LCH The Markets' Partner	N°	Title
Instruction	IV.2-5	**MARGINING OF TRIPARTY REPO TRANSACTIONS AND TRANSACTIONS ON DEBT SECURITIES EXECUTED ON TRADING AND MATCHING PLATFORMS AND ON THE MTS ITALY MARKET (CALCULATION METHODOLOGY)**

CHAPITRE 1 SCOPE

Article 1

For the purpose of this Instruction, the term "Variation Margin" covers the notion of negotiation risk.

This Instruction sets out the procedure for the calculation of Margins on Triparty Repo Transactions and Transactions on Debt Securities executed on Trading and Matching Platforms and on MTS Italy.

In the framework of this Instruction, as far as Repos are concerned, the following definitions apply:

- Transactions on Debt Securities executed on Trading and Matching Platforms and on MTS Italy:
    - The buyer of Securities holds the obligation to deliver cash payment on the settlement of the Initial Transaction and the obligation to deliver Securities back on the intended Settlement Date of the Return Transaction.
    - The seller of Securities holds the obligation to deliver Securities on the intended Settlement Date of the Initial Transaction and the obligation to deliver cash back on the settlement of the Return Transaction.
- Triparty Repo Transactions:
    - The Cash Borrower / Collateral Giver holds the obligation to deliver collateralising securities, to pay Triparty Repo Interest and to return the cash borrowed;
    - The Cash Lender / Collateral Taker holds the obligation to pay the cash lent and to return the collateralising securities.

The margining methodology foresees the following types of Margins:

a) Variation Margin, which covers the negotiation risk and is based on a daily (for Special Clearing Members) or three times a day (for Clearing Members other than Special Clearing Members) revaluation of the portfolio to the market; The portfolio considers the trades, the fails and the Securities allocated by a triparty agent in connection with Triparty Repos ("**Triparty Repo Allocation**").

b) Initial Margin, which evaluates the potential loss under the hypothesis of portfolio liquidation. The risk parameters for the VaR Initial Margin calculation are set out in a risk Notice. The Initial Margin is updated three times a day.

c) Additional Margins which are computed as part of the calculation of Margin for each margin run

The provisions of this Instruction do not apply to Special Clearing Members, save for articles 2 and 4).

CHAPITRE 2 MARGINING METHODOLOGY

Section 2.1 Calculation of Variation Margins

Article 2 Common Provisions

The calculation is based on the following steps (detailed calculation formulae are available in the secure area of the LCH SA website):

Retrieval of market prices

In order to revaluate the portfolio, Trade Legs are revaluated on the basis of their current market value at Settlement Prices; such prices are representative of market conditions at the time of calculation.

Elements to be included in calculation of Variation Margins

The following elements will be included in calculation of Variation Margins:

a) For sell and purchase Transactions, all unsettled Trade Legs at the Margin calculation date;

b) For Repos, all unsettled Trade Legs (i.e. all unsettled Initial and Return Transactions);

c) For Triparty Repos, all unsettled Trade Legs (i.e. all unsettled Initial and Return Transactions);

d) Net Fails

e) Triparty Repo Allocations

Calculation of Variation Margin per Trade Leg

The Variation Margin of a given Trade Leg is equal to the discounted difference between the Trade Leg revaluated amount and the traded amount;

Calculation of Variation Margin on Net Fails

$$Variation\ Margin\ Net\ Fails = (remaining\ reevaluated\ amount - remaining\ Net\ Fails\ amount) \times pos\ sign$$

Calculation of Variation Margin on Triparty Repo Allocations

$$Variation\ Margin\ Triparty\ Repo\ Allocations = (reevaluated\ allocated\ Securities\ amount - triparty\ agent\ valuation\ of\ allocated\ Securities) \times pos\ sign$$

Calculation of the overall Variation Margin

The Overall Variation Margin is equal to the sum of all the Variation Margins calculated for each Trade Leg, Net Fail, and Security in Triparty Repo Allocation.

$$Overall\ Variation\ Margin = \sum Variation\ Margins\ per\ Trade\ Leg + \sum Variation\ Margins\ per\ Net\ Fail + \sum Variation\ Margins\ per\ Security\ in\ Triparty\ Allocation$$

Regarding Clearing Members other than Special Clearing Members, a negative Variation Margin results in a debit for the Clearing Member towards LCH SA; a positive Variation Margin results in a theoretical credit for the Clearing Member.

Regarding Special Clearing Members only, the Variation Margin call at "t" is:

$$Variation\ Margin\ Call_t = Overall\ Variation\ Margin_t - Overall\ Variation\ Margin_{t-1}$$

Therefore, regarding Special Clearing Members only, a negative Variation Margin call results in a debit for the Special Clearing Member towards LCH SA; a positive Variation Margin results in a credit for the Special Clearing Member.

Section 2.2 Calculation of Initial Margins

Article 3 Common Provisions

The methodology is based on the following steps (detailed calculation formulae are available in the secure area of the LCH SA website):

General overview of the calculation of Initial Margin

$$IM = IM_{VaR} + IM_{PIMM}$$

VaR means *value at risk*.
PIMM means *parametrical Initial Margin methodology*
IM means Initial Margin

Article 3.1. Selection, evaluation of Trade Legs and classification of Open Positions to be included in VaR Initial Margins calculation:

Selection of elements to be included in the VaR initial Margins

The following elements are taken into account:

a) For sell and purchase Transactions, all unsettled Trade Legs at the margin calculation date;

b) For Repos (including Triparty Repos), all unsettled Trade Legs (all unsettled Initial and Return Transactions).

c) Net fails resulting from sell and purchase Transactions and Repos

d) Triparty Repo Allocations for which the allocated Securities are Fixed Income Securities

General overview of the VaR Initial Margin

The VaR Initial Margin aims at tackling the following risks:

1- Global change in market value of the portfolio (base model)
2- Decorrelation
3- Component between different risk factors (DC)
4- Anti-procyclicality Component (APC)
5- Idiosyncratic risk (the idiosyncratic risk is covered by a dedicated additional Margin).

The final generic formula of the Initial Margin is:

$$IM = Max(IM_{Core}; IM_{Floor})$$

With

$$IM_{Core} = Base_{Model_{Core}} + DC_{Core} + APC_{Core}$$

$$IM_{Floor} = Base_{Model_{Floor}} + DC_{Floor} + APC_{Floor}$$

Base Model of the VaR Initial Margin

The base model is looking at the change in value of the portfolio over the holding period, considering the entire position of the portfolio including all long and short positions; on all risk factors

- The core base model is based on an expected shortfall model
- The floor base model is based on a value at risk (VaR) model

Decorrelation Component of the VaR Initial Margin

The decorrelation component will ensure that the Initial Margin:

- Does not allow more offset than authorized by EMIR article 27
- Does consider any decorrelation event, which would leave LCH SA not necessarily covered in case of new type of decorrelation event

- The core decorrelation component is based on an expected shortfall model
- The floor decorrelation component is based on a VaR model

Anti-procyclicality Component of the VaR Initial Margin

The anti-procyclicality component guarantees compliance with Article 28 of EMIR Regulatory Technical Standards

- The Core APC is based on an expected shortfall model
- The Floor APC is embedded within the floor base model

Idiosyncratic risk

This component tackles the specificity of some ISINs that could embed some risks not precisely captured by the above framework.

Particularly inflation linked bond on all countries (ILB) and Italian floaters will be impacted by such add-on.

Article 3.2 Selection, evaluation of Trade Legs and classification of Open Positions to be included in PIMM Initial Margins calculation:

Selection of elements to be included in the PIMM Initial Margins

The following elements are considered:

Triparty Repo Allocations for which the allocated Securities are not Fixed Income Securities

General overview of the PIMM Initial Margin

The methodology is based on the following steps:

- Identification of allocated Securities which are not Fixed Income Securities
- Initial Margin calculation is processed as described below.

The PIMM Initial Margin covers the expected variation of the collateral value compared to the cash amount given or received.

The PIMM Initial Margin covers Financial Instrument price variations in the case of a sale or purchase of Securities following an Event of Default.

The PIMM Initial Margin calculation is computed per Clearing Member; it is based upon risk classes set by LCH SA with associated variation parameters.

Section 2.3 Calculation of total Margin

Article 4

Total Margins for a given Margin call are equal to the sum of Variation Margins, Initial Margins and additional Margins computed during this Margin calculation session. Should the amount of Variation Margins credit be larger than the amount of Initial Margins and additional Margins (detailed calculation formulae are available on the LCH SA website) debits, the difference is not paid out to the Clearing Member, being just a theoretical credit.

$$TotalMargin_t = Max(Initial\ Margin_t + additional\ Margin_t - Variation\ Margin_t; 0)$$

Total Margins are requested from Clearing Members. The following Margin call processes are applied:

For the first daily Margin call:

All assets posted as Collateral pursuant to Instruction IV.4-1 are revaluated on the basis of real-time prices.

a) If total Margins are larger than the amount of existing revaluated Collateral, Clearing Members are required to deposit the difference;
b) If total Margins are smaller than the amount of existing revaluated Collateral, the excess may be withdrawn by the Clearing Member.

For the two intra-day Margin calls:

All assets posted as Collateral pursuant to Instruction IV.4-1 are revaluated on the basis of real time prices.

a) If total Margins are larger than the amount of existing revaluated Collateral plus the threshold amount (defined in Article 6 below), the Clearing Member is required to deposit the difference.
b) If total Margins are smaller than the amount of existing re-evaluated Collateral plus the threshold amount (defined in Article 6 below), the excess cannot be withdrawn by the Clearing Member.

Section 2.4 Determination of Margins parameters

Article 5

The VaR Initial Margin parameters (holding period, lookback period, and confidence interval) that apply to the different expected shortfall / VaR components described above are defined in a Notice.

The parameters used in the VaR Initial Margin calculation procedure will be periodically revised and, if deemed necessary, updated in order to take into account market conditions, volatility trends and the evolution of Financial Instruments.

Section 2.5 Thresholds parameters calculation methodology

Article 6

The thresholds' parameters are defined and assessed by LCH SA at a regular frequency as for any other parameters.

The threshold's parameters are set out in the Notice dedicated to Margins parameters.