

Risk Disclosure

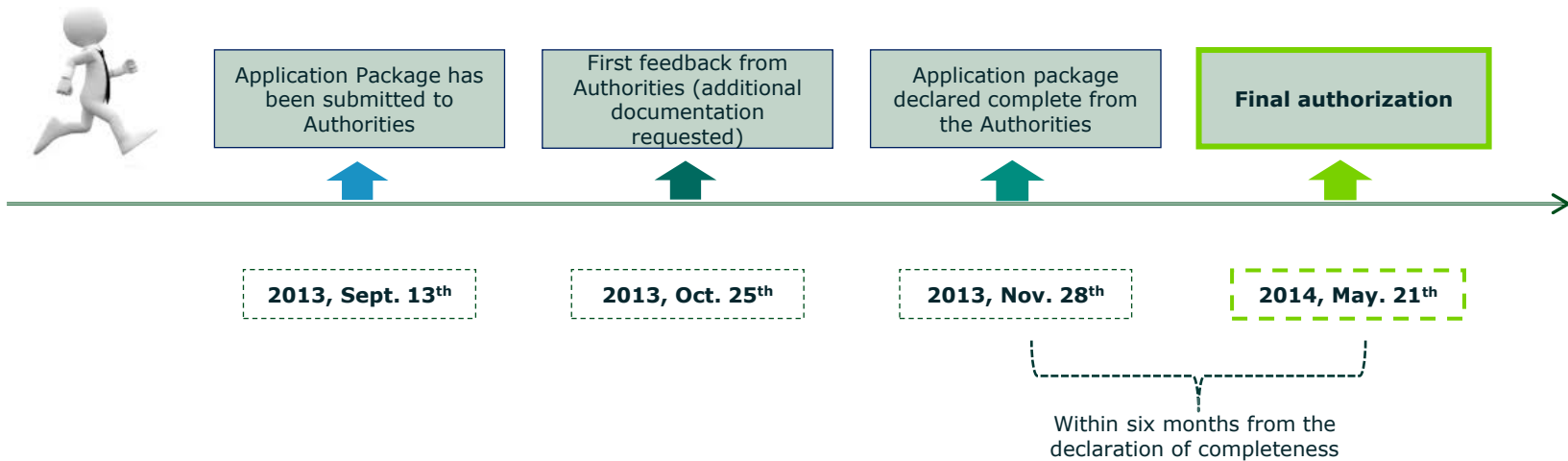
Euronext Clearing



EURONEXT CLEARING

May 2023

Authorization under EMIR



The authorization was obtained with the unanimous opinion of the College of Regulators on full compliance by Euronext Clearing of the EMIR requirements to operate as a CCP

Summary

- ▶ **Risks in CCPs**
- ▶ **Margins**
- ▶ **Default Funds**
- ▶ **Interoperability arrangement**

Risk in CCPs (1/2)

Risk	Definition
Credit Risk	The risk that a counterparty, whether a participant or other entity, will be unable to meet fully its financial obligations when due, or at any time in the future
- Principal Risk	The risk that a counterparty will lose the full value involved in a transaction, for example, the risk that a seller of a financial asset will irrevocably deliver the asset, but not receive payment
- Replacement Cost Risk	The risk of loss of unrealized gains on unsettled transactions with a counterparty. The resulting exposure is the cost of replacing the original transaction at current market prices
Liquidity Risk	The risk that a counterparty, whether a participant or other entity, will have insufficient funds to meet its financial obligations as and when expected, although it may be able to do so in the future
Custody Risk	The risk of loss on assets held in custody in the event of a custodian's (or subcustodian's) insolvency, negligence, fraud, poor administration, or inadequate recordkeeping
Investment Risk	The risk of loss faced by a Financial Market Infrastructure when it invests its own or its participants' resources, such as collateral

Risk in CCPs (2/2)

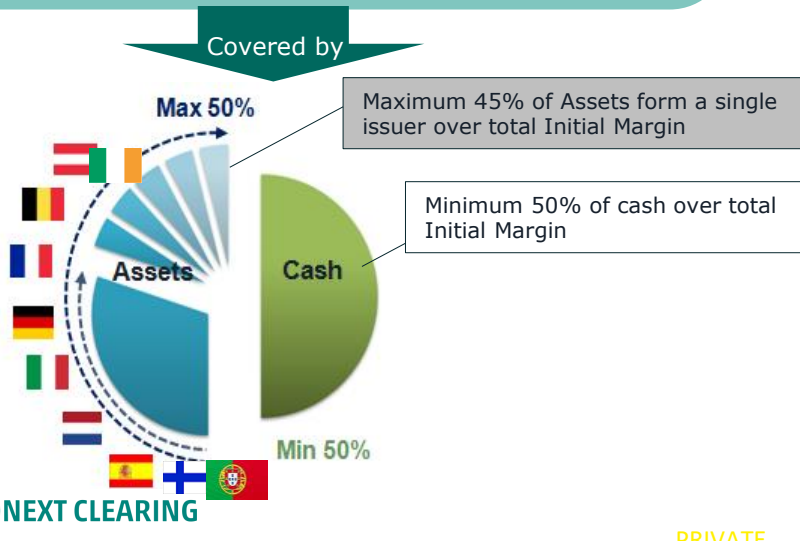
Risk	Definition
Legal Risk	The risk of the unexpected application of a law or regulation, usually resulting in a loss
Operational Risk	The risk that deficiencies in information systems or internal processes, human errors, management failures, or disruptions from external events will result in the reduction, deterioration, or breakdown of services provided by an FMI
General Business Risk	Any potential impairment of the FMI's financial position (as a business concern) as a consequence of a decline in its revenues or an increase in its expenses, such that expenses exceed revenues and result in a loss that must be charged against capital
Systemic Risk	The risk that the inability of one or more participants to perform as expected will cause other participants to be unable to meet their obligations when due

(CPSS-IOSCO Principles for Financial Markets Infrastructures 2012)

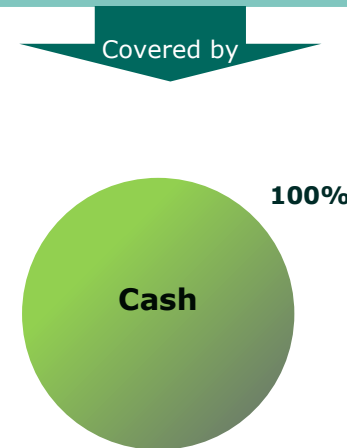
Prudential requirements

Margins, Default Fund coverage, Collateral

Margins	Topic	Main Requirement
	Confidence intervals	Minimum 99,00%
	Holding period	From 2 days to 5 days
	Lookback period	From 6 months up to the whole time series
	Procyclicality	<ul style="list-style-type: none"> 10 years time series or 25% buffer Filtering methodologies



Default Fund	Topic	Main Requirement
	Minimum coverage (# of CMs covered)	



Initial Margins

Initial Margins are calculated using leading practices Risk Based Margining Methodologies:

Historical prices and yield curve analysis:

- ✓ Higher Confidence Level than the minimum regulatory requirements
- ✓ Time Horizon: 2-5 days (the time to manage the insolvency)
- ✓ Long Term Price Historical Analyses (more than 20 years)

SPAN to VaR-like model transition for the Fixed Income Section in June 2022

Soundness and robustness of the model strongly proven during recent crises

Margins : Overview of methodologies

Model Type	Distributional assumptions	Confidence levels	Lookback periods	Holding periods	P&L methodology
Equity and Equity derivatives section: EXM (shares, warrant, convertible bonds) MIV (closed-end fund, investment companies, REIC) , ETFplus (ETF, ETC)	MarS (Margining System) Industry Standard Scenario Based Analysis	The most conservative result obtained by assuming normal distribution and real distribution of price variations is considered.	99,5% minimum for the minimum time horizon/holding period required by EMIR (1 year/2 days).	Look back periods ranging from 6 months to 10 years, plus one for the whole time series starting, where available, from 1991.	<ul style="list-style-type: none"> For equity cash: 1 day and 2-days; For derivatives: 1 day, 2-days, 3-days. Full valuation
Bond Section Italian, Spanish, Ireland and Portuguese Government Bonds	FIRE (Fixed Income Risk Engine) Historical VaR Based Analysis	Real distribution of yield variations is considered.	Confidence Levels are defined by applying an internal model, namely "Sovereign Risk Framework" (SRF). Currently applied Confidence Levels are 99,6% for Ireland and 99,7% for the other countries.	Look back period is equal to the whole available time series starting from 2004.	Holding Period 5 days for all the sovereign countries. Cashflow valuation
Bond Section Corporate Bonds and Government Bonds of different countries	MVP (Method for Portfolio Valuation) Industry Standard Scenario Based Analysis	The most conservative result obtained by assuming normal distribution and real distribution of yield variations is considered.	Ranging from 99% to 99,99%, depending on the Rating of the Europe financial/non-financial curves.	Look back periods ranging from 6 months to 10 years.	Ranging from 1 to 5 days. Full valuation
IDEX Energy Futures	MMeL The MMeL margining methodology has a structure of Classes which recognises contracts tradable on the market grouped by their specific characteristics (Delivery Period and type of supply: Baseload or Peakload). Specific classes are assigned to contracts during the delivery period.	The most conservative result obtained by assuming normal distribution and real distribution of price variations is considered.	99% confidence level.	1-year time series	2-days holding period. Full valuation
Agrex Durum Wheat Futures	MMeG The margining methodology foresees a Class structure capable of classifying the contracts which are actually traded on the market plus additional Classes for managing Delivery Positions (Covered and Uncovered from a delivery certificate) and Matched (between seller and buyer) Positions.	The most conservative result obtained by assuming normal distribution and real distribution of price variations is considered	Same as for Equity derivatives.	Look back periods ranging from 6 months to 10 years, plus one for the whole time series referred to time series of <i>comparables</i> .	Same as for Equity derivatives. Full valuation

Procyclicality

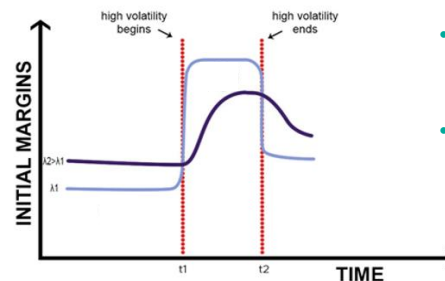
ESMA requirements

Regulatory framework	Requirement
Procyclicality (ESMA art. 28)	One of the following options: 1. Look-back period of at least 10 years; or 2. Margin buffer of 25%; or 3. 25% weight to stressed observation

Equity&EquityDer

- Minimum 10 years LBP always applied where available
- 25% buffer applied for new instruments

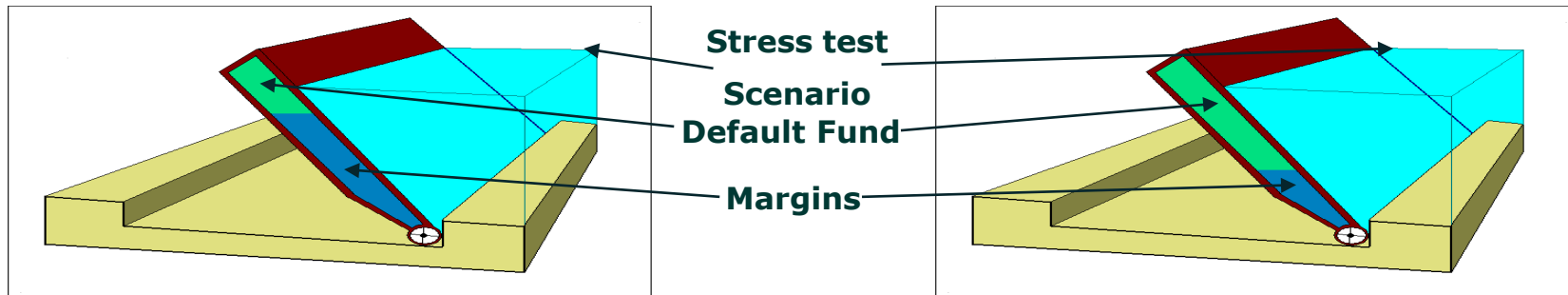
Bond



- Long time series (from 2004)
- Filtering approach based on EWMA λ methodologies
- Increasing weight applied to extreme observations in computing portfolio PnLs

Default Funds

- The size of the Default Funds is gauged on Stress Tests results
- The Default Funds cover the losses in excess of margins for the pertinent market segment (i.e. equity cash & derivatives vs. bonds) in case of catastrophic events
- Four separate Default Funds
 - Equity/Derivatives
 - Bonds
 - Electricity
 - Agricultural
- Members contribute on a pro-rata basis
- The contribution to the Default Fund of each Member is adjusted on a monthly basis and is proportional to the average initial margin paid in the previous month
- Lines of Defense (Margins, Default Funds, etc) should not be seen in isolation, but to the contrary, they should be seen as different facets of the same entity



Stress Test Scenarios

Equity – Equity derivatives section

Equity Section

It is assumed that each security has a downside / upside variation equal to the worst between the following events:

Price Hypothesis	Downside / Double Volatility	Downside / Half Volatility	Upside / Double Volatility	Upside / Half Volatility	Real-life sign price change / Double Volatility	Real-life sign price change / Half volatility	Extra Stress
a.	Largest 1d, 2d, 3d price variation occurred over the whole available time series						
b.	1.20 the value of the «Applicable Margin Interval»						
c.	4 times the standard deviation						
d.	n.a.						The shares of the two most exposed banking groups in the Downside Price Variation / Double volatility Scenario have a downside price variation equal to 90%
Sign Hypothesis	-Decrease		Increase		Real life sign		Decrease

Equity Derivatives Section

It is assumed that each security has a downside / upside variation equal to the worst between the following events:

Hypothesis	Downside / Double Volatility	Downside / Half Volatility	Upside / Double Volatility	Upside / Half Volatility	Real-life sign price change / Double Volatility	Real-life sign price change / Half volatility	Extra Stress
a. Futures, FTMIB Index, SSDF	one-to-one price variation with their underlying						
b. Equity Options prices and FTMIB Index Options	Recalculated using stressed underlying price and double the implied volatility	Recalculated using stressed underlying price and half the implied volatility	Recalculated using stressed underlying price and double the implied volatility	Recalculated using stressed underlying price and half the implied volatility	Recalculated using stressed underlying price and double the implied volatility	Recalculated using stressed underlying price and half the implied volatility	Recalculated using stressed underlying price and double the implied volatility

Stress Test Scenarios

Fixed Income Section

Yield Increase and Decrease scenarios

It is assumed a increase / decrease of the Italian yield curve and Eurozone yield curve:

Hypothesis	Yield Increase/Decrease
a. Fixed rate bonds (BTP), CTZ (Zero-coupon securities), Treasury bills (BOT)	<ul style="list-style-type: none">- Largest between the largest upside and downside, one-day, two-days, three-days, four-days and five-days yield variations- Yield Variations resulting of the linear interpolation of the largest variation for the previous and next vertices to the duration of the bond
b. Inflation Indexed Bonds (BTPi and BTP Italia), Floating Rate Bonds (CCT), Corporate Bonds	1,20 the size of the Margin Interval

Steepening and Flattening scenarios

It is assumed a non-parallel shift of the Italian yield curve and Eurozone yield curve:

Steepening	Flattening
<p>+/-n basis point on the vertex "x" and +/-m basis point on the vertex "y"</p> <p>(ITGOV3YZ DELTA: 1,00% – ITGOV10YZ DELTA: 1,98%)</p>	<p>+/-n basis point on the vertex "x" and +/-m basis point on the vertex "y"</p> <p>(ITGOV5YZ DELTA: 1,69% – ITGOV10YZ DELTA: 1,32%)</p>

Risk Management Test

Stress test

Determining the Default Fund for each Section

At least the first 2 most exposed participants definition of a set of historical or hypothetical scenarios for each Section

Euronext Clearing policy minimum:
• "Cover 4" → Bond Section
• "Cover 3" → Other Sections

Back test

Determining the Default Fund for each Section

Performed both at instrument level and portfolio level

Portfolio level is based on the comparison between the Initial margins and the profits and losses that would apply in case Euronext Clearing was to close out all positions of the portfolio over a hypothesized horizon of n days.

Sensitivity test

Assess the adequacy of margining parameters

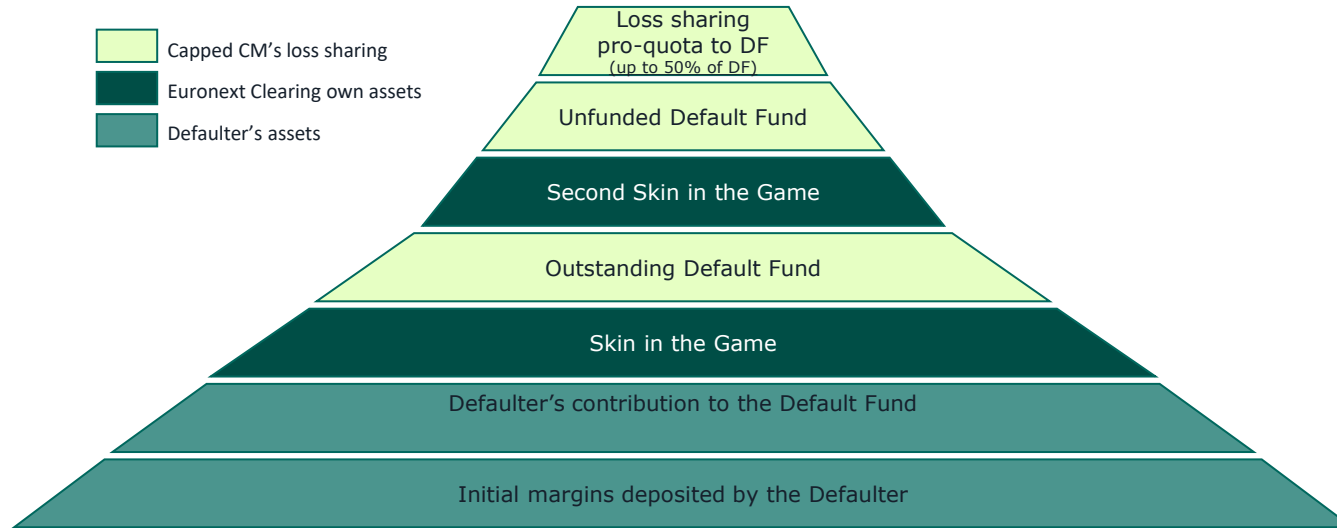
If a small change in the margin parameters (confidence level or holding period) results in a significant increment in Initial Margin value after sensitivity test, then it means that margin parameters have to be amended such as to produce more robust results.

Reverse stress

Determining the Default Fund for each Section

Reverse stress testing adopted by Euronext Clearing consists in a reprocessing of the stress tests using a "trial and error" approach up to identify the conditions where available resources are no longer sufficient to cover the Non-Collateralized Exposure of the two most exposed clearing members.

Default Waterfall



Default Procedures

In compliance with Article 61, par. 2 of Commission Delegated Regulation (EU) No 153/2013 (obligation to make available to the public key aspects CCP's default procedures), Euronext Clearing's Rulebook outlines the key aspects of Euronext Clearing Default Management Procedures (see Part B.6 of Euronext Clearing's Rulebook), available on Euronext Clearing website, including:

- the circumstances in which action may be taken
- the scope of the actions which may be taken, including the treatment of both proprietary and client positions, funds and assets
- the mechanisms to address a CCP's obligations to non-defaulting clearing members
- the mechanisms to help address the defaulting clearing member's obligations to its clients

With reference to contractual default (Article B.6.1.1 par.1 letter a), the declaration of default is taken by Euronext Clearing's CEO whereas with respect to default arising from insolvency proceedings (Article B.6.1.1 par. 1 letter b), the declaration of the insolvency proceedings will be carried out by the competent authority. The consequent actions indicated in the Rulebook are taken by CEO or, in his absence, by the delegated people (as per CEO Delegation of Powers in force) upon advice of the Default Management Committee. Euronext Clearing Top Management is involved in all the default management process. The Service Closure decision can be taken only by the CEO since this action was not delegated.

Additional aspects of treatment of both proprietary and client positions, funds and assets are indicated in the document "Levels of protection associated with the different levels of segregation" available on Euronext Clearing Website.

Investments

- **There is strong regulatory guidance on how CCPs mitigate their investment risk through a number of reinforcing mechanisms, among which:**
 - CCP shall invest only in cash or **highly liquid financial instruments with minimal market and credit risk:**
 - Cash balances with central banks
 - Max 5% with commercial banks
 - Highly Liquid Financial Instruments are debt instruments backed by:
 - A Government
 - Central Bank
 - Qualified Supranational Entities
 - Average Time to Maturity < 2yrs
 - Diversification by:
 - Issuer
 - Instruments
 - Own financial resources which are not invested as per above, do not concur to the CCP capital
- **Euronext Clearing has access to Central Bank Liquidity**
 - EMIR: "In assessing the adequacy of liquidity resources, especially in stress situations, a CCP should take into consideration the risks of obtaining the liquidity by only relying on commercial banks credit lines"

Two CCPs, one Single Virtual Counterparty

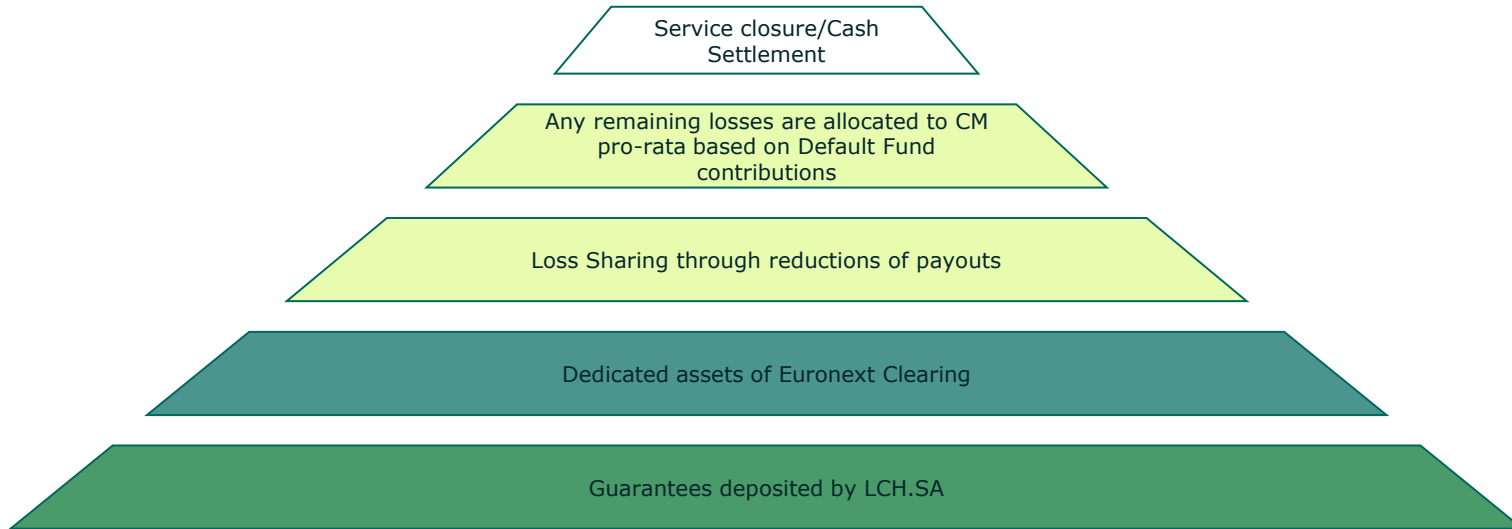


Interoperability Model

- In case of default the service covers all Italian Government bonds traded on:
 - MTS
 - EuroMTS
 - BrokerTec cash and repo platforms
- CCP services jointly provided by Euronext Clearing and LCH.SA through an interoperability model
- The terms of the Euronext Clearing and LCH.SA agreement (December 2002) established that the two CCPs would set up an integrated Central Counterparty service which would be seen by users as a single service: a “Virtual Single CCP”
- Common Risk Margining principles: No competition on risk grounds with members
- If the 2 players are members of different CCPs, the 2 CCPs will face each other in acting as Special Clearing Members/Allied/Clearing House
- In case of a member's default, its CCP will guarantee all its obligations without affecting the other CCP and the relative members. Each CCP would be exposed to losses exclusively default of one of its own participant and not in the case of default of a participant of the other CCP: No spillover

Waterfall for LCH.SA Default

- Capped CM's loss sharing
- Euronext Clearing own assets
- Defaulter's assets





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