publish a Corporate Action Notice confirming adjustments made to Option Contracts or Futures Contracts.

5. Adjustment Methodologies

Where adjustments to the terms of a contract are required under the terms of this Policy to cater for a Corporate Action, Liffe shall use either of the Ratio Method or the Package Method, or substitute the underlying shares of a contract.

In cases where it is inappropriate or impossible to adjust contracts in line with the below methodologies, or in cases where the Corporate Action is an event other than those listed in section 6 of this Policy Document, Liffe will have regard, as far as practicable, to the principle detailed in paragraph 4.1 above in determining the appropriate adjustment.

5.1 Ratio Method

Where the Ratio Method is used to make adjustments to Option Contracts and Futures Contracts, Liffe will disclose the adjustment ratio if known or the equation necessary to calculate the ratio. The following conventions will apply for an application of the Ratio Method:

- The adjustment ratio shall be calculated by dividing the ex entitlement holding (or value thereof) by the cum entitlement holding (or value thereof), such that:

$$\text{Adjustment Ratio} = \frac{\text{Ex entitlement holding}}{\text{Cum entitlement holding}}$$

- The adjustment ratio will be rounded, using normal mathematical rounding conventions, to five decimal places.
- Application of the adjustment ratio with respect to exercise prices, the creation of Reference Prices, and Lot Sizes will be made with the rounded adjustment ratio.

For **Option Contracts** the ratio is used to alter the Lot Size (by dividing the lot size by the ratio) and the exercise price of each series (by multiplying the exercise price by the ratio). On exercise, Delivery Sellers are required to deliver the adjusted number of ex entitlement shares in return for a consideration of the adjusted exercise price multiplied by the adjusted Lot Size.

For **Paris Option Contracts** having a Standard Lot Size of 10 underlying shares, no change will be made to the Lot Size if the value of the adjustment is less than 16.666667% of the nominal value of the contract. Instead, the difference will be neutralised by means of an equalisation payment.

Equalisation payments will be made for *all* Paris Options Contracts to neutralise the error observed due to rounding of the contract (see section 4.4)

In the case of **Futures Contracts**, the ratio is used to alter the Lot Size (by dividing the Lot Size by the ratio) and to create the Reference Price of each contract (by multiplying the previous business day's Daily Settlement Price by the ratio).

For **Amsterdam Option Contracts** where application of the Ratio Method results in a Lot Size that is greater than the Standard Lot Size, an additional contract will be introduced which contains the shares which are in excess of the Standard Lot Size (the O-class, see section 4.3).

5.2 Package Method

The Package Method entails substituting the underlying shares in a contract with a package of the ex entitlement shares and the proportionate number of entitlements.

In the case of **Option Contracts**, on exercise, Delivery Sellers are required to deliver the ex entitlement shares and the proportionate number of entitlements in consideration for the exercise price multiplied by the Lot Size. No adjustment will be made to Lot Sizes or exercise prices. Amsterdam Option Contracts will be renamed to become an O-class.

In the case of **Futures Contracts** (cash settlement), the ex event EDSP will be determined by aggregating the components which form the package. Daily Settlement Prices will not be adjusted to create Reference Prices and no adjustment will be made to Lot Sizes or to the Trading Code.

On the Last Trading Day of **Futures Contracts** (physical delivery), Delivery Sellers are required to deliver the number of ex entitlement shares they have contracted to sell together with the proportionate number of entitlements. Daily Settlement Prices will not be adjusted to create Reference Prices and no adjustment will be made to Lot Sizes or to the Trading Code.

In all cases, no new delivery months will be introduced where the Package Method has been applied.

6. Corporate Action Types

The following section details the adjustment methodology Liffe will apply to Option Contracts and Futures Contracts to determine what adjustments (if any) will be applied to cater for the following Corporate Actions:

- Bonus issues
- Stock splits and reverse stock splits
- Subdivision or consolidation of share capital
- Rights issues and open offers
- Special dividends
- Demergers
- Liquidation
- Mergers and takeovers
- Share repurchases

As noted, Liffe retains the right to determine how any particular Corporate Action will be reflected in contract adjustments. However, as a general rule, the following provides details of the methodology applied to cater for the above Corporate Actions.

In cases in which not all shareholders are entitled to the Relevant Entitlement, Liffe will decide on a case by case basis whether an adjustment needs to be made. In doing so, Liffe will have regard, as far as practicable, to the principle detailed in paragraph 4.1.

6.1 Bonus Issues, Stock Splits, Reverse Stock Splits and Subdivisions or Consolidations of Share Capital

The Ratio Method will be used to adjust Option Contracts and Futures Contracts to cater for a bonus issue, stock split, reverse stock split, subdivision or consolidation of share capital.

The ratio shall be constructed as follows:

$$\text{Adjustment Ratio} = \frac{(P - E) \times \left(\frac{O}{N}\right)}{P}$$

Where:

- P = The official closing price of the cum entitlement share on the Relevant Stock Exchange
- E = Value of the entitlement per share
- O = Cum amount of shares (old)
- N = Ex amount of shares (new)

For bonus issues, stock splits and reverse stock splits, P and E are irrelevant. Therefore the formula for the adjustment ratio for bonus issues, stock splits and reverse stock splits simply reads:

$$\text{Adjustment Ratio} = \frac{O}{N}$$

For the Amsterdam, Brussels, Lisbon and Paris Market where the ratio results in a Lot Size divisible by the standard Lot Size to an exact integer, the open interest shall be adjusted rather than the Lot Size in order to maintain the equivalent economic exposure pre and post event. For the London Market the Lot Size will be adjusted rather than the open interest.

6.2 Rights Issue and Open Offers

The Ratio Method will be used to adjust Option and Futures Contracts to cater for rights issues and open offers. The adjustment ratio will be calculated by creating a ratio of the theoretical ex entitlement share price to the cum entitlement share price.

For the avoidance of doubt, Liffe will make adjustments to Option Contracts and Futures Contracts where the entitlement issue creates an exclusive entitlement to existing shareholders, irrespective of the tradability of the entitlement. Liffe will interpret a rights issue or an open offer to shareholders as a Corporate Action that creates an exclusive entitlement to shareholders, insofar that the entitlement has positive value.

Calculations of the value of the entitlement and the adjustment ratio for a straightforward issue are as follows:

Value of the Relevant Entitlement

$$E = \frac{P - d - S}{(n + x)}$$

Where:

- E = Theoretical value of an entitlement
- P = The official closing price of the cum entitlement share on the Relevant Stock Exchange
- S = Subscription price of one new share
- d = Dividend to which new shareholders are not entitled
- n = Number of entitlements required for one new share
- x = Number of entitlements received for one share

Adjustment Ratio

$$\text{Adjustment Ratio} = \frac{P - E}{P}$$

The ratio will be applied to exercise prices of each series and Daily Settlement Prices as described in section 5.1 of this Policy, at the close of business on the last business day that the company's shares are trading cum entitlement.

Where an entitlement issue entitles shareholders to take up securities that are not *pari passu* in all respects to those shares which derived the entitlement, or will not immediately convert into those shares, Liffe may determine the value of the entitlement by means of a members' survey. The survey will be conducted on the last business day that the company's shares are trading cum entitlement.

It should be noted that where a market auction facility is available on the Relevant Stock Exchange, Liffe may, at its discretion, use the closing price of the rights from the market auction on the last cum entitlement trading day to determine a theoretical ex entitlement share price.

Liffe will have regard, where possible, to any adjustment or valuation methodology applied to any index which the underlying share may be a constituent of, to cater for the event.

6.3 Dividends

In the case of cash or scrip dividends, Option Contracts and Futures Contracts will only be adjusted if these dividends are special. Liffe will use the following criteria for deciding whether a dividend should be considered to be a special dividend:

- (a) The declaration by a company of a dividend additional to those dividends declared as part of the company's normal results and dividend reporting cycle; merely an adjustment to the timing of the declaration of a company's expected dividend would not be considered as a special dividend circumstance; or
- (b) The identification of an element of a dividend paid in line with a company's normal results and dividend reporting cycle as an element that is unambiguously additional to the company's normal payment.

For the purpose of clarification, Liffe will not make adjustment for the following situations:

- 1. Payment of ordinary dividends, irrespective of how they are financed;
- 2. The issue of redeemable shares or any other entitlement in lieu of an ordinary dividend; or
- 3. An unexpected increase or decrease, resumption or cessation, or change in frequency to an ordinary dividend.

The Ratio Method will be used in making adjustments to Option Contracts and Futures Contracts to cater for special dividends, and shall be calculated as follows:

$$\text{Adjustment Ratio} = \frac{P - Od - E}{P - Od}$$

Where:

- P = The official closing price of the cum entitlement share on the Relevant Stock Exchange.
- Od = Any ordinary dividend payment per share which has the same ex date as E
- E = The special dividend payment per share

6.4 Demergers

The Package Method will be used to cater for demergers where shares of the demerged company can be delivered and settled in the domestic market of the shares of the original company; and those shares are either:

- (a) Traded on an exchange designated by Liffe; or
- (b) Included in the traded-but-not-listed segment of NYSE Euronext Group.

If the shares of a demerged company can not be delivered and settled in the domestic market of the shares of the original company, and do not satisfy either of conditions (a) or (b) above, then the Ratio Method will be applied to Option Contracts and Futures Contracts.

The adjustment ratio will be calculated as follows:

$$\text{Adjustment Ratio} = \frac{(\text{Cum entitlement share price} - \text{value of demerged company per share})}{\text{Cum entitlement share price}}$$

In the case that a demerger results in the creation of two or more companies, shares of those demerged companies will be subject to the above conditions, such that if the shares of each demerged company can not be delivered and settled in the domestic market of the shares of the original company, and do not satisfy either of conditions (a) or (b) above, then the Ratio Method will be applied to shares of those demerged companies, in their respective proportions.

In determining the value of a demerged company's shares for the purpose of applying the Ratio Method, Liffe may conduct a members' survey on the last date which the company's shares are trading cum entitlement. However, on or prior to this date, if the value of shares in the demerged company can be determined from market trading on any facility operated by the Relevant Stock Exchange, then this value will be used in place of a members' survey.

If the demerged company is already traded on an exchange designated by Liffe, Liffe may adjust the contracts in accordance with the ratio method.

6.5 Liquidation

Where a company is delisted from its Relevant Stock Exchange as a consequence, amongst other things, of liquidation or bankruptcy Option Contracts and Futures Contracts will be settled according to their intrinsic value.

Where the underlying shares in question are suspended from trading but still transferable through the relevant settlement system, trading, exercise and settlement in the Option Contracts may still be allowed.

6.6 Mergers and Takeovers

To cater for a merger or takeover, Liffe will use the structure of the headline offer ("offer consideration") to determine what adjustment methodology to apply to Option Contracts and Futures Contracts.

The Ratio Method will be applied where the offer consideration is **composed purely of shares** in another company, and those shares which form the headline offer can be delivered and settled in the domestic market of the shares of the company being acquired; and such shares are either:

- (a) Traded on an exchange designated by Liffe; or
- (b) Included in the traded-but-not-listed segment of NYSE Euronext Group.

In applying the Ratio Method to substitute the underlying value of the Option Contracts and/or Futures Contracts the ratio will be calculated as follows:

$$\text{Adjustment Ratio} = \frac{x}{y}$$

Where y is equal to the number of shares offered under the headline offer for every x shares held in the underlying company. This ratio will be applied as described in section 5.1 of this Policy, such that the underlying shares of the contract will be substituted in the same proportion as determined by the headline offer, for the shares that form the offer consideration. Use of the Ratio Method will ensure Daily Settlement Prices and exercise prices are adjusted in line with the level of the new underlying shares.

If those shares which form the offer consideration can not be delivered and settled in the domestic market of the shares of the company being acquired; and such shares do not satisfy either of conditions (a) or (b) above, then Option Contracts and Futures Contracts will be settled at their theoretical Fair Value (as described in Appendix 1).

Where the offer consideration is **composed purely of cash**, Option Contracts and Stock Futures Contracts will be settled at their theoretical Fair Value (as described in Appendix 1).

Where the **offer is composed of both shares and cash**, and if the share element cannot be delivered and settled in the domestic market of the shares of the company being acquired, and does not satisfy either of conditions (a) or (b) above, then all Option Contracts and Futures Contracts will be settled at their theoretical Fair Value. If the share element can be delivered and settled in the domestic market of the shares of the company being acquired, and satisfies either of condition (a) or (b) above, then the Ratio Method will be applied, such that the resulting contracts would become contracts purely on the share element. In this case the ratio will be based on the share price of the company issuing the bid.

Generally Liffe will seek to use the official closing price of the shares on the market where the company has its primary listing. However in cases where the company issuing the bid has its primary listing in a different time zone than the target company, Liffe may use an official closing/opening price established on a secondary venue, use a **VWAP calculation** or use the EDSP calculation. Lastly, if the price of the share of the company issuing the bid is not available or cannot be determined at an appropriate time, Liffe reserves the right to calculate the ratio on the basis of the share price of the target company.

In the circumstance that the cash element represents over 67% of the total offer consideration, Option Contracts and Stock Futures Contracts will be settled at their theoretical Fair Value (as described in Appendix 1), and the Ratio Method will not be applied. For the avoidance of doubt, once Liffe has determined the proportion of cash and made such announcement as to the type of adjustment methodology, the methodology will not then be changed simply due to share price movements affecting the proportion of cash.

$$adjustment\ ratio = \frac{(P_t - C) * \frac{O}{N}}{P_t}$$

Where:

- P_t = Theoretical value of the target company
- O = Number of shares before the offer is effective (old) (being target company)
- N = Number of shares after the offer is effective (new)* (being offerer)
- C = Cash element of the offer

$$P_t = \frac{C + (N * S)}{O}$$

Where:

- S = cum event share price of the company that is issuing the offer (being offerer)

Adjustments to Options and Futures Contracts will be made when a relevant offer is made effective. To determine whether the relevant offer is effective, a threshold of the majority of the outstanding shares (50% + 1) shall be used.

6.7 Share Repurchases

Liffe will generally treat instances where a company repurchases its own shares in the market as a non adjustable event. However, on occasions where a company makes an offer for its own shares at a premium to the prevailing market price, and where shareholders have equal opportunity to participate in the offer, the Exchange may deem the share repurchase as an adjustable event.

Appendix 1: Calculation of Fair Value

Options and Futures contracts are settled at their fair values, after the offer has been declared effective.

A 1.1 Option Contracts

For the purpose of settling Option Contracts at fair value, Liffe will use the Cox Ross Rubenstein option valuation model.

Liffe reserves the right, in special circumstances, to consult a panel of market parties and independent experts instead of using the fair value method described below.

Determination of implied volatility

The option valuation model takes several factors into account, including the volatility of the option, interest and future dividends. For the purpose of settling Options Contracts at fair value, Liffe will use an average implied volatility based on the settlement prices of the relevant Options series over a ten trading day period preceding the announcement of the takeover bid¹.

For each day of the ten day period an implied volatility is determined for each series based on:

- The settlement price of each series²
- The underlying share price at the time of the settlement price calculation

Subsequently, the average of each series implied volatility over the 10 day period is calculated, excluding the lowest and the highest implied volatility observation of that series over the ten day period³.

Once determined these implied volatilities are fixed until the moment of settlement, regardless of any changes in the price of the underlying share in the intervening period.

If during the course of a takeover the offeror increases the offer consideration or makes any other change to the respective offer (such as extending the acceptance period), new implied volatilities will not be calculated. In addition, should a counter bid be launched by another company whilst a bid is still active (i.e. has not expired or been withdrawn), then the implied volatilities, calculated as described above and in relation to the initial bid, will be used if the counter bid should be declared effective.

Calculation of fair value

The Cox-Ross-Rubinstein binomial model is used to calculate the fair value of an option. This method sets up a matrix of possible underlying prices during the lifetime of the option, based on a given starting price.

Step 1 : Adjustment of the underlying value to take account of future dividends.

Before a matrix of underlying prices can be constructed, the starting price has to be adjusted to take account of dividends that will be paid out during the lifetime of the option. This is done by subtracting the discounted cash value of all the expected dividends over the lifetime of the option from the starting price.

¹ For the purpose of this policy, a bid is deemed to be announced as soon as a firm price has been mentioned by the company issuing the bid. This could be an intended bid.

² If the settlement price of any series is lower than the lowest possible theoretical price of that series, then the implied volatility will be based on the lowest possible theoretical price. For the purpose of determining implied volatilities, the lowest possible theoretical price is deemed to be the intrinsic value, corrected to take into account interest and future dividend payments.

³ If an option has been listed for less than ten trading days at the time that its implied volatility is determined, the implied volatility will be calculated on the basis of the days it has been listed. In addition, if the option has been listed for less than seven trading days, the lowest and highest implied volatility will not be excluded.

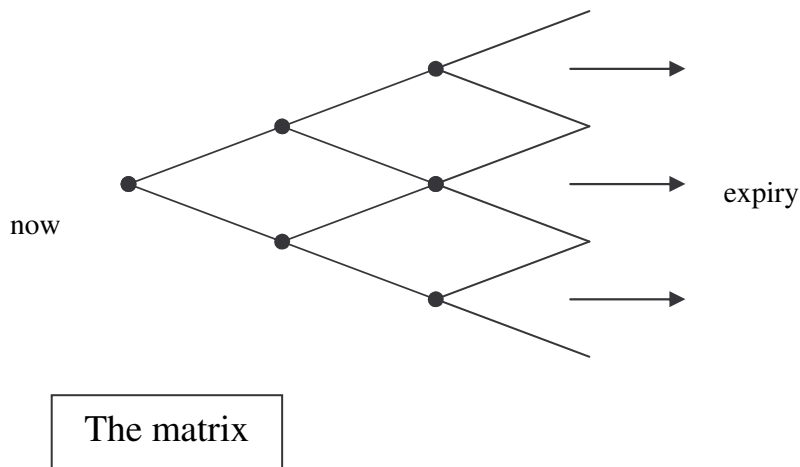
$$S = Z - \sum_{i=1}^m D_i e^{-rt_i}$$

- D_i = Dividends that will be paid out during the option's lifetime (based on data from Markit Dividends⁴)
 m = The number of dividends paid out during the option's lifetime
 r = Risk-free interest rate over the option's lifetime (based on Euribor)
 S = Share price, adjusted to take dividends into account
 Z = Starting price of the share
 t_i = Time remaining until dividend payment (in years)

Step 2: The underlying value matrix

Once the starting price of the underlying has been adjusted, the matrix can be constructed by dividing up the remaining lifetime of the option into "n" periods. The value of "n" is:

- the number of days remaining in the option's lifetime if this number is smaller than 100
- 100 in all other cases



The following formula is used to calculate the simulated prices used in the matrix:

$$u = e^{\sigma \sqrt{\frac{t}{n}}}$$

Where:

- σ = implied volatility of the option
 t = remaining lifetime of the option
 n = number of periods into which the option's lifetime is divided
 u = relative upward price movement in the binomial model

Step 3: Calculation of underlying prices

From every junction in the matrix an upward price movement and a downward price movement can be simulated by either multiplying or dividing the price at the junction by "u". The result of this sum

⁴ If the information available on Markit Dividends is not sufficient then Liffe may use historical dividends. If there is no information available on Markit Dividends then Liffe may also use historical dividends.

should then be added to the cash value of the future dividends at that point in time. This simulated price is then used for the next step in the simulation, and the process repeated until the entire matrix has been filled with underlying prices.

Step 4: Determination of the value of the option at expiry

The value of the option at expiry can be calculated as follows, using the simulated price matrix.

$$c = \text{maximum}(S - X, 0)$$

$$p = \text{maximum}(X - S, 0)$$

Where:

- c = value of the call
- S = simulated price of the underlying
- X = strike price of the option
- p = value of the put

Step 5: Probability of a price increase or decrease

The matrix can also be used to calculate the probability of a price increase or decrease, using the following formula.

$$K = \frac{(e^{r \cdot t/n} - \frac{1}{u})}{(u - \frac{1}{u})}$$

Where

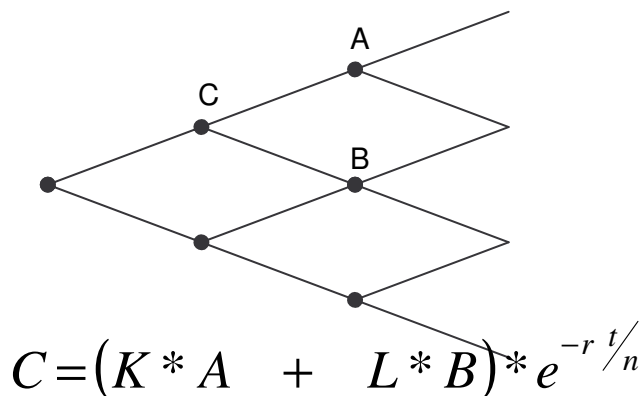
- K = probability of a price increase

The probability of a price decrease (L) is then 1-K.

Step 6: Calculation of option prices

The option values at expiry can be used to recalculate the option price matrix in the other direction. This is done by calculating the option price at each junction on the basis of the two preceding prices (one corresponding to the higher price and one to the lower).

The option value that corresponds to the higher price is multiplied by “K”, the option value for the lower price is multiplied by “L” and the two amounts are added together. The result is multiplied by the previously calculated value to calculate its cash value at that moment in time as follows:



Early exercise (this only applies to American Style options; the below adjustments for early exercise are not made for European Style options)

Finally, it is possible to determine the advisability of exercising of the option ahead of expiry at each junction in the matrix. If the value calculated for an option at a given junction is less than the intrinsic value of the option, it may be advisable to exercise the option. In that case, the intrinsic value of the option should be used for further calculations.

Step 6 is repeated until the final value of the option has been calculated.

The calculation (steps 1 to 6) is then repeated using a value of "n-1", and the average of the two calculations.

A 1.2 Calculation of the theoretical value for futures

Liffe will use the following model for the purpose of settling Futures Contracts at theoretical value.

Step 1: Adjustment of the price of the underlying security for future dividend flow

For futures, the price of the underlying security has to be adjusted for future dividends paid out during the remaining life time of the Futures Contract. Future dividends will be determined by Markit.

$$D^* = \sum_{i=1}^n D_i e^{-rt_i}$$

Where:

D_i	=	Dividends that are ex entitlement in period i
D^*	=	Present value of the future dividends during the remaining life of the Futures Contract
r	=	Risk-free interest rate for the remaining life of the future defined by the Relevant Interbank Rates
t_i	=	The time to payment of a dividend divided by 365
n	=	Total number of all dividend payable in period i during the remaining life of the Futures Contract

Step 2: Calculation of the futures price

$$F = (S - D^*) e^{r(T-t)}$$

Where:

F	=	The futures price
S	=	The share price (being the cash bid)
$T-t$	=	The remaining life of the Futures Contract
r	=	Risk-free interest rate for the remaining life of the Futures Contract defined by the Relevant Interbank Rates
D^*	=	Present value of the future dividends during the remaining life of the Futures Contract

Appendix 2: Equalisation Payments

A 2.1 Equalisation payment and the Ratio Method

In the case that an equalisation payment is made necessary under this Policy Document, the Ratio Method will be applied in the following manner (as described in section 5.1):

1. The exercise prices (K) will be multiplied by the ratio to create the adjusted exercise prices, rounded to two decimal places (K1) as described in section 4.2.
2. The Lot Size (Q) will be divided by the ratio to create the new Lot Size (Q1) which will be rounded to the nearest whole share (Q2) as described in section 4.2.

A 2.2 Equalisation payment calculation

1. The settlement price of the modified series (c) must be equal to the ratio (R) multiplied by the settlement price of the unadjusted series.
2. The theoretical position has to be preserved post an adjustment, such that:

$$Q1 \times K1 = Q \times K$$

However, as the new Lot Size is rounded to the nearest whole share (Q2), this relationship will not always hold true, so that, where rounding has occurred:

$$Q2 \times K1 \neq Q \times K$$

The variation (V) of a position (expressed as a percentage) is thus:

$$V = \frac{(Q2 \times R) - Q}{Q}$$

3. The equalisation payment (S) for each series is calculated as follows:

$$S = c \times V \times Q$$

Where:

- c = Series settlement price of the previous day
- V = The Variation of a position (expressed as a percentage)
- Q = The Lot Size before the corporate action

4. If $S < 0$, then option holders will receive S. If $S > 0$, then option sellers will receive S.

Disclaimer

The **Euronext Derivatives Markets ("Liffe")** comprise the markets for derivatives operated by Euronext Amsterdam, Euronext Brussels, Euronext Lisbon, Euronext Paris and LIFFE Administration and Management, referred to respectively as the Amsterdam, Brussels, Lisbon, Paris and London markets. Euronext is part of the NYSE Euronext group. Whilst all reasonable care has been taken to ensure that this document is accurate and not misleading, neither Euronext N.V. nor any of its group companies shall be liable (except to the extent required by law) for the use of the information howsoever arising. Euronext N.V. expressly disclaims all warranties, expressed or implied, as to the accuracy of any of the content provided, or as to the fitness of the information for any purpose.