EURONEXT CLEARING

COMMODITY DERIVATIVES RISK ENGINE

Model parameters

Methodological notes

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1 What's new

REVISION NO./ VERSION NO.	DATE	CHANGE DESCRIPTION
1.0	29/02/2024	Document submitted for approval to Regulatory Authorities

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:

Risk measure	*Historical simulation Expected Shortfall (Ordinary/Stressed)*
Weights applied to Ordinary and Stressed ES	*Ordinary ES: 75%* *Stressed ES: 25%*
Holding period	*2 business days*
Confidence level	*99.5%*
Lookback period	*Ordinary ES: 5 years, rolling, most recent* *Stressed ES: stressed periods, non-rolling (e.g. Russian-Ukrainan war)*[1]
Tail approach	*Single tail*
Weighting of tail events	*Equal weighting*
Scaling window (seed volatility calculation)	*60 days* *(Ordinary ES only)*
λ	*98%* *(Ordinary ES only)*
Portfolio margining	*Applied (except for farmed salmon)*

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) guidelines. 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 procyclical 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 represented by 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 in line with margining of equities and equity derivatives and considering the peculiarities of the cleared market and products. In particular, the main drivers of the choice are the various characteristics of the underlying risk factors. Every product has its own price 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 necessarily share the listing time, therefore the historical depth of data may be 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.

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 commodity 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, in line with default management process assumptions.

3.4 *Confidence level*

The *confidence level* is equal to *99.5%* for both *Ordinary* and *Stressed Initial Margins* calculation purposes, in line with CCP risk appetite.

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. Russian-Ukrainan war and are identified based on quantitative analyses on the volatility of the model risk factors, with a focus on those which mostly drive the margins on Clearing Members' portfolios. A periodical review of the set of is performed, and the set is potentially integrated/updated. An update is also possible when deemed necessary, e.g. when a new relevant market stress arises. 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) and 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 concerning different underlying commodities is *allowed*, apart from farmed salmon, which forms a segregated product group.

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 EU RTS 153/2013 art. 27 on 'Portfolio margining' mentions.

In any case and again in line with the abovementioned art. 27, the (potential) margin reductions coming from margining different 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 underlying level.

3.10 *Other parameters*

3.10.1 Unexpired physical delivery futures: (T-t) difference boundary for the allocation to the proper sub-portfolio

SUB
HP

with:

- *T*: expiry date;
- *t*: margin date;
- *HP*: model *Holding Period*.

3.10.2 Futures price return computation framework

Product category code	Underlying product category code	Underlying product currency	*Futures* price return computation framework
EBM	EBM	EUR	Relative
OBM			
ECO	ECO	EUR	Relative
OCO			
EMA	EMA	EUR	Relative
OMA			
EDW		EUR	Relative
ESF		EUR	Relative
BCS		EUR	Absolute
BKS		EUR	Absolute
BMS		EUR	Absolute

3.10.3 Futures prices: benchmark pairing for missing data handling

Product category code	Underlying product category code	Underlying product currency	Benchmark	Benchmark product currency
EBM	EBM	EUR	EBM expiry1 *nearby* (i.e. front month)	EUR
OBM				
ECO	ECO	EUR	ECO expiry1 *nearby* (i.e. front month)	EUR
OCO				
EMA	EMA	EUR	EMA expiry1 *nearby* (i.e. front month)	EUR
OMA				
EDW		EUR	EDW expiry1 *nearby* (i.e. front month)	EUR

		(EBM expiry1 *nearby* until EDW expiry1 *nearby* is usable)	
ESF	EUR	ESF expiry1 *nearby* (i.e. front month)	EUR
BCS	EUR	BCS expiry1 *nearby* (i.e. front month)	EUR
BKS	EUR	BKS expiry1 *nearby* (i.e. front month)	EUR
BMS	EUR	BMS expiry1 *nearby* (i.e. front month)	EUR

3.10.4 Option pricing framework

Product category code	Underlying product category code	Underlying product currency	Pricing framework
OBM	EBM	EUR	Regular prices
OCO	ECO	EUR	Regular prices
OMA	EMA	EUR	Regular prices

The employed root finding algorithm is the Newton-Rhapson method, with an initial guess equal to the *option* strike price and a tolerance of 0.00001.

The risk-free rate is replaced by 0.000001 whenever equal or less than 0.

3.10.5 Option implied volatilities: benchmark pairing for missing data handling

Product category code	Underlying product category code	Underlying product currency	Benchmark	Benchmark product currency
OBM	EBM	EUR	OBM expiry2 *nearby*	EUR
OCO	ECO	EUR	OCO expiry2 *nearby*	EUR
OMA	EMA	EUR	OMA expiry2 *nearby*	EUR

3.10.6 Physical delivery margins – Holding period (HPpd)

Underlying product category code	Underlying product currency	***HPpd***
EBM	EUR	*12 business days*
ECO	EUR	*27 business days*
EMA	EUR	*12 business days*

3.10.7 Physical delivery margins – Extra percentage

Underlying product category code	Underlying product currency	*extra_percentage*
EBM	EUR	10%
ECO	EUR	10%
EMA	EUR	10%

3.10.8 Physical delivery margins – Margin percentage

Underlying product category code	Underlying product code	Position sign	*margin_percentage*
EBM	EUR	+ (i.e. long)	100%
ECO	EUR	+ (i.e. long)	0%
EMA	EUR	+ (i.e. long)	100%
EBM	EUR	- (i.e. short)	60%
ECO	EUR	- (i.e. short)	0%
EMA	EUR	- (i.e. short)	60%

3.10.9 Physical delivery margins – Fee percentage

Underlying product category code	Underlying product currency	*fee_percentage*
EBM	EUR	0%
ECO	EUR	0%
EMA	EUR	0%

4 Margin add-ons

Below is the description of the parameters/assumptions employed for the computation of the margin add-ons.

4.1 *Decorrelation risk*

4.1.1 Decorrelation percentage

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

4.1.2 Decorrelation sub-portfolios

Product category code	Underlying product category code	'Decorrelation sub-portfolio'
EBM	EBM	EBM
OBM		
ECO	ECO	ECO
OCO		
EMA	EMA	EMA
OMA		
EDW		EDW
ESF		ESF
BCS		BCS
BKS		BKS
BMS		BMS