Default Fund and Stress Testing

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<u>Default Fund</u>

Regulatory requirements outline the framework and governance for the Default Fund; the need to cover '*extreme but plausible'* market conditions.

<u>Stress Testing</u>

Regulatory requirements outline the need for stress testing to '*…reflect the risk profile of the CCP…'* and identify '*…the market risks to which the CCP would be exposed following the default of one or more clearing members, including unfavourable movements in the market price…reduced market liquidity…and declines in the liquidation value of collateral'*

Regulatory requirements detail the CCP should '*…specify extreme but plausible market conditions based on at least: (a) a range of historical scenarios, including periods of extreme market movements observed over the past 30 years…(b) a range of potential future scenarios…'*

Regulatory requirements also include the need to conduct reverse stress testing into '*…extreme market conditions that go beyond what are considered plausible market conditions…'*

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Stress Testing Approach – Historic

LME Clear have taken at least 30 years of historic price data

- Key stressed periods identified, e.g. Lehmans, New Orleans zinc, Sumitomo, Euro crisis, Tin Crisis, US Sanctions 2018, Nickel 2022

- Days that show extreme move for any metal within stress periods used as a basis for stress test scenarios that cover the worst case of 1 and 2 day price moves. Price history covering all metals on that day captured including option volatilities.

- Over 450 scenarios captured.

- Key largest shifts for 3M tenor:

Contract	Contract Code	Max Stress Shift up	Max Stress Shift down
Aluminium HG	AH	15.87%	-14.43%
Copper	CA	18.80%	-15.90%
Nickel	NI	78.75%	-26.03%
Lead	PB	22.90%	-17.70%
Tin	SN	25.40%	-19.67%
Zinc	ZS	19.05%	-17.20%

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Stress Testing Approach – Hypothetical

- Covers potential extreme outright and spread returns based on historic observations

- Scenarios which cover all metals moving up or down

- De-correlation scenarios

- Stress inter-commodity spreads and inter contract correlations

- Event scenarios such as pandemic, sanctions, low stocks

Quantitative Approach for hypothetical scenarios

- The approach looks for the extreme and plausible scenarios from a portfolio perspective at a set confidence level that is "extreme" enough while still being "plausible" by basing the calculation on historically observed volatility and interdependencies, as well as hypothetical de-correlation matrices.

- Extreme: 99.95% confidence interval is selected which is much higher than LMEC's Initial Margin confidence interval at the portfolio level (99.5%).

- Plausible: The approach incorporates the most up-to-date market volatility, correlation behaviour (based on 10y+ historical data) and member portfolios into the scenario creation on a monthly calibration cycle. De-correlation scenarios are also generated by using hypothetical de-correlation matrices.

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Stress Testing Approach – Collateral

- All collateral positions are stressed using historically and hypothetically created scenarios based on data from the same dates as for historic cleared position stresses.

- Additional stresses for collateral specific events are also added with relevant cleared product data.

Stress Testing Approach – Frequency

- The historical and hypothetical stress testing are undertaken on a daily basis across all scenarios and Member portfolios.

- There is also a monthly review of scenarios and recent market data to consider the creation of new scenarios.

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Default Find Sizing

- The LME Clear Default Fund (DF) will be sized based upon the two largest Clearing Members and their stress testing losses across hypothetical and historical scenarios under the assumption that all clients positions would fail to port.

- The calculations will use stress testing results over the previous three months.

- An additional buffer of 10% of the calculated DF value will be added to ensure the fund remains regulatory compliant between recalculation points.

- A minimum DF size is based on a percentage of total Initial Margin over the previous six months. The DF lower limit is currently set to 10%, which will be reviewed annually.

- The DF size has an upper limit, based on a percentage of total Initial Margin over the previous six months, which is currently set to 14%. The DF upper limit will be reviewed annually.

- There is also a limit by which the Default Fund size can decrease on the monthly re-set, currently set to 10%.

- Recalculation of the DF is performed as standard on a monthly basis, on the first business day of each month. Intra-month re-sets may be performed in the event that internal triggers are breached and Clearing Members would be informed in advance if an intra-month re-set was required.

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Member Contribution Process

- Contributions are allocated based upon relative member total initial margins (across all accounts) for end-of-day and 2pm intra day from the previous month, subject to a minimum contribution of $1m.

- Contributions are payable in USD cash only.

- Payment changes are collected/redeemed via SPS on the following business day.