

LONDON INFO-FLASH NO. LO09/08

ISSUE DATE: 3 April 2009

SHORT TERM INTEREST RATE (“STIR”) OPTIONS CONTRACTS

INTRODUCTION OF STIR OPTIONS EXERCISE PRICES OF 100.000 (“PAR”) AND ABOVE

Executive Summary

In response to requests from customers, the Exchange will make series in STIR options with exercise prices of 100.000 (“par”) and above available for trading from Wednesday 22 April 2009.

This Info-Flash provides Members with guidance regarding the implementation schedule for the listing of the new series with such exercise prices, the impact on the Exchange’s Fair Value Options Model and the availability of a customer test environment which will enable Members to test their own systems’ ability to support the new exercise prices.

1. Introduction

- 1.1 With interest rates approaching zero and in response to customer demand, the Exchange will, on and from Wednesday 22 April 2009, make available exercise prices of 100.000 and above for certain STIR Options Contracts.
- 1.2 The following STIR Options products will support par exercise prices and above.

Product	TRS Commodity Code
Options on Euribor Futures	I
Mid Curve Options on Euribor Futures	K
Options on Eurodollar Future	ED
Mid Curve Options on Eurodollar Futures	EM
Options on EuroSwiss Futures	S
Options on Short Sterling Futures	L
Mid Curve Options on Short Sterling Futures	M

- 1.3 Currently, the maximum price for a STIR Futures Contract on LIFFE CONNECT[®] is 99.995. In association with the availability of STIR Options exercise prices of par and above, STIR Futures prices will be supported up to a maximum of 110.000 from 22 April 2009.

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2. Introduction of New Exercise Prices

- 2.1 Exercise prices will be generated in accordance with the NYSE Liffe Trading Procedures and the relevant Contract Specification. Furthermore, as of the implementation date the Exchange will immediately introduce exercise prices of 100.000 through to 100.500 for Options on Euribor Futures and Options on Short Sterling Futures, for White months and Serial months.
- 2.2 Other series, including those with par exercise prices and above for Mid Curve Options on Euribor Futures, Mid Curve Options on Short Sterling Futures, Options on Eurodollar Futures, Mid Curve Options on Eurodollar Futures and Options on Euroswiss Futures will be introduced on request, or as deemed necessary by the Exchange.

3. Fair Value Options Pricing Model

- 3.1 The Exchange employs the Black Model for establishing fair value in respect of its listed STIR Options Contracts (please see the Attachment to this Info-Flash). As has been common practice in Options on Short Term Interest Rate Futures markets, the underlying asset used in the model has been the Interest Rate rather than the Futures Price (of 100 – Interest Rate). As interest rates have approached zero per cent, this has acted to create a distortion, due to the division by a number approaching zero within the model. Furthermore, the Black Model makes the assumption that the underlying asset cannot take a value of zero or lower.
- 3.2 Following consultation with market makers, the Exchange is aware that at least two distinct methods are being adopted within the market to address this issue. The Exchange has decided to adapt its Fair Value Options Model to take the Futures Price as the underlying asset, thereby removing the “divide by zero” issue and eliminating the distortion in the model.

Implied Volatilities

- 3.3 As a result of changing the underlying asset used in the model from the Interest Rate to the Futures Price, the basis for calculating implied volatilities has also changed. Therefore, historic implied volatilities previously calculated and published by the Exchange will not be consistent with those calculated using the revised model.
- 3.4 Prior to the implementation of the revised model and introduction of the par exercise prices and above, the Exchange will re-calibrate its market volatilities to operate with the new model. Consequently, as of Monday 20 April 2009, absolute levels of implied volatility published in the Exchange’s Daily Information Sheets and Daily Settlement Files will be notably lower (see figure 1 below).

Deltas

- 3.5 The cumulative distribution function (i.e. “normal distribution”) that operates within the Black Model assumes linearity or symmetry in the range of likely outcomes represented by possible movements in the underlying asset over the lifetime of the option. As the asset price approaches zero, this assumption breaks down.
- 3.6 The effect of this break down, or distortion in the linearity of likely outcomes, is that the model generates Call Option Deltas that are low and Put Option Deltas that are high. Figure 1 below illustrates the change in delta resulting from the revision in the model.

Figure 1

Future (100 – Rate)	97.935		Underlying (Rate)		Underlying (Future)
Rate	2.065		Call Delta	0.25	0.31
Exercise Price	98.250		Put Delta	-0.75	-0.69
Days to Expiry	175		Volatility	47.56%	0.919%
Call Premium	0.1225				
Put Premium	0.4375				

Trade Reporting

- 3.7 As mentioned above, the Exchange has identified two methods of addressing the breakdown in the model, both of which have the effect of generating Call Option and Put Option Deltas that are more in line with values expected by the market. The Exchange is aware that there is however a small difference in Delta calculated via these two methods. Therefore, the Exchange will recognise a range of possible deltas in its procedures for booking trades where the Option's Delta needs to be reported at the time of trade.

Daily Settlement Prices

- 3.8 The changes to the model will not in themselves impact the level of the Exchange's Daily Settlement Prices.

Initial Margin

- 3.9 Initial margins for broadly balanced option portfolios are not likely to be materially different from current levels. Portfolios that are particularly biased will incur more or less margin to reflect the difference in deltas recognised by the revised model.

4. Technology Impact

- 4.1 The listing of series with par exercise prices and above, and the change in the fair value options model, will have no external impact on LIFFE CONNECT®.
- 4.2 Reports within the Trade Registration System (TRS) will accommodate the additional (sixth) digit required to support Futures and exercise prices of 100.000 or above.
- 4.3 Please contact technologypartnerships@nyx.com if you require further details of the technology impact associated with this Info-Flash.

5. Summary of Implementation Schedule

- 5.1 The Exchange has made available from Thursday 2 April 2009 a customer test environment that will enable Member Developers and Independent Software Vendors to test their own software for compatibility with the newly listed series with exercise prices of par and above.
- 5.2 From Monday 20 April 2009, the Exchange will operate using the revised model. As a result, implied volatilities, deltas and initial margin levels will operate accordance with this model, as explained in Section 3 above.
- 5.3 On and from Wednesday 22 April 2009 ("**Implementation Date**"), series with exercise prices between 100.000 and 100.500, at 0.125 intervals, will be available for trading in the Options on Euribor Futures and Options on Short Sterling Futures markets. Other exercise prices,

including par exercise prices and above for Mid Curves, EuroSwiss and Eurodollar Options can be made available on request from Wednesday 22 April 2009.

For further information in relation to this Info-Flash, Members should contact:

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Black Model

$$C = U \times N(d) - K \times N(d - v\sqrt{t})$$

$$P = -U \times N(-d) + K \times N(v\sqrt{t} - d)$$

$$Dc = N(d)$$

$$Dp = -N(-d)$$

$$d = \frac{\ln\left(\frac{U}{K}\right) + \frac{v^2}{2}t}{v\sqrt{t}}$$

Where

C = Call Premium

P = Put Premium

Dc = Call Delta

Dp = Put Delta

U = Underlying Asset Price

K = Exercise Price

v = Volatility

t = Time to Expiry (years)

N(z) = Standard Normal Cumulative Distribution Function (z is the value for which the distribution is required)

STIR Options

Current operation of the model:

U = Interest Rate (100 – Futures Price)

Call and Put Premiums are reversed; Call and Put Deltas are reversed

Revised operation of the model:

U = Futures Price (100 – Interest Rate)