EQUITIES & EQUITY DERIVATIVES RISK ENGINE

Mark-to-market/Variation Margins

Methodological notes

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1 Introduction

This document describes the methodology for computing the *Mark-to-market/Variation Margins* for the Clearing Members with outstanding positions at the evaluation date on the *Equities/Equity Derivatives* Section.

Methodologically speaking, these *Mark-to-market/Variation Margins* do not vary with respect to current, production methodology.

In particular, all positions are assigned to the *cash*, *futures* and *option* categories according to their particular contractual features. Each of the aforementioned categories implies the adoption of a different calculation methodology of the *Mark-to-market/Variation Margins*, in order to take into due consideration the specific riskiness associated with it.

The *Mark-to-market Margins* for the small portion of bonds cleared in the *Equities/Equity Derivatives* asset class on the Euronext cash legacy market is computed following the same methodology applied to *cash* instruments.

The calculation methodology of the *Mark-to-market/Variation Margins* applies to all types of securities subject to margining.

The following sections describe in detail the calculation methodologies of the *Mark-to-market/Variation Margins* for each of the categories described above.

Position netting

Position netting is allowed between short and long positions on the same financial instrument (cash or derivative) having the same exact characteristics, including denomination currency. Position netting on the same financial instrument is allowed also if traded on different markets. In that case, risk factor data of the 'reference' (i.e. main) market are taken into account for margin calculation purposes.

2 *Cash* positions – *Mark-to-market Margins*

Cash mark-to-market margining include:

- Stocks;
- Exchange Traded Products ETPs (ETFs/ETNs/ETCs);
- Closed-end and open-end funds;
- Certificates;
- Warrants;
- Rights issues.

Mark-to-market Margins aim at revaluating the theoretical liquidation cost of the *cash* positions at current market value. In particular, *Mark-to-Market Margins* cover the change in value of the security from the agreed upon purchase price to the end of day market price (i.e. it covers a gain/loss that has already been observed). It is calculated according to the following formula:

1) $Mark\_to\_market\_Margins = CMV\_amount - DVP\_amount$,

where:

the *DVP amount* represents the Delivery Versus Payment amount, i.e. the cash amount to be paid/collected in the system, and is calculated as

2) $DVP\_amount = Trade\_price * Net\_positions * Multiplier$;

the *CMV amount* represents the Current Market Value amount, i.e. the securities value at current market prices, and is calculated as

3) $CMV\_amount = Close\_price * Net\_positions * Multiplier$;
4) $Net\_positions = Short\_contract\_quantity * Long\_contract\_quantity$;

Multiplier is the number of shares underlying a certain contract.

Here and in the following the convention of subtracting long positions from short positions (S – L) is aimed at expressing margin debts as positive quantities and margin credits as negative quantities.

3 *Futures* positions

Futures mark-to-market and variation margining include:

- Stock *futures*;
- Stock index *futures*;
- Stock index *total return futures*;
- Stock *dividend futures*;
- Stock index *dividend futures*.

3.1 Mark-to-market Margins

Mark-to-Market Margins are calculated for physically delivered *futures* that have expired but have not settled yet, in order to evaluate their theoretical liquidation gain/loss at current market prices. It is calculated according to the following formula:

5) $Mark\_to\_market\_Margins = (Underlying\_close\_price - Futures\_delivery\_price) * Net\_positions * Multiplier$,

where:

6) $Net\_positions = Short\_contract\_quantity - Long\_contract\_quantity$.

3.2 Variation Margins

Futures positions are subject to daily mark-to-market in the time span between the trading date and the expiration date (included), through the payment/receipt of the differential between the daily settlement price of the current day and the trade price for open positions arising from the trading activity of that same day, and the daily settlement price of the current day and the daily settlement price of the previous business day for open positions arising from previous days' activity. These margins are called *Variation Margins*:

7) $Variation\_Margins = (Futures\_close\_price - Futures\_trade\_price) * Net\_positions * Multiplier$

for positions arising from the trading activity of that same day, or

8) $Variation\_Margins = (Futures\_close\_price - Previous\_futures\_close\_price) * Net\_positions * Multiplier$

for positions arising from previous days' activity,

where:

9) $Net\_positions = Short\_contract\_quantity - Long\_contract\_quantity$.

4 *Option* positions – *Mark-to-market (Premium) Margins*

Option mark-to-market margining include:

- Stock *options* (European and American);
- ETF *options* (American);
- Stock index *options* (European).

The *Mark-to-market Margins* for *option* positions are called *Premium Margins* and cover the cost of liquidating *options* at current market prices.

Premium Margins are a credit for the holder of the long position as they represent the proceeds from selling the long position if it were liquidated at the current market price. On the other hand they are a debit or requirement for the holder of the short position as they represent the cost to buy back the short position if, likewise, it were to be liquidated at the current market price.

Premium Margins are calculated differently for open *option* positions and exercised and assigned *option* positions. The resulting amounts are then summed algebraically and the final outcome can be a debit or a credit.

4.1 Open positions

For each open *option* series in the portfolio the *Premium Margins* are calculated as follows:

10) $Premium\_Margins = Option\_close\_price * Net\_positions * Multiplier$,

where:

11) $Net\_positions = Short\_contract\_quantity - Long\_contract\_quantity$.

4.2 Exercised/assigned positions

For exercised/assigned *option* series in the portfolio the *Premium Margins* are calculated as follows:

12) $Premium\_Margins = In\_the\_money\_amount * Net\_positions * Multiplier$,

where:

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13) $Net\_positions = Assigned\_contract\_quantity -$
    $Exercised\_contract\_quantity^{1},$
14) $In\_the\_money\_amount\_call = Underlying\_close\_price - Strike\_price,$
15) $In\_the\_money\_amount\_put = Strike\_price - Underlying\_close\_price.$

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[1] *Premium Margins* are a credit for the holder of an exercised position (assuming it is in-the-money) as they represent the profit which would derive from buying/selling the underlying at the exercise price and selling/buying it at the current market price. *Premium Margins* are a debit or requirement for the holder of an assigned position (always assuming it is in-the-money) as they represent the loss which would occur if the underlying were to be bought/sold at the current market price and sold/bought at the exercise price.

5   FX conversion

All *Mark-to-market/Variation/Premium Margins* calculated this way are expressed in product (i.e. denomination, trading) currency.

The conversion to the relevant clearing currency(ies) is performed employing the current appropriate FX rate(s).

6   Aggregation

While *Variation Margins* on *futures*, as above mentioned, are daily marked-to-market and liquidated to Clearing Members, thus representing a separate margin component, other *Mark-to-market* and *Premium Margins* items can be aggregated to form a total *Mark-to-market Margins* of:

16) $Total\_Mark\_to\_market\_Margins = Cash\_Mark\_to\_market\_Margins + Expired\_unsettled\_futures\_Mark\_to\_market\_Margins + Option\_Premium\_Margins.$