clear to trade

eurex clearing *circular 019/10*

Date: Frankfurt, March 31, 2010
Recipients: All Clearing Members of Eurex Clearing AG and Vendors
Authorized by: Thomas Book

⚠ **Action required** ⚠ **High priority**

Changes in Implied Volatility for Risk-Based Margining

Contact: Market Supervision, Risk Operations, tel. +49-69-211-1 24 52, fax +49-69-211-1 84 40

Content may be most important for:	**Attachments:**
➲ All departments	none

Summary:

In order to ensure a high degree of security, Eurex Clearing protects against the risk of default by any of its Clearing Members. The mainstay of this security system is the robust margining system Risk-Based Margining.

Starting **April 6, 2010**, Eurex Clearing will enhance the Risk-Based Margining Methodology for options by implementing changes in the implied volatility. With this enhancement, Eurex Clearing will increase the accuracy of the additional margin calculation for options and reflect more accurately a further risk component in the margining. Product types other than options (e.g. futures, cash market products) are not affected by this change. The adjustment of the methodology is necessary to secure zero weighting for solvency purposes related to positions with Eurex Clearing and is based on discussions with the supervisory authorities.

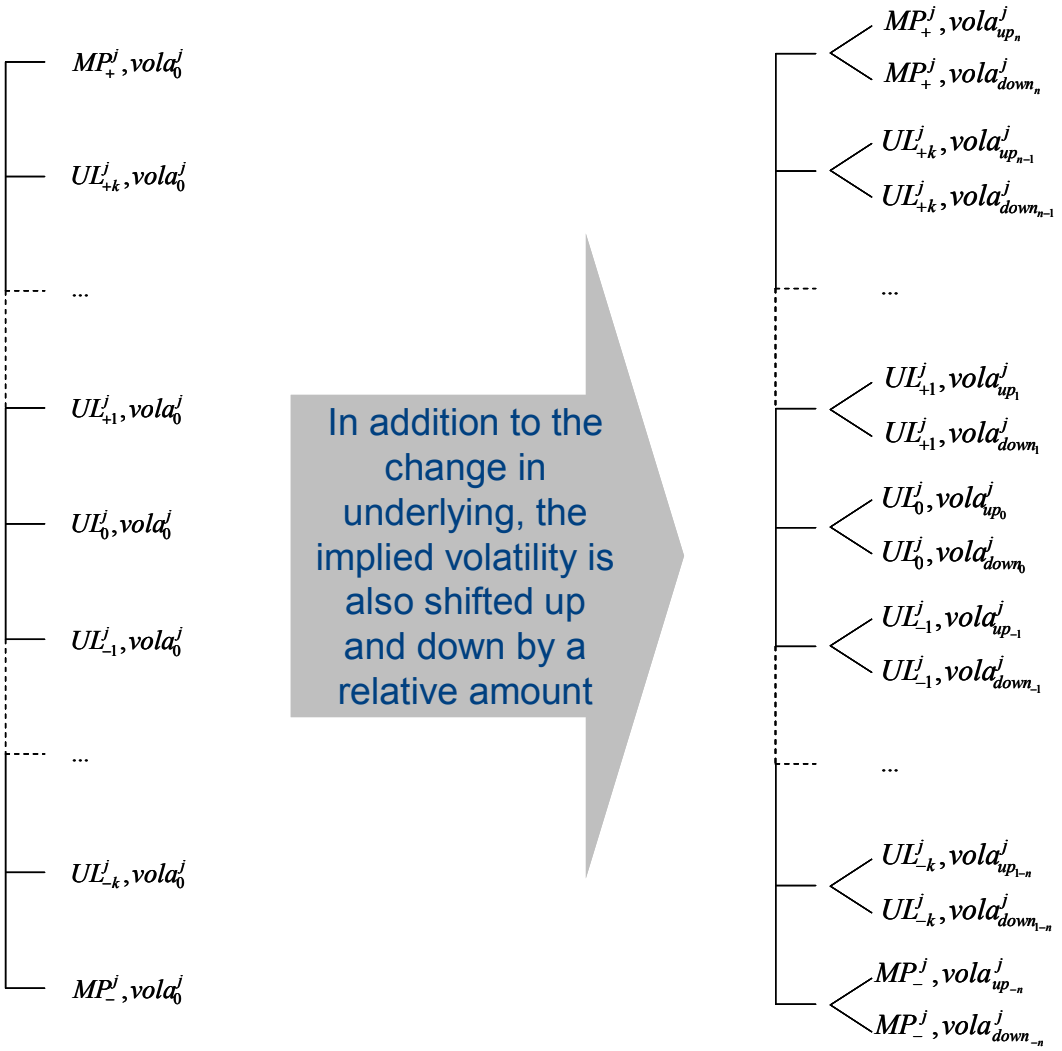
This circular outlines the details of the methodology enhancement and describes the functional concept, the calibration and the operational process.

Changes in Implied Volatility for Risk-Based Margining

Functional Concept

In the current Risk-Based Margining (RBM) system, option prices for different risk scenarios are calculated by using the implied volatility of the corresponding traded series and by different projected underlying prices. The risk emanating from an increase or a decrease in implied volatility (Vega risk) is currently reflected by means of the Short Option Adjustment for out-of-the-money options and in stress-testing scenarios.

With the enhancement to consider the changes in implied volatility, the risk scenarios will calculate two-dimensional scenarios, i.e. simultaneously shifting the underlying price and the implied volatility. Thus, the 99 percent confidence interval will be based on the bivariate history movements of the underlying price and implied volatility.



The enhancement combines moves in the underlying with moves in the implied volatility such that 99 percent of changes in the option value are captured. The following properties of the effect of changes in implied volatility on the option price are modelled and calibrated:

- The implied volatility of an option changes as the underlying moves since the moneyness of the series changes and options with different moneyness exhibit different implied volatilities according to a volatility smile observable from market prices.
- The dependency structure between implied volatility and underlying movements is considered. In particular it should be noted that implied volatility tends to go up if the underlying price falls.

- Additionally, the Vega risk depends on the moneyness and time to expiration of the option since Vega is higher at-the-money and increases as the option approaches expiration.

The enhancement will therefore enable more accurate margin calculations for volatility-based strategies, which only have a minor delta exposure. The margin amount will differ compared to the existing RBM methodology depending on the portfolio structure.

Calibration

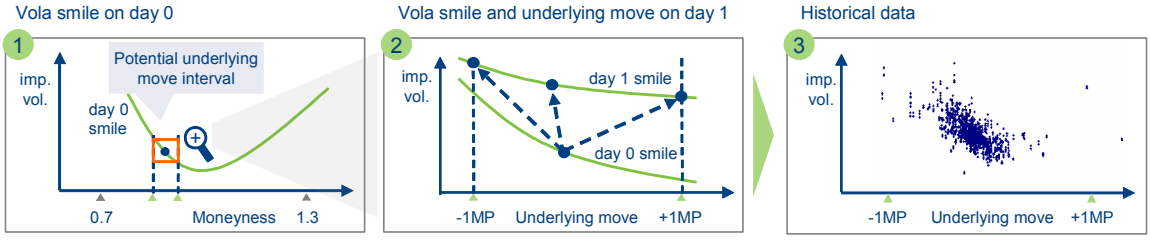
The objective of calibration is to derive a comprehensive set of parameters based on the observed historical data and enable the adequate combination of volatility moves and underlying moves into RBM.

The calibration inputs are taken from the long and comprehensive history of option data Eurex Clearing has in its own production database. It contains all option series providing information on date, expiration date, underlying price, strike price, option price, call/put flag, implied volatility and moneyness factor.

The general idea of calibration is to analyze the sub-groups of options sharing the following characteristics:

- same margin class
- similar moneyness
- similar time to expiration

The figure below depicts the general calibration idea:



Starting on day 0 from a given point on a smile curve …

.. implied volatility changes on day 1 due to two factors: underlying move and move of the smile itself

Historical data for volatility and underlying price moves (within buckets defined by initial moneyness and time to expiration) provide data points for calibration

Several steps are conducted to derive the data points relevant for further thorough analysis:

- From the historical data we select the options with the same margin class, similar moneyness and time to expiration.
  Example: The moneyness in question is between 0.9 and 0.95. A resulting set contains, amongst other things, option 1 with strike 200 on date X and option 2 with strike 160 on date Y, if the underlying price was 180 on day X and 147 on day Y.
- Starting on day 0 from a given point on the smile curve we observe that the implied volatility changes within one day (see picture 1 and 2). Day 0 and day 1 may be different for different options, but their times to expiration fall into the same buckets.
  Example: X in the previous example is March 11, 2010, Y is January 9, 2010. Expiration dates are August 2010 and June 2010, respectively, so that both dates fall into the same expiration bucket.

The resulting data points for volatility moves and underlying price moves provide data points used in the calibration (see picture 3).

Operational Process

Due to the tight introduction timeline defined by discussions with the supervisory authorities, the enhancement will be introduced outside the regular release schedule. To minimize direct Member and vendor impact with respect to changes of existing EOD (end-of-day) and intra-day reports layouts, files and messages, the changed exposure will be included in the existing processes as follows:

The existing intra-day and end-of-day processing remain unchanged, i.e. all Members receive their reports (e.g. CC050, CC055, CC060, CD042) without the inclusion of the enhancement.

Overnight Eurex Clearing will calculate the changed margin amount including the volatility shift scenarios. By this means the potential additional exposure due to the Vega risk is determined. The calculation results will be made available to the Members, i.e. all Clearing Members receive margin reports (CV050, CV055, CV060, CV042), that are structured exactly the same as the regular EOD reports (CC050, CC055, CC060, CD042), but contain the margin figures as determined by Risk-Based Margining including the changes in the implied volatility.

Until 10:00 CET on the next business day, Eurex Clearing will aggregate the potential additional exposure of the CM accounts and all NCMs to one sum and charge this total sum to a new margin class called ”VEGA1” on the Clearing Member’s P-account. Thereby, the exposure of the margin class ”VEGA1” is adjusted only once a day. From the time the margin class ”VEGA1” is updated, updated numbers are reflected in the following intra-day and end-of day calculations.

The detailed reports CV050, CV055, CV060, CV042 enable Members to break down the additional exposure to the respective Member, account and margin class.

Eurex Clearing will distribute the above-mentioned implied volatility shift-based reports (CV050, CV055, CV060, CV042) as of Tuesday, April 6, 2010. As of Tuesday, April 27, 2010, Eurex Clearing will charge the aggregated additional exposure to the Clearing Member’s P-account via the margin class ‘VEGA1’.

If you have any questions, please contact Market Supervision, Risk Operations at tel. +49-69-211-1 24 52.

Frankfurt, March 31, 2010