

EQUITIES & EQUITY DERIVATIVES RISK ENGINE

Model parameters

Methodological notes

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1 Summary

The present document describes the set of parameters used for computing both *Initial Margins* and *Decorrelation risk add-on*.

The CCP reserves the faculty to review the parameters' values periodically and/or whenever deemed appropriate.

2 Clearing currency

Margins can be paid in EUR currency only.

3 Initial Margins

The following table summarizes the main parameters/assumptions that will be employed for *Initial Margins* calculation purposes:

Table 1: *Initial Margins* parameters/assumptions

| Risk measure | <i>Historical simulation Expected Shortfall (Ordinary/ Stressed)</i> |
|---|--|
| Weights applied to Ordinary and Stressed ES | <i>Ordinary ES: 75% Stressed ES: 25%</i> |
| Holding period | <i>2 business days</i> |
| Confidence level | <i>99.5%</i> |
| Lookback period | <i>Ordinary ES: 5 years, rolling, most recent Stressed ES: stressed periods, non-rolling (e.g. EU sovereign debts crisis, Brexit, Covid-19, Russia-Ukrainian war, ...)¹</i> |
| Tail approach | <i>Single tail</i> |
| Weighting of tail events | <i>Equal weighting</i> |
| Scaling window (seed volatility calculation) | <i>60 days (Ordinary ES only)</i> |
| λ | <i>98% (Ordinary ES only)</i> |
| Portfolio margining | <i>Applied</i> |

Further details on the above table are provided below.

¹ A stress period is identified by expert judgement and in line with internal anti-procyclicality (hereinafter APC) policy. Should a new stress period begin, it would (potentially) be included (also) among the non-rolling stressed periods once the impacted markets get back to calm, in order to avoid any further pro-cyclical behaviour of the margin model (i.e. avoid any increase in the *Stressed Expected Shortfall* during this stress period).

3.1 Risk measure

The chosen risk measure is the *historical simulation Expected Shortfall (ES)*. The Expected Shortfall (also called Conditional-VaR – C-VaR) risk measure, given a P&L distribution, represents the average of the tail events of the distribution. By definition, it is a coherent and more conservative risk measure with respect to Value at Risk (VaR), which instead represents the quantile of the distribution beyond which one can find the tail.

The historical simulation modelling approach is a standard, fairly simple market practice which allows to infer risk factor volatility and correlation from past dates, including relevant market stress events. This allows to avoid assuming any distributional forms (and parameters) for risk factor returns.

3.2 Weights applied to Ordinary and Stressed ES

Initial Margins are a combination of *Ordinary* and *Stressed* components.

This allows the CCP to comply with the European APC regulation, in particular with ESMA RTS 153/2013. The reference APC tool is the art. 28(1)(b) tool, i.e. 25% weight to stressed observations in the *lookback period*. The weights applied to the *Ordinary* and *Stressed* components are indeed 75% and 25%, respectively. The CCP may potentially alter these weights during stressed market periods, in order to contrast procyclicality. The choice of the tool has been made considering the peculiarities of the cleared financial markets and products. In particular, the main drivers of the choice are the large number and the various characteristics of the underlying risk factors. Every product has its own underlying price/value risk factor and *option* products also have underlying (implied) volatility risk factors, therefore the amount of historical data needed is non-negligible (this is particularly true for volatility data). Very old historical data also pose a concern under availability and quality (thus, robustness) points of view. Furthermore, underlyings don't share the listing time, therefore the historical depth of data is quite fragmented. This contrasts with the need for a fixed *lookback period*: the longer the *lookback period* is, the more frequently some proxying will be required. Finally, increasing the length of the *lookback period* also implies increasing the computational burden linked to the full revaluation of American-exercise style *options*.

For all these reasons, employing a very long *lookback period* (as required e.g. by art. 28(1)(c) tool – 10 years) does not seem to fit well the Equities/Equity derivatives market peculiarities. Art. 28(1)(b) tool (with a *lookback period* shorter than 10 years – see item 3.5 below) instead seems to fit them better, being it also easy to implement and maintain (also with regards to the *stressed events* for the *Stressed* component calculation).

3.3 Holding period

The *holding period* is equal to 2 *business days* for both *Ordinary* and *Stressed Initial Margins* calculation purposes. This means that only the 2-*business day* returns are considered.

3.4 Confidence level

The *confidence level* is equal to 99.5% for both *Ordinary* and *Stressed Initial Margins* calculation purposes and has been duly calibrated via portfolio back-testing.

3.5 Lookback period

The *lookback period* employed for *Ordinary Initial Margins* calculation purposes is equal to 5 *years, rolling, most recent*. Please also refer to item 3.2 above for some insights on the choice.

Stressed events which are relevant for the cleared markets form the *lookback period* for *Stressed Initial Margins* calculation purposes. These events include e.g. EU sovereign debts crisis, Brexit, Covid-19, Russian-Ukrainian war, A new stressed period is (potentially) incorporated in the *Stressed Initial Margins lookback period* once it has passed in order to avoid a potential increase in the *Stressed Initial Margins* risk measure during stressed market circumstances, thus avoiding any procyclical effects. The calculation of the *Stressed Initial Margins* allows the CCP, on one hand, to mitigate procyclicality and, on the other hand, to ensure that significant stressed events are always considered in the historical data employed to compute the *Initial Margins*.

3.6 Tail approach

The *single tail* approach adopted for both *Ordinary* and *Stressed Initial Margins* calculation purposes implies that only the loss tail of a P&L distribution is considered to compute the risk measure. Therefore only actual values of losses are taken into account, as opposed to absolute values of both gains and losses of the double tail approach.

The approach allows to reflect into the called margins the actual composition (i.e. exposure, historically-gauged) of the portfolios of the Clearing Members.

3.7 Weighting of tail events

Events in the tail for both *Ordinary* and *Stressed Initial Margins* calculation purposes are *equally-weighted*.

3.8 Scaling window (seed volatility calculation), λ

The filtering (scaling) of the historical simulation allows to take into account the volatility clustering phenomenon that characterizes historical data, this way reflecting into the called margins the current volatility regime.

Scaling of risk factors (returns) is applied for *Ordinary Initial Margins* calculation purposes only. For a given risk factor (time series of returns) a seed volatility must be computed. This volatility is computed on a time window (*scaling window*) of *60 business days*. The λ parameter of 98% is the result of a calibration aimed at reaching a balance between model reactivity to market volatility and anti-procyclical behaviour. The *Stressed Initial Margins* are not affected by the scaling of the risk factors (returns), in line with APC guidelines.

3.9 Portfolio margining

Portfolio margining of cash and derivative products sharing the underlying is *allowed*, as under current production model.

This is compliant with EU RTS 153/2013 art. 27 requirement on ‘Portfolio margining’, which states that the instruments must have their price risk significantly and reliably correlated/dependent. Clearly, this is the case of a cash instrument and the derivatives on it, as the main risk factor of the latter is by far the underlying value (it suffices to look at theoretical pricing formulas). This is also supported by ESMA opinion on ‘Portfolio margining’ (ESMA70-708036281-18, 04/2017), section 3.2 (‘Situations where the CCP may apply more than 80% of margin reduction’) item 39.

The option of separate margining is made available to the Clearing Members though, upon request. In this latter case, it is worth noting that since the Expected Shortfall is a coherent risk measure the sub-additivity property is always respected. Consequently, diversification always represents a benefit for the Clearing Member in terms of margins calls.

Portfolio margining also concerns different cash products/underlyings. The historical simulation approach, as the name suggests, plunges its roots in the historical correlations between instruments (together with the historical volatilities of the instruments). Therefore, the possibility and the extent of margin reductions deriving from portfolio margining are a direct function of the historically witnessed correlations (over the *lookback period*, which includes stressed scenarios) the art. 27 mentions.

In any case and again in line with the art. 27, the (potential) margin reductions coming from margining different cash products/underlyings together as a portfolio are capped at the *Decorrelation risk add-on* percentage of the difference between ‘undiversified’ and ‘diversified’

risk measures. The *Decorrelation risk add-on* indeed tackles the potential break in historical correlations at cash product/underlying level.

4 **Margin add-ons**

Below is the description of the parameters/assumptions employed for the computation of the *Decorrelation risk add-on*.

4.1 **Decorrelation risk**

The 80% percentage is applied in compliance with EU RTS 153/2013 art. 27 requirement on 'Portfolio margining'.