

Margining

Margin Methodology

Margin Overview

There are two main elements to the overall margin liability

Initial Margin

- “For the Clearing House to be holding sufficient funds on behalf of each Clearing Member to offset any losses incurred between the last payment of margin and the close-out of the Clearing Member’s positions should that Clearing Member default”

Variation Margin

- “The valuation calculation of a transaction or position is a mark-to-market calculation and is used to determine the profit or loss (“P&L”) or asset value of that transaction or position. In the case of positions the change in that asset value from one pricing point to another is variation margin (“VM”)”

Initial and variation margin is calculated on a daily basis, both end-of-day and intra-day. At any point a Clearing Member will need to ensure they have sufficient collateral at LME Clear to cover their overall margin requirement.

Margin Methodology

Margin Algorithm

- LME Clear uses Standard Portfolio Analysis of Risk (SPAN)
 - “SPAN” is a registered trademark of Chicago Mercantile Exchange Inc., used herein under license. Chicago Mercantile Exchange Inc. assumes no liability in connection with the use of SPAN by any person or entity.
- LME Clear SPAN implementation uses 16 scenarios to calculate loss values (Risk Arrays).
- LME Clear has the ability to calculate loss values on an extended number of scenarios. For example where the SPAN implementation uses the 1/3, 2/3 and 3/3 scenarios LME Clear can revalue Members portfolios on a more granular level of scenarios, for example every 1/10. This will be used in certain situations on specific portfolios, in consultation with the Clearing Member.
- LME Clear has the ability to set tiered Scanning Ranges, Volatility Shifts and Inter-prompt Spread charges.

Margin Methodology

SPAN Margin Parameters

- All SPAN margin parameters, except inter-prompt spreads, are calculated using a historical VaR calculation based on a 2 and 10 year look-back periods. The final parameter is the worst case across the 2 and 10 year calculations.
- The 10 year calculation is specifically utilised in order to manage procyclicality.
- Scanning Ranges use absolute price returns. LME Clear monitors the scanning range calculated on a relative return basis, especially where there are fundamental market changes and amendments can be made on a per contract basis where deemed appropriate.
- Inter-prompt spreads and inter-contract credits also use absolute returns. Volatility shifts use relative returns.
- To determine the overall margin parameter the risk factors at multiple points along the maturity curve are assessed to identify the risk factor with the greatest volatility and therefore the largest parameter.
- Margin parameters are calculated using a 2 day liquidation period and 99% confidence interval. To ensure that all market scenarios are captured in the analysis overlapping returns are used.

Margin Methodology

Inter-prompt spread charge methodology

- The methodology incorporates the relationship between spread level and forward volatility. It reflects the analysis which identified the level of volatility in the market being largely dependent on whether the market is in contango or backwardation.
- The existing 2yr look-back calculation using historical simulation remains.
- The 10yr look-back method to manage procyclicality is replaced by a stress calculation using Expected Tail Loss (ETL). ETL essentially averages the largest 1% of historical spread movements.
- A forward look at the level of volatility is compared to the level against the historical maximum and minimum, over a certain period, for each risk factor combination.
- Where volatility is low, in periods of contango, a smaller percentage of the stress ETL calculation is utilised, floored at 25% in accordance to regulatory requirements.
- Where volatility increases, as the curve moves into backwardation, an increased percentage of the stress ETL is used. Once the level of backwardation reaches the maximum historical volatility then 100% of the stress ETL is used.
- The look-back period will range from 5 years to 10 years and different periods may be implemented across contracts and the forward curve for a single underlying.

Margin Methodology

SPAN Margin Parameter changes

- Margin parameters are reviewed on a monthly basis. Changes can be made intra-month on an ad-hoc basis as required.
- All margin parameter proposals will be notified to the internal Clearing Risk Committee, which will require a full explanation where any parameters deviate from the methodology. The Risk Committee will then be informed where these exceptions were approved for implementation.
- Clearing Members will be notified in advance of any parameter changes.
- LME Clear has a secondary SPAN calculation. These parameters will be updated when the notification of parameter changes is sent. This will allow Members to analysis the impact on their Initial Margin calculation ahead of the implementation.

Margin Methodology

Additional margin

LME Clear calculates several types of additional margin:

- Credit Additional Margin; where a Clearing Member's internal credit score falls below a certain level, additional margin will be charged to cover stress testing losses.
- Concentration Additional Margin; where a Clearing Member (and clients) position is too large for the assumed liquidation period. This is an automatic calculation, refreshed daily.
- Default Fund Additional Margin; where a Clearing Member's stress testing losses are in excess of percentage of the Default Fund an automatic overnight call will be generated to reduce stress testing losses to the defined level.
- Discretionary Additional Margin; where LME Clear is uncomfortable with the risk posed by a Clearing Member or their clients.

Credit and Discretionary Additional Margin will only be charged after discussion with the Clearing Members impacted.

Margin Methodology

Concentration additional margin

- Is used to cover the risk of large positions that in a default would potentially take longer to close out than the two day assumed liquidation period.
- It is automatically calculated at a Member level based on positions in all accounts and refreshed at end-of-day only.
- LME Clear calculates the average traded volume for each contract. For the main contracts this uses the LME Select 3 month volume as a conservative view of the outright traded volume LME Clear would first utilise to reduce the outright position.
- The LME Clear tradable volume uses the average trade volume and then takes into account the increase in traded volume that occurs following a market event and the market depth, which is the estimated share of the daily volume LME Clear could trade.
- If the position is determined to be larger than could be traded in a two day period, i.e. a concentrated position, then a charge is calculated based on the additional scanning range required over the extended period.
- Volume threshold parameters are reviewed and updated at least every month.
- Total concentration additional margin will be subject to a floor of \$1mn.
- Clearing Members can view the volume thresholds and associated charges in the clearing system as well as on the margin parameter circular.

Margin Methodology

Variation Margin types

Product	VM Methodology
LME Traded Forwards	Discounted Contingent Variation Margin - DCVM
LME Traded Average Price Futures	Discounted Contingent Variation Margin - DCVM
LME Cash Futures – (Ferrous, Alumina etc)	Realised Variation Margin - RVM
LME Traded American Options	Net Liquidation Value - NLV
LME Traded Average Price Options, (TAPOs)	Net Liquidation Value - NLV
LMEprecious Futures*	Realised Variation Margin - RVM

**During the delivery period these contracts will be charged Contingent Variation Margin*

Margin Methodology

Variation Margin explanation

VM Methodology	Description
Discounted Contingent Variation Margin - DCVM	Calculated from the change in price between the original transaction execution price and the current market price and discounts the resultant figure from the prompt date to a current value using the current discount factor, of that prompt date.
Realised Variation Margin - RVM	Calculated from the change in price between the trade price or previous closing price and the current closing price. This is then settled on a daily basis.
Net Liquidation Value - NLV	NLV is calculated as the current Present Value of an option position. Long options generate a credit value while short option positions generate a debit value.

Margin Methodology

Total Margin requirement

- At the end of each business day LME Clear calculates a total margin requirement per clearing members account.
- This includes Initial Margin (IM), Additional Margin (AM), Discounted Contingency Variation Margin (DCVM), Net Liquidating Value (NLV) and Settlement Requirement (SR).
- Settlement Requirement results from a liability which is delayed in its settlement, for example JPY cash flows which settle T+1.
- Realised Variation Margin is not included and this settles as a cash flow on a daily basis and so not held as a margin requirement.
- Debit DCVM or NLV increases the total margin requirement.
- Credit DCVM or NLV can be used to offset other forms of margin requirement.

$$\text{Total Margin requirement} = \text{IM} + \text{AM} - \text{DCVM} - \text{NLV} + \text{SR}$$

Intra-day Margining

Intra-day Margin Methodology

Intra-day calculation and thresholds

LMEmercury provides for near real-time calculation of both initial and variation margin. The intra-day margin process is:

- Price snaps run hourly throughout the day
- Risk is calculated in real time on receipt of new trades based on the latest system price
- The updated liability for the portfolio will be compared with available collateral
 - A threshold is set for requesting additional collateral (Limit A) – this will be set at a level to ensure that in normal circumstances a Member will always have sufficient collateral available for LME Clear to accept trades i.e. that the risk on the new trade does not breach the account collateral plus remaining credit tolerance. For example Limit A could be set at 75% of the credit tolerance.
 - A threshold (Limit B) is set at a level to ensure that certain trades will not be accepted which would breach the total available collateral (collateral held plus full credit tolerance). At this point certain new trades will not be accepted until additional collateral is provided or risk reducing trades are received.
- There is a margin run at 2pm, where credit tolerance is temporarily removed. This helps to minimise the possibility of later requests for additional collateral.
- Members can view the latest margin requirement calculation and the percentage of collateral utilised within the clearing GUI. Viewing the clearing system just before 2pm will provide an indication of the size of the margin call.

Intra-day Margin Methodology

Trade registration – Open Offer and Risk checks

- Trades transacted on the Ring and LME Select flow through to LMEmercury without exception via Open Offer.
- Such trades are not subject to an indicative Variation Margin check.
- These trades will still be accepted in LMEmercury even if a member has exceeded its credit tolerance and has an outstanding margin call that has not been settled.
- Trades transacted on other venues, such as inter-office, will be subject to an indicative variation margin check based on the latest system price.
- Where the trade is deemed to be large from a variation margin perspective an automated 'what-if' check will be performed before the trade is novated/registered – risk will be recalculated for the portfolio including the large trade.
- If the resultant liability is below available collateral, including credit tolerance, then the trade will be automatically released and accepted. If not, a request for additional collateral (margin call) will be initiated and once settled the trade accepted.
- Trades not deemed large and passing the variation margin check will be immediately accepted.
- The pre-check has been implemented to optimise the performance of the system whilst still protecting LME Clear from novating/registering trades that would significantly increase the risk profile of the portfolio.

Intra-day Margin Methodology

Intra-day margin calls

- Following an intra-day revaluation, where the liability on a margin account exceeds the available collateral, a margin call will be generated.
- Available collateral will include credit tolerance determined by LME Clear, based on the Clearing Members internal credit score, Default Fund contribution and Initial Margin usage.
- Margin calls are for the full liability increase, i.e. excluding the credit tolerance. This reduces the number of subsequent calls as the full credit tolerance becomes available again.
- Margin calls will not automatically be sent but subject to review.
- Members are notified of a margin call being generated within LMEmercury. LME Clear will then discretionarily provide a window of time to enter risk reducing trades and allow the margin call to be cancelled.
- Where a call is due to a large trade which has subsequently been offset by further trades, LMEC can cancel the margin call.