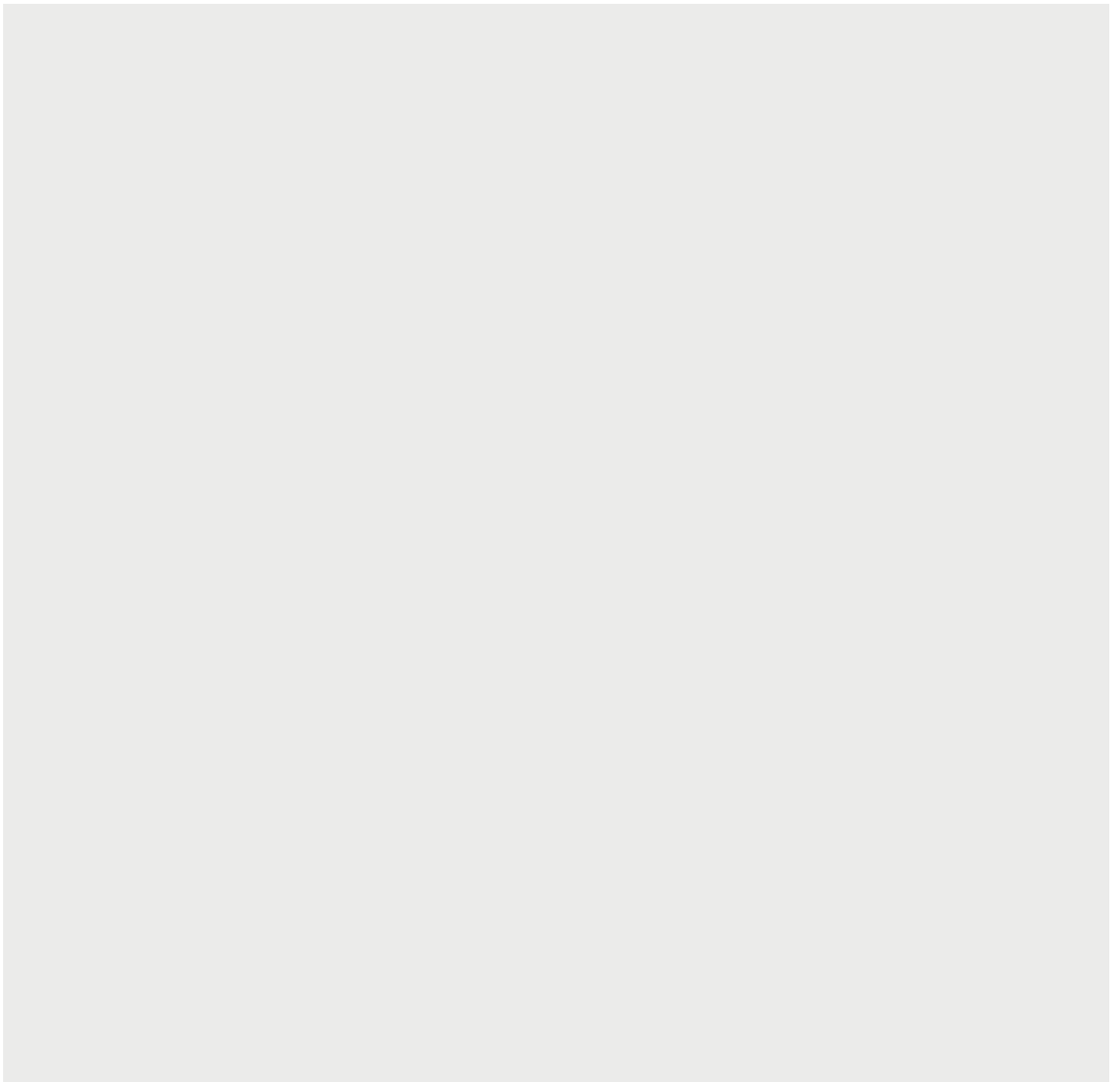


# Comprehensive Disclosure

As required by SEC Rule 17Ad-22(e)(23)

**LCH** The Markets'  
Partner



**Institution :**

Banque Centrale de Compensation ("LCH SA")

Except if specified, the information provided in this Disclosure document is accurate as of July 31<sup>st</sup> 2019.

This disclosure document can also be found at [www.lch.com](http://www.lch.com) .

# CONTENTS

CONTENTS .....	3
1. Executive summary .....	4
2. Summary of major changes since the last update of the disclosure.....	4
3. General background of LCH SA.....	5
3.1. General description of LCH SA and the markets it serves.....	5
3.2. General Organisation of LCH SA .....	6
3.3. Legal and regulatory framework .....	7
3.4. System Design and Operations.....	8
4. Standard-by-Standard Summary Narrative Disclosure .....	9
4.1. Standard 1: Legal Risk .....	9
4.2. Standard 2: Governance.....	12
4.3. Standard 3: Framework for the Comprehensive Management of Risks .....	15
4.4. Standard 4: Credit Risk.....	21
4.5. Standard 5: Collateral .....	29
4.6. Standard 6: Margin .....	31
4.7. Standard 7: Liquidity Risk.....	38
4.8. Standard 8: Settlement Finality.....	44
4.9. Standard 9: Money Settlements.....	45
4.10. Standard 10: Physical Delivery Risks .....	46
4.11. Standard 11: CSDs.....	46
4.12. Standard 12: Exchange-of-Value Settlement Systems .....	47
4.13. Standard 13: Participant-Default Rules and Procedures .....	48
4.14. Standard 14: Segregation and Portability.....	51
4.15. Standard 15: General Business Risk .....	52
4.16. Standard 16: Custody and Investment Risks.....	54
4.17. Standard 17: Operational Risk Management.....	56
4.18. Standard 18: Access and Participation Requirements.....	61
4.19. Standard 19: Tiered Participation Arrangements .....	63
4.20. Standard 20: Links.....	63
4.21. Standard 21: Efficiency and Effectiveness .....	64
4.22. Standard 22: Communication Procedures and Standards.....	68
5. Definitions of Key Terms and Abbreviations.....	69
6. List of publicly available resources .....	71

# 1. Executive summary

LCH SA provides, on its website, a comprehensive public disclosure, among others, of the market it serves, its rules, its financial accounts, its governance arrangements and its risk management. It publishes quantitative information in line with CPMI-IOSCO principles as well as the elements required by regulation EU N° 575/2013 (CRR).

The disclosure thereunder, in accordance with Rule 17Ad-22(e) (23) of the Securities and Exchange Commission, aims to provide the general public with a summary narrative explaining how LCH SA complies with the standards set forth in Rules 17Ad-22(e) (1) through (22).

The Commission granted LCH SA exemptive relief from the requirements of Section 19(b) of the Act with respect to filing certain proposed rule changes that primarily affect its Non-US Business and do not significantly affect CDSClear operations or any rights or obligations of LCH SA with respect to the CDSClear services. Therefore, the disclosure thereunder focuses particularly on CDSClear and all matters that can affect CDSClear operations.

As it is described in more detail for each standard, we consider that LCH SA has established, implemented and is maintaining and enforcing written policies and procedures reasonably designed to provide assurance that LCH complies with all the requirements set forth for clearing agencies by the Security and Exchange Commission.

## 2. Summary of major changes since the last update of the disclosure

The initial version of LCH SA's disclosure document was published in April 2018, the current 2019 version is the third to be posted on the LCH SA website.

Since the last report, LCH SA has, on a continuous basis, improved its risk management, its security, its resiliency and the effectiveness and efficiency of its procedures and systems. However, the risk framework structure and the principles and standards under which LCH SA operates have remained relatively stable since the 2018 disclosure. Therefore, only a limited amount of change has been made in the 2019 version. The main changes are the following:

- In 2018, LCH SA started clearing Netherlands, Austria, Supranationals, Portugal, Ireland, Finland, Slovakia and Slovenia sovereign debts and repos. The clearing of European Sovereign debts in Euro was consolidated in LCH SA in 2019.
- A particular focus has been made in order to reduce IT and Cyber risk. Besides heavy investments aimed at reinforcing LCH's defenses and operational reliability, it is to note that:
  - The Technology Risk has been added to the Risk Governance Framework, bringing the total number of risks to 23.
  - A new Board Committee dedicated to these matters, the Technology Security and Resilience Committee (TSR) chaired by an INED has been created

## 3. General background of LCH SA

### 3.1. General description of LCH SA and the markets it serves

LCH SA provides clearing services for major exchanges and platforms as well as over-the-counter (“OTC”) markets.

LCH SA clears a broad range of asset classes such as securities, exchange-traded derivatives, Credit Default Swaps and Euro denominated bonds and repos.

#### 3.1.1. CDSClear

LCH SA provides clearing services for eligible CDS contracts including both European and US Indices and Single Names Index constituents, and clearing services for eligible European Index Swaptions. CDSClear offers its members and their clients clearing services on European and US Indices and Single Names Index constituents and European Index Swaptions, through MarkitSERV, Bloomberg and Tradeweb trade sources.

List of instruments:

- ITraxx Europe – Main, and CrossOver indices (3, 5, 7, 10-year tenors) – Senior Financials indices (5 and 10-year tenors) – from Series 12 onwards, Euro-denominated,
- Single Names on the reference entities composing the eligible indices, 25/100/300/500 bp coupons (quarterly maturities up to 10-year tenors), ‘Standard European Corporate’ or ‘Standard European Senior Non Preferred Financial Corporate’ transaction types, Euro-denominated,
- CDX Investment-grade indices (3, 5, 7 and 10-year tenors) from Series 13 onwards, US dollar-denominated, CDX High-yield indices (5-year tenor) form series 23 onwards
- Single Names on the reference entities composing the eligible indices, excluding monoline insurers, 100/500 bp coupons (quarterly maturities up to 10-year tenors), ‘Standard North American Corporate’ transaction types, Senior debt, US dollar-denominated.
- European physically delivered Index Swaption on on-the-run and on-the-run-1 iTraxx Main and Crossover indices (3-month expiries).

Complete information on services provided by CDSClear can be found at:

<https://www.lch.com/services/cdsclear>

#### 3.1.2. EquityClear, Listed Commodities & Listed Derivatives

For Cash and Derivatives activities, LCH SA provides clearing services to the Euronext markets: Euronext Amsterdam NV, Euronext Brussels SA/NV, Euronext Lisbon, Euronext Paris. It also provides clearing services to Börse Berlin (Equiduct Trading), Bourse de Luxembourg and Turquoise Global Holdings.

Complete information on services provided by EquityClear and CommodityClear can be found at:

<https://www.lch.com/services/equityclear/equityclear-sa>

<https://www.lch.com/services/commodityclear/commodityclear-sa>

#### 3.1.3. RepoClear

LCH SA provides cash and repos trades on Euro-denominated sovereign debts issued by French, Belgian, Italian, Spanish, German, Austrian, Dutch, Portuguese, Slovenian, Slovakian, Irish, Finnish governments as well as supranational bonds. LCH SA also provides a triparty clearing service called €GCPlus, based on a European Central Bank (“ECB”) eligible Euroclear pool of collateral, Euroclear acting as triparty agent.

The RepoClear service is offered through the platforms of MTS Group, Nex, Tullet Prebon and ETCMS.

Complete information on services provided by RepoClear can be found at: <https://www.lch.com/services/repoclear/repoclear-sa>

### 3.1.4. Key figures

In February 2015, the Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO) published 'Public quantitative disclosure standards for central counterparties'. These are based on the CPSS-IOSCO (Committee on Payment and Settlement Systems (CPSS) and the IOSCO standards known as Principles for financial market infrastructures (PFMIs). These principles include information on products, accounts, transactions, margin requirements, collateral on deposit, risk and stress testing, and treasury and liquidity for both derivatives and non-derivative products.

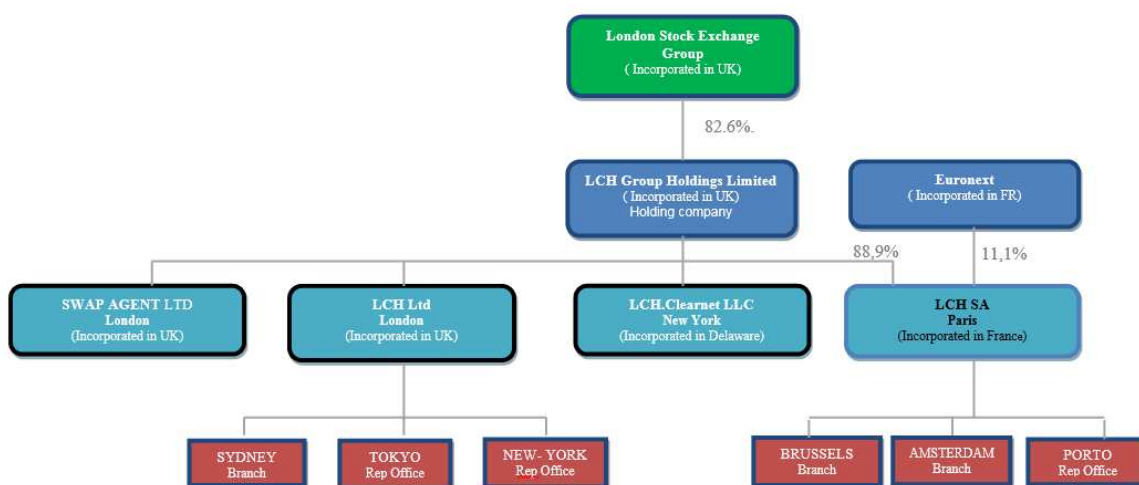
LCH SA's disclosures against the CPMI-IOSCO Quantitative Disclosure Standards can be found at <https://www.lch.com/resources/rules-and-regulations/ccp-disclosures>

LCH SA's disclosures against the CPMI-IOSCO Qualitative Disclosure can be found at:

<https://www.lch.com/resources/rules-and-regulations/ccp-disclosures>

## 3.2. General Organisation of LCH SA

LCH SA is a subsidiary of LCH Group Holdings Limited a private company limited by shares, incorporated in the United Kingdom which owns 88.9 percent of the capital. The remaining 11.1 percent is owned by Euronext NV. LCH Group is 82.61 per cent owned by London Stock Exchange Limited, a wholly owned subsidiary of London Stock Exchange Group plc ("LSEG"), and 17.39 per cent owned by participants and exchanges.



### 3.3. Legal and regulatory framework

LCH SA is a central counterparty ("**CCP**") incorporated under the laws of France, with branches in Amsterdam and Brussels and a representative office in Portugal. In accordance with European Market Infrastructure Regulation ("**EMIR**") and the French monetary and financial code, the LCH SA Board of Directors presides over four local committees, which assist the Company: The Company's Audit Committee, the Company's Risk Committee, the Remuneration Committee and the Nomination Committee. The terms of reference defining the functions, missions, powers and responsibilities of these Committees are approved by the Board of Directors.

LCH SA operates under robust governance arrangements, which provide an explicit responsibility and accountability structure. The LCH SA website publicly discloses the governance arrangements, including the ownership and organisational structure, composition of the Board and Board Committees, as well as Board and Committee terms of reference.

LCH SA serves major international exchanges and platforms, as well as a range of OTC markets. In its role as a central counterparty LCH SA assumes counterparty risk between trading counterparties by becoming the legal counterparty to the trade and ensuring the financial performance of the trade.

In clearing a trade, LCH SA becomes counterparty to, and responsible for, trade obligations to clearing members. This principle is known as "novation" or "registration". LCH SA does not, in its normal course of business, assume any market risk in respect of the trades that it clears.

#### **Regulatory Framework**

LCH SA is regulated as a CCP by three National Competent Authorities: the Autorité de Contrôle Prudentiel et de Résolution ("**ACPR**"), the Banque de France and the Autorité des Marchés Financiers ("**AMF**").

LCH SA is authorized to offer clearing services in the European Union pursuant to EMIR which includes the supervision by a College of 18 European regulators and the ESMA.

As a clearing house and investment services provider, LCH SA is regulated by the AMF and therefore subject to the Règlement Général de l'AMF.

LCH SA is a credit institution as per the French Monetary and Financial Code and regulated by the ACPR. It is therefore subject to all the European and French banking legislations. It is indirectly regulated by ECB as a lesser important financial institution.

LCH SA is registered in the US as a Derivatives Clearing Organization ("**DCO**") with the US Commodity Futures Trading Commission ("**CFTC**") for its CDS business, and as Clearing Agency with the US Securities and Exchange Commission ("**SEC**").

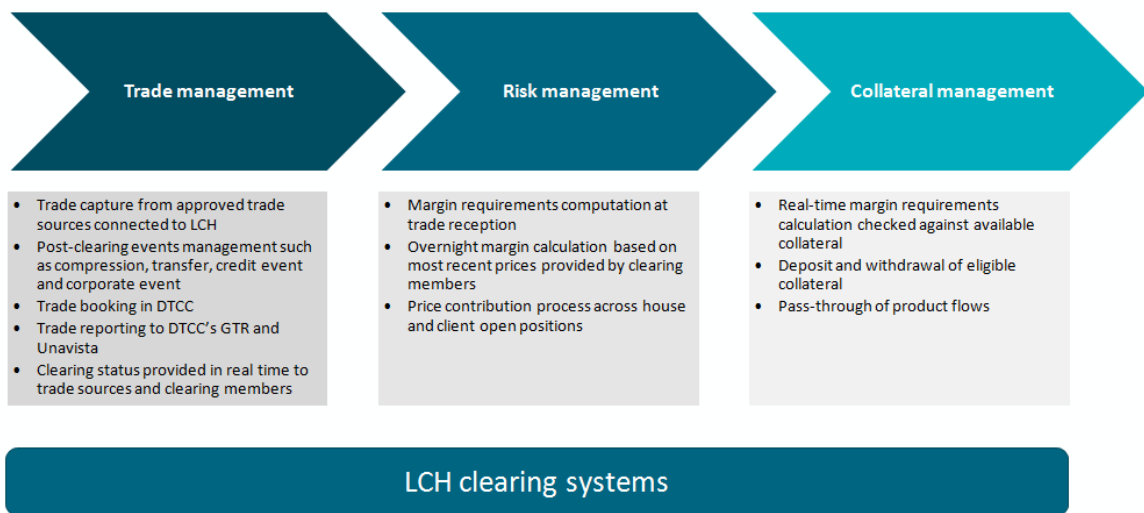
LCH SA is recognized as a foreign Central Counterparty by FINMA.

As branches of a credit institution, the activities of LCH SA branches in Belgium and Netherlands are regulated respectively by the Belgium National Bank (BNB) & the Dutch National Bank (DNB).

### 3.4. System Design and Operations

LCH SA safeguards market integrity and offers its customers ways to streamline their business. The core functions increase overall efficiency and promote standardization in the clearing and settlement industry. From trade capture to risk management and on to delivery management, LCH SA offers a complete value chain.

## LCH Clearing





## 4. Standard-by-Standard Summary Narrative Disclosure

### 4.1. Standard 1: Legal Risk

Rule 17Ad–22(e)(1)	<i>Rule17Ad–22(e)(1) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for a well-founded, clear, transparent, and enforceable legal basis for each aspect of its activities in all relevant jurisdictions.</i>
--------------------	---

LCH SA ensures that it establishes, implements, maintains and enforces written policies and procedures reasonably designed to provide a well-founded, clear, transparent, and enforceable legal basis for each aspect of its activities in all relevant jurisdictions through (i) making its clearing rules publicly available on the web-site (ii) obtaining legal opinions and (iii) complying with its clearing rules changes process.

#### **Clearing rules publicly available on the web site**

LCH SA publishes on its website two sets of Clearing Rules, specifically for cash, fixed income, derivatives and triparty repos markets on one hand, and for OTC credit default swaps (CDS) and Swaptions on the other hand.

The Clearing rules aim at covering all material aspects of LCH SA's activities, and providing a clear and certain legal basis for its operations and the rights and obligations of each of its clearing members.

The Clearing rules are composed of two Rulebooks; Instructions/Procedures and Notices.

In addition, for CDS Clear, the Clearing Rules also contain the CDS Clearing supplement and FCM CDS Clearing Regulations.

Both sets of Clearing rules are publicly available on LCH SA's website: <https://www.lch.com/resources/rules-and-regulations/sa-rulebooks>

#### **Clearing Rulebooks**

The two rulebooks provide a clear and certain legal basis on all material aspects:

- Settlement finality;
- Default of clearing members;
- Netting arrangements in the event of an LCH SA's default or winding down;
- Porting of client positions;
- Enforcement of collateral.

A high degree of legal certainty on LCH SA's activities is achieved through obtaining legal opinions as to the enforceability of the relevant Rulebook in all relevant jurisdictions, performing due diligence, reviewing applicable legislation and procuring local legal advice.

Both Rulebooks are governed and construed in accordance with the the laws of France.

Each prospective clearing member must enter into an admission agreement with LCH SA, which requires the clearing member to comply with the terms of the relevant Rulebook.

For all changes to the Rulebook, members are given a consultation period during which they can comment on proposed changes.

### Instructions/CDS Procedures and Notices:

LCH SA publishes its Instructions/CDS Procedures and Notices, as part of the Clearing Rules, on its website at <https://www.lch.com/resources/rules-and-regulations/sa-rulebooks>.

The Instructions/CDS Procedures and Notices aim to complete the Rulebook in providing more detailed and specific rules on operations and for each specific market and clearing members. Instructions/CDS Procedures and Notices are also governed and construed in accordance with the laws of France.

### CDS Clearing Supplement:

The CDS Clearing Supplement sets out the economic terms of the cleared transactions resulting from the novation of the original OTC CDS or Swaption transactions between the Clearing Members and LCH SA. The CDS Clearing Supplement is based on both the 2003 ISDA Credit Derivatives Definitions, the 2014 ISDA Credit Derivatives Definitions and the 2006 ISDA Definitions but amends some of them to reflect the impact of multilateral clearing on the OTC CDS or Swaption transactions. The CDS Clearing Supplement, the 2003 and 2014 ISDA Credit Derivatives Definitions, the 2006 ISDA Definitions and any cleared transaction are governed by and construed in accordance with English substantive law.

### FCM CDS Clearing Regulations:

The FCM CDS Clearing Regulations deals with the treatment of the collateral deposited FCM Clients to their FCM Clearing Members. This contractual document grants to LCH SA a security interest over the collateral deposited by the FCM Clearing Members on behalf of their FCM Clients and is meant to ensure that such collateral is deposited and managed in accordance with the U.S. regulatory requirements, in particular the CFTC Regulations. The FCM CDS Clearing Regulations are governed by and construed in accordance with the laws of the State of New York

### **Legal opinions**

Before clearing members can be admitted, LCH SA checks the adequacy of its legal framework for cross-border clearing members by obtaining legal advice from a reputable external counsel based in the relevant jurisdiction regarding the enforceability of its Clearing Rules.

To date, LCH SA has obtained legal advice for all jurisdictions where its clearing members are incorporated.

LCH SA has a Legal Opinion Refresh Policy which requires legal opinions be refreshed every three years or earlier if material changes occur to either the foreign jurisdiction or the Rulebook that could impact the outcome of the opinion.

In addition to the Jurisdiction legal opinion, LCH SA also obtains a legal opinion from a reputable external counsel on the validity of each set of netting provisions contained in the Rulebooks in the event of a default or insolvency of LCH SA.

The Clearing rules are consistent with applicable law. Should any inconsistencies with applicable law arise, such as on implementation of a new regulation, LCH SA will remedy this through changes to its Clearing Rules or operations. LCH SA monitors releases of new regulations or changes to current regulations through in-house specialist functions and third party providers.

No court in any jurisdiction has ever held any of LCH SA's relevant activities or arrangements under its rules and procedures to be unenforceable.

### **Clearing rules changes process**

Any change, which may fundamentally affect the way LCH SA operates will involve a change to the Clearing Rules.

LCH SA requires that any changes to its Clearing rules be reviewed by a Rule Change Committee, which ensures that rules are clear and comprehensive by discussing each rule change in full and by means of challenge.

The Rule Change Committee, which includes representatives of the compliance, risk and legal functions, and a clearing business representative.

Following internal Rule Change Committee's approval, proposed changes are submitted, where required, to LCH SA's competent regulators.

In accordance with EMIR, for changes that materially impact clearing members, the relevant clearing members are consulted prior to the implementation of the new clearing rules.

## 4.2. Standard 2: Governance

Rule 17Ad-22(e)(2)(i)	<i>Rule 17Ad-22(e)(2)(i) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for governance arrangements that are clear and transparent.</i>
-----------------------	--

LCH SA operates under robust governance arrangements, which provide a clear organisational structure, and set out the composition, role and responsibilities of the LCH SA Board and the LCH SA Board Committees. The Chairman of the Board and the Chairs of the Board Risk, Remuneration, Audit, Technology, Security and Resilience (TSR) Committees are among the independent non-executive directors. The Matters Reserved for the Board and Board Committee ToR are available on the LCH SA website.

The governance arrangements of LCH SA are publicly available, including details of the LCH SA Board and LCH SA Board committees' compositions.

Rule 17Ad-22(e)(2)(ii)	<i>Rule 17Ad-22(e)(2)(ii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for governance arrangements that clearly prioritize the safety and efficiency of the covered clearing agency.</i>
------------------------	---

LCH SA's risk management is governed by the LCH Group Risk Governance Framework, setting out the risks facing LCH SA, its tolerance for these risks, the personnel with responsibility for each risk and has defined reporting requirements for each. This framework provides a comprehensive list of risks faced by LCH SA. It is annually reviewed and approved by the LCH SA Risk Committee and LCH SA Board.

Through regular business and risk management reviews, LCH SA assesses its performance against its objectives at both LCH SA Board and executive level.

Rule 17Ad-22(e)(2)(iii)	<i>Rule 17Ad-22(e)(2)(iii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for governance arrangements that support the public interest requirements in Section 17A of the Exchange Act and the objectives of owners and participants.</i>
-------------------------	--

LCH SA provides accountability to owners, participants and other relevant stakeholders by including user, clearing member and client representatives in governance forums.

In addition, as indicated in the narrative supporting Rule 17Ad-22(e)(2)(vi), by including as an objective the reduction of risks and the safeguarding of the financial infrastructure in the markets it serves, LCH SA explicitly places a high priority on safety and efficiency as well as supporting financial stability in its public mission.

Rule 17Ad-22(e)(2)(iv)	<i>Rule 17Ad-22(e)(2)(iv) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for governance arrangements that establish that the board of directors and senior management have appropriate experience and skills to discharge their duties and responsibilities.</i>
------------------------	---

The LCH SA Board is comprised of 12 individuals: five independent non-executive directors (INEDs), one of whom is Chairman, four non-executive directors (of whom one is a LSEG director, one a representative of a venue, and two representatives of clearing members) and three executive directors. The LCH SA Board takes the advice from the LCH Group Nomination Committee before approving changes in its size, structure and members. The Committee's Terms of Reference state that the Committee will need to ensure that its recommended candidates are respected for their competence and are of good standing in their field of business.

An LCH SA INED must be independent in character and judgement, and have no relationships or circumstances (including any with LSEG or any of its subsidiary undertakings and/or with any significant user or venue shareholder) which are likely to affect, or could appear to affect, his or her judgement. The identities of the INEDs are disclosed on the LCH SA website.

It is a responsibility of the LCH SA Board, through its Reserved Matters, to perform adequate succession planning for the LCH SA Board, thereby ensuring the LCH SA Board continues to have appropriately skilled members.

LCH SA's management team is made up of experienced professionals, taking responsibility for distinct areas of the operation, risk management and control of the CCP. In separating responsibilities, LCH SA has management in place with the necessary expertise for each area and maintains a mix of skills necessary for the operation and risk management of the CCP.

LCH SA's senior management is subject to at least annual performance management reviews against their objectives and the core competencies identified as essential for all LCH SA employees. LCH SA is committed to ensuring that its reward practices promote sound and effective risk management and do not create incentives to relax risk standards. At least once a year, in line with the ESMA-EBA suitability guidelines, each member of the Local Management Committee are assessed on both an individual and a collective basis.

LCH SA monitors the performance of its senior management through regular reviews: in the case of non-performance, processes are in place to identify, escalate, remediate and ultimately reprimand and remove management if necessary.

Rule 17Ad-22(e)(2)(v)	<i>Rule 17Ad-22(e)(2)(v) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for governance arrangements that specify clear and direct lines of responsibility.</i>
-----------------------	---

The governance arrangements including CEO Executive Delegation, the ExCo ToR, the Local Management Committee (LMC) ToR and individual job descriptions for senior management set out the roles and responsibilities of the senior management, as well as their reporting lines, authorities and the procedures for their appointment. These arrangements also set out the process for ensuring accountability to stakeholders.

LCH SA provides accountability to owners, participants and other relevant stakeholders by including user, clearing member and client representatives in governance fora. LCH SA's clearing services run Product Advisory Groups and Risk Working Groups where participants are able to comment on proposed changes to markets, products and services, and to risk policies, models and frameworks. In addition, Clearing Members and Clients of Clearing Members are represented on the LCH SA Board Risk Committee where all material proposals are reviewed and approved prior to being submitted to the Board for approval.

LCH SA's senior management is responsible, in general, for ensuring consistency of LCH SA's activities with the LCH SA Board's objectives and strategy, establishing appropriate compliance and internal controls, subjecting internal controls to regular review and testing, ensuring sufficient resources are devoted to risk management and compliance, being actively involved in risk control processes and ensuring that risks posed to the CCP by its clearing and activities linked to clearing are duly addressed.

The roles and responsibilities of senior management are determined on the needs of LCH SA and set out in individual job descriptions.

Rule 17Ad–22(e)(2)(vi)	<i>Rule 17Ad–22(e)(2)(vi) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for governance arrangements that consider the interests of participants’ customers, securities issuers and holders, and other relevant stakeholders of the covered clearing agency.</i>
------------------------	---

The objectives of LCH SA are clearly identified and publicly available on the group’s website. LCH SA’s objectives are to reduce risk and safeguard the financial infrastructure in the markets it serves and to be the most trusted clearing house in the markets it serves by providing market leading risk management and clearing solutions. Furthermore, LCH SA is committed to safeguarding its members’ interests and supporting general market and financial stability through its operations, including with respect to international and jurisdictional regulations regarding procyclicality.

By including as an objective the reduction of risks and the safeguarding of the financial infrastructure in the markets it serves, LCH SA explicitly places a high priority on safety and efficiency as well as supporting financial stability in its public mission.

### 4.3. Standard 3: Framework for the Comprehensive Management of Risks

Rule 17Ad-22(e)(3)	<i>Rule 17Ad-22(e)(3) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to maintain a sound risk management framework for comprehensively managing legal, credit, liquidity, operational, general business, investment, custody, and other risks that arise in or are borne by the covered clearing agency.</i>
--------------------	--

The LCH SA risk management framework reflects the LCH Board’s Risk Appetite, and any amendments to this framework are subject to review and approval by the Board, to ascertain that such changes remain in alignment with the Board’s risk tolerance. The risks identified within the framework and the risk management tools used to mitigate such risks are subject to ongoing and regular review, through a robust governance process.

Rule 17Ad-22(e)(3) (i)	<i>Rule 17Ad-22(e)(3)(i) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for risk management policies, procedures, and systems designed to identify, measure, monitor, and manage the range of risks that arise in or are borne by the covered clearing agency, and subject them to review on a specified periodic basis and approval by the board of directors annually.</i>
------------------------	---

LCH SA’s overarching approach to risk management is administered according to the LCH SA Risk Governance Framework. This framework seeks to comprehensively identify the range of risks to which LCH SA is potentially exposed and to designate responsibility for these risks. Through the framework, the LCH SA Board defines tolerance levels for each category of risk and also sets guidelines for internal reporting to provide assurance that the framework is observed.

There are 23 risks defined within the Risk Governance Framework which has been mandated by the LCH SA Board:

- Latent market risk
- Sovereign risk (specific to clearing member positions)
- Wrong-way risk (specific to clearing member positions)
- Concentration risk (specific to clearing member positions)
- Counterparty credit risk
- Liquidity risk
- Procyclicality risk
- Settlement, payment and custody risk
- FX risk
- Technology Risk
- Business risk
- Operational risk

- Legal risk
- Regulatory and compliance risk
- Pension risk
- Project risk
- Business continuity risk
- Model risk
- Information security and cyber risk
- Investment risk
- Default management risk
- Strategic risk
- Reputational risk

The framework is given effect by targeted and detailed LCH SA risk policies which are managed by the LCH SA risk management function. Ownership of the risks and the control environment is defined in the policies, including the responsibility to maintain procedures in support of each relevant function.

The CRO is responsible for ensuring that an appropriate framework is in place to measure and monitor the status of each of the 23 risks against the Board’s appetite, which is reported to the Board quarterly.

LCH SA operates systems which facilitate the accurate measurement and monitoring of risk exposures for all clearing services and associated functions, including margining, collateral and investment management, and credit risk management. These systems enable the aggregation of exposures across clearing services, counterparties and risk types.

The LCH SA Board ensures it has adequate governance surrounding the adoption and use of risk management models by setting policies and standards for the minimum level of review and governance steps that are required. The review steps culminate in evaluation by the LCH SA Risk Committee, which makes recommendations related to the models to the LCH SA Board.

New models and material changes to existing margin models and related methodologies are reviewed through internal committees as well as being subject to clearing member review and independent validation, in line with policies and standards.

The Risk Governance Framework specifies the LCH SA Board’s standards and tolerance for each risk type; these underlie the principles and standards detailed in the risk policies. A set of performance indicators are used to monitor the effectiveness of the risk management framework. These indicators include backtesting of initial margins, ‘cover 2’ stress testing of clearing member exposures against default fund sizes, aggregate exposure measures, counterparty credit scores, liquidity ratios, interest rate risk analysis, procyclicality and sensitivity analysis and operational risk assessments.

System performance is constantly monitored; methodologies for the calculation of key risk parameters, including margin levels, stress testing, collateral haircuts and liquidity management are independently reviewed at least annually, with a strict governance process in place for managing changes. The LCH SA Board reviews compliance with the framework on at least an annual basis. The Risk policies supporting the framework and the framework itself are also subject to review on at least an annual basis taking into account changes in market and regulatory environments.

Rule 17Ad–22(e)(3)(ii)	<i>Rule 17Ad–22(e)(3)(ii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably</i>
------------------------	---



	<i>designed to ensure that it establishes plans for the recovery and orderly wind-down of the covered clearing agency necessitated by credit losses, liquidity shortfalls, losses from general business risk, or any other losses.</i>
--	--

In accordance with its status as a banking institution LCH SA maintains a recovery plan as per the Bank Recovery & Resolution Directive (“**BRRD**”).

The Plan sets out the steps that it will take in order to maintain the continuity of the services that it provides and the activities that it carries out that are specified in the event that such continuity is threatened.

The recovery plan contains the following elements:

- Recovery plan governance
- Review of critical services (including IT), operations and shared services
- FMI and SPC (Settlement, Payment, Custodian) risk
- Recovery Scenario analysis
- Definition of recovery plan triggers and measures
- Description of recovery tools
- Quantitative and qualitative analysis of recovery tools
- Strength and weakness analysis

Additionally, as required by EMIR, LCH SA maintains a Wind Down Plan which describes the scenarios and events that may trigger the Wind Down Plan alongside the expected activities to wind down the clearing activities of LCH SA.

LCH SA operates a robust Risk Governance Framework, which has the objective of defining risk appetite, designating responsibilities for the measuring, monitoring and managing of risks and also providing guidelines for assurance activities associated with the framework. Through the execution of this framework, LCH SA covers scenarios that may threaten its ability to continue to provide critical clearing services.

Scenarios have been categorised as follows:

- Member default losses resulting in uncovered credit losses or
- Potential and actual liquidity shortfalls
- Non Clearing member default losses or events that threaten LCH SA’s solvency or ability to provide critical service to its clearing members (for example general business risks, custody and investment risks)

The Plans have been created with the objective of either continuity of critical services (Recovery Plan) or maintaining stability in financial markets by avoiding a disorderly failure of a CCP (Wind Down Plan). These objectives continue to be achieved by the comprehensive set of recovery tools available to LCH SA and the relevant wind down procedural steps and associated ring-fenced capital required to enable execution of the Wind Down Plan.

Reviews of both the Recovery and Wind Down Plans take place at least annually. Where the underlying business model of LCH SA is amended, the change framework in place ensures the implication of the change to the business model is considered with reference to the Recovery and Wind Down Plans and the

necessary updates made. The LCH SA Board approves the Recovery and Wind Down Plans and is the final governance authority for the updates to the Plans

Where appropriate the testing of recovery tools are included in the fire drill in order to simulate practical implementation Recovery and/or Wind Down Plans.

Rule 17Ad–22(e)(3)(iii)	<i>Rule 17Ad–22(e)(3)(iii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide risk management and internal audit personnel with sufficient authority, resources, independence from management, and access to the board of directors.</i>
-------------------------	---

The objectives, standards, roles and responsibilities of Internal Audit are set out in the LCH SA Audit charter. The Audit Methodology is then detailed in a more operational procedure named “Internal Audit Manual”. The Charter and the Audit Manual are formally reviewed on an annual basis.

LCH Internal Audit is organised as a group function with one team in LCH SA and one team in the sister company LCH Limited. They jointly perform the audit plan as most activities, IT systems and risks are similar in both CCPs. Therefore, most audit assignments are carried out simultaneously in Paris and London. When a theme is specific to LCH SA only, the review is performed by an auditor from LCH SA.

When a review is common to both CCPs, the recommendations can be directed to LCH SA only, to LCH Limited only or to both, depending on the issue raised.

The team in LCH SA consists of 3 full-time members: One Head and two senior auditors, with a mix of skills, experience and seniority. It can rely on other auditors from LCH Limited based in London as well as on external auditing firms when required.

Issues arising from management not accepting or not implementing Internal Audit recommendations are escalated and resolved in a timely manner. Any breach to an agreed action plan deadline has to be justified and approved by the Executive Management Committee. A follow-up of all action plans, including any delays, is reported to the Audit Committee in accordance with French regulations.

Rule 17Ad–22(e)(3)(iv)	<i>Rule 17Ad–22(e)(3)(iv) also requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide risk management and internal audit personnel with oversight by and a direct reporting line to a risk management committee and an independent audit committee of the board of directors.</i>
------------------------	--

The roles and responsibilities of the LCH SA Board are clearly specified through the company’s Articles of Association and LCH SA Board Terms of Reference.

The LCH SA Board is responsible for the establishment of clear objectives and strategies, monitoring LCH SA’s senior management, establishing appropriate remuneration policies, establishing and overseeing the risk management function, overseeing the compliance and internal control functions, overseeing outsourcing arrangements and providing accountability to shareholders, employees, clearing members, clients and other stakeholders.

The LCH SA Board has established an Audit Committee, a Technology, Security and Resilience Committee, a Remuneration Committee and, as an advisory committee, a Risk Committee.

The composition of the LCH SA Board, Audit Committee, Technology, Security and Resilience Committee, and Risk Committee are publicly available. The terms of reference of the Audit Committee, Technology, Security and Resilience Committee and Risk Committee are publicly available. The terms of reference are reviewed at least annually. Any changes arising from the annual review are reported to the relevant committee for recommendation to the Board, which is then asked to approve the amendments.

The Audit Committee represents the interests of the LCH SA Board in the sound financial management and internal control management of the company. Its responsibilities include:

- assisting the LCH SA Board in fulfilling its responsibilities to review audited financial statements;
- appointing external auditors;
- reviewing the internal audit function;
- reviewing regulatory compliance;
- reviewing the operational risk framework and reviewing the internal control environment
- reviewing the Information Security and Business Continuity Planning programmes

The Audit Committee is comprised of four individuals: two INEDs, one of whom is the Chairman, a user representative, and an LSEG director.

The Technology, Security and Resilience Committee represents the interests of the Board in the sound management of technology security and operational resilience including cyber security to ensure that technology security and operational resilience strategies, investments and outcomes support the mission, values, and strategic goals of the Company. Its responsibilities include:

- assisting the LCH SA Board in reviewing the Operations and Technology as well as the Cyber Security and Information security strategies and related investments
- reviewing of the Operational Risk Management Framework
- reviewing the company's maturity against concepts of security and resilience

The Technology, Security and Resilience Committee is comprised of 6 individuals, three of them being INEDs.

The Risk Committee advises the LCH SA Board on the company's risk appetite, tolerance and strategy. Its responsibilities include:

- reviewing risk policies periodically;
- reviewing membership criteria and reviewing decisions with regards to LCH SA membership;
- considering risk controls designed or adapted for new contracts, product types or services; and
- considering proposals to make significant amendments to margin methodologies.

In all cases, following their review, the Risk Committee will make recommendations to the LCH SA Board for approval based on their findings. In the event the Board decides not to follow the recommendation of the Risk Committee, the CCP is required to notify the competent authority within five days.

The Risk Committee is comprised of six individuals: three INEDs, two representatives of clearing members and one representative of clients of clearing members. The metric for determining which clearing members and clients should be elected of the Committee is based on factors including the asset classes and volumes cleared, the level of contribution to the relevant default funds and whether they have previously been a voting member of the Committee.

As a measure of best practice, the LCH SA Board performs an annual review of its own performance and that of its Committees. The review includes consideration of the performance of LCH SA's Board members and the Chairman, and the LCH SA Board's behaviours and culture.

The Head of Internal Audit reports hierarchically to the Chairman of the Board and to the Chairman of the Audit Committee.

The Chief Risk Officer directly reports to the Risk Committee.

Rule 17Ad-22(e)(3)(v)	<i>Finally, Rule 17Ad-22(e)(3)(v) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for an independent audit committee.</i>
-----------------------	---

The LCH SA Audit Committee is appointed by the Board of Directors of the company and represents the interests of the Board in the sound financial management and internal control. The Committee determines whether management has put in place adequate internal control systems that provide reasonable assurances that corporate objectives will be achieved and that the company complies with all relevant regulatory requirements.

The Audit Committee comprises of no fewer than 4 non-executive directors of the Board, of which no fewer than 3 are independent non-executive directors of the Board; each of whom has been appointed in accordance with the criteria for independence set out in the terms of reference of the LCH Group nomination committee. One of such independent directors is appointed chair of the Audit Committee.

#### 4.4. Standard 4: Credit Risk

Rule 17Ad–22(e)(4)	<i>Rule 17Ad–22(e)(4) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to effectively identify, measure, monitor, and manage its credit exposures to participants and those exposures arising from its payment, clearing, and settlement processes, including by, at a minimum, meeting the seven requirements specified in the rule.</i>
--------------------	---

LCH SA manages its credit exposures to clearing members through the maintenance of prefunded financial resources, the enforcement of participation criteria, and regular monitoring. In addition, the Clearing rules allows LCH SA to call for additional funds from clearing members under certain conditions.

LCH SA calculates Internal Credit Scores (“ICS”) for each clearing member and other counterparties to which LCH SA has an exposure through an assessment of both quantitative and qualitative factors. These ratings influence LCH SA’s risk management function’s response to more specific risks identified by daily monitoring, as well as determining the frequency of future assessments of each clearing member. These internal credit ratings are also considered by internal risk governance.

LCH SA’s risk management function is responsible for reviewing each clearing member’s creditworthiness and financial condition. Clearing members’ positions are monitored continuously, with particular focus on the size of each clearing member’s cleared positions relative to its capital and to the total open interest in a particular contract.

Further, all new products are subjected to the risk governance process in order to ensure that all new risks introduced by a new product or market (or maturity) are appropriately assessed as to their impact on the current risk management practices. Where additional risk measures are required, such as amendments to existing margin calculations, these are proposed along with a formal application to clear the new products through the risk governance process.

LCH SA’s credit scoring framework is reviewed at least annually, as part of the regular policy review. This review will take account of changes to the business and market environment, market practices and new products; recommendations to change will be presented to the LCH SA Board Risk Committee and LCH SA Board for approval.

If LCH SA establishes a relationship with investment counterparties, these are subject to minimum internal rating and collateralisation of exposures with high quality collateral.

LCH SA also monitors the credit risk towards other counterparties through internal credit score and very low financial exposure because of the preference to use central bank money and (International) Central Securities Depository (“**I**CSDs”)

Rule 17Ad–22(e)(4)(i)	<i>Rule 17Ad–22(e)(4)(i) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to maintain sufficient financial resources to cover its credit exposure to each participant fully with a high degree of confidence.</i>
-----------------------	---

LCH SA uses variation margin, initial margin, add-ons , a dedicated portion of its own resources and four mutualised, service specific default funds covering CDSClear, EquityClear/CommodityClear, RepoClear and €GCPlus plus for each default fund a dedicated waterfall to cover current and potential future exposures to its clearing members.

Variation margin is called at least daily to cover market price movements on each clearing member’s positions. Initial margin is called at least daily and one time intraday and is calibrated to a 99.7 percent confidence level, assuming an appropriate holding period and using market prices from a sufficiently long lookback period.

Further margins (add-ons) are called from members who have weak credit scores, those that have large or concentrated positions, or positions that are illiquid or exhibit correlation with the member itself; and in some circumstances where the clearing member has excessive exposures modelled under stress scenarios.

In order to cover potential future exposures to clearing members under extreme but plausible market conditions, clearing members contribute to the service specific default funds. LCH SA maintains additional financial resources sufficient to cover a wide range of potential stress scenarios that include, but are not limited to, the default of the two clearing members and their affiliates that would potentially cause the largest aggregate credit exposure for LCH SA in extreme but plausible market conditions (in line with both EMIR and this requirement under CPMI IOSCO for CCPs which are systemically important in multiple jurisdictions). The relevant default funds are sized to meet the largest two member stress losses above margins (including those of clients and affiliates), applying a set of scenarios of extreme but plausible market conditions. A buffer of 10% is added to the combined stress risk exposures as to set the default fund.

The default funds' values may be subject to the application of a floor or cap, as prescribed in the LCH SA Clearing rules.

LCH SA places a portion of its own resources, an amount equal to 25 percent of its minimum net capital held in accordance with Article 16 of EMIR and Commission Delegated Regulation (EU) No 152/2013 RTS, ahead of all non-defaulting members' contributions to the mutualised default funds. However, with the exception of CDS Clear where SA hold at least 20 million Euro of own resources in the waterfall as per a specific agreement with CDS Clear participants.

The sizes of each default fund and of each amount of own capital is published at [https://www.lch.com/system/files/media\\_root/2b%20Default%20Waterfall%20SA%2020190830-V1.pdf](https://www.lch.com/system/files/media_root/2b%20Default%20Waterfall%20SA%2020190830-V1.pdf)

There are underlying procedures and model documentation for each of the services that outline the key principles adopted for the calculation of initial margin, add-ons, variation margin and default funds to cover credit exposures to each clearing member. All such models are independently validated at least annually.

Variation Margin liabilities must be covered by clearing members in cash or collateral depending on the relevant service or product. Liabilities for Initial Margin Contingent Variation Margin and further margins may be met by clearing members either in cash, in a set of eligible currencies (EUR, USD and GBP), securities issued or explicitly guaranteed by high quality sovereigns and Central Bank Guarantee (limited to guarantee issues by the Belgian and Dutch central bank).

Contributions to default funds are only acceptable in EUR cash and Central Bank Guarantee (limited to Belgian and Dutch members).

Margins are calculated separately for each proprietary account and for each client account. DF contributions are calculated per clearing member.

Prompt access to these resources is ensured through the use of CSDs or (I)CSDs and the investment of cash received according to the internal policy, which sets minimum standards for the security, quality and liquidity of assets and instrument type.

As described above, LCH SA's Risk Appetite and policies establish that a confidence level of 99.7 percent is used to cover LCH SA's close-out losses in the event of a member default in all but extreme market conditions. The sufficiency of these financial resources is evaluated on a daily basis via statistical tests results and backtesting coverage ratios. A reduction in coverage would initiate further investigation, which may lead to a formal model review in accordance with LCH SA's model validation governance. Interim measures include amending configurable model parameters and/or calling additional margin from affected members until model remediation is complete. LCH SA's risk controls include a range of financial resources to cover its credit exposures. These consist of margin provided by clearing members in respect of their outstanding positions, capital contributions from LCH SA and segregated, mutualised default funds of prefunded contributions from clearing members. These resources would be used in the following order to cover loss due to a clearing member's default: the defaulted clearing member's margin and default fund contributions; LCH SA's capital contribution; and contributions from non-defaulting clearing members to the relevant default fund.

The LCH SA Clearing Rules provides for the segregation of each of the EquityClear/CommodityClear, €GCPlus, CDS Clear and RepoClear, Default Funds from the financial resources of each other under a limited recourse

structure; accordingly, the financial contributions of non-defaulting clearing members to each default fund cannot be utilised to meet losses arising from the default of clearing members in other services. Further, this segregation provides for the continuation of LCH SA’s other services should any single service close.

Stress losses on each clearing member’s positions, including those of its clients and affiliates, are modelled each day against the set of extreme but plausible stress scenarios used to size the default fund and netted against margins held. In addition to the daily stress testing of default fund adequacy, quarterly reverse stress testing is carried out to examine the stress testing results to determine whether there exists a combination of more than two members defaulting under the same scenario, which would result in the default fund being exhausted. The results, together with any recommended actions, are reviewed by internal risk governance and are reported to the Risk Committee quarterly.

The rationale for the financial resource sizing is documented in both the LCH SA Board’s Risk Appetite statement and the LCH SA Board approved suite of risk policies. Risk Appetite is expressed in the Risk Governance Framework, issued by the LCH SA Board at least annually, which establishes the risk appetite and tolerance for each identified risk, and sets the high level standards it expects LCH SA to adopt in managing such risks.

LCH SA maintains policies covering each of the risk types and detailing how each risk is managed according to the LCH SA Board’s expectations. These policies are subject to a thorough review at least annually by internal risk governance and the Risk Committee and approved by the LCH SA Board.

Rule 17Ad–22(e)(4)(ii)	<i>Rule 17Ad–22(e) (4) (ii) requires a covered clearing agency that provides CCP services, and that is “systemically important in multiple jurisdictions” or “a clearing agency involved in activities with a more complex risk profile,” to establish, implement, maintain and enforce written policies and procedures reasonably designed to maintain additional financial resources, to the extent not already maintained pursuant to Rule 17Ad–22(e)(4)(i), at a minimum level necessary to enable it to cover a wide range of foreseeable stress scenarios, including but not limited to the default of the two participant families that would potentially cause the largest aggregate credit exposure for the covered clearing agency in extreme market conditions (hereinafter the “cover two” requirement).</i>
------------------------	--

In order to cover potential future exposures to clearing members under extreme but plausible market conditions, clearing members contribute to the service specific default funds. LCH SA maintains additional financial resources sufficient to cover a wide range of potential stress scenarios that include, but are not limited to, the default of the two clearing members and their affiliates that would potentially cause the largest aggregate credit exposure for LCH SA in extreme but plausible market conditions. Therefore, these default funds are sized to meet the largest two-member stress losses above margins (including those of clients and affiliates), applying a set of scenarios of extreme but plausible market conditions.

Stress losses on each clearing member’s positions, including those of its clients and affiliates, are modelled each day against the set of extreme but plausible stress scenarios used to size the default fund and netted against margins held. Their largest net stress loss is limited to a maximum of 45 percent of the relevant default fund (the daily Clearing Limit); members with weaker credit scores have lower limits. In order to reduce its net stress exposure, additional margin (Default Fund Additional Margin or (“**DFAM**”)) is called from any member with a net stress loss above this limit.

LCH SA maintains a record of historical stress test scenarios covering financial crises and exceptional trading days in the last 30 years. These are a well recognised set of past stresses in use today by most financial institutions. Any changes are subject to approval by the Executive Risk Committee and are reported to the LCH SA Risk Committee. Such changes will lead to the inclusion of scenarios covering new periods of increased market volatility which are added to the set of historical stress-test scenarios as soon as practicable.

In addition, LCH SA maintains and regularly reviews a suite of theoretical scenarios which entail either a remodelling of historically observed scenarios, with more extreme movements and/or de-correlation, or hypothetical scenarios including, for example, a sovereign default, price changes and yield curve shifts.

Together, the scenarios suite covers historical, antithetic, theoretical, de-correlation and Portfolio Specific Liquidity (PSL) stresses with mechanisms ensuring that the scenarios include extreme but plausible conditions for all clearing member portfolios.

The stress scenario suite, together with the default fund sizing methodology, are independently validated at least annually.

Rule 17Ad-22(e)(4)(iii)	<i>Rule 17Ad-22(e)(4)(iii) requires a covered clearing agency that is not subject to Rule 17Ad-22(e)(4)(ii) to establish, implement, maintain and enforce written policies and procedures reasonably designed to maintain additional financial resources, to the extent not already maintained pursuant to Rule 17Ad-22(e)(4)(i), at the minimum to enable it to cover a wide range of foreseeable stress scenarios, including the default of the participant family that would potentially cause the largest aggregate credit exposure for the covered clearing agency in extreme market conditions (hereinafter the “cover one” requirement).</i>
-------------------------	---

This rule is not applicable to LCH SA as LCH SA is subject to Rule 17Ad-22(e)(4)(ii).

Rule 17Ad-22(e)(4)(iv)	<i>Rule 17Ad-22(e)(4)(iv) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to include prefunded financial resources, exclusive of assessments for additional guaranty fund contributions or other resources that are not prefunded, when calculating the financial resources available to meet the standards under Rules 17Ad-22(e)(4)(i) through (iii), as applicable.</i>
------------------------	---

LCH SA’s risk controls include a range of financial resources to cover its credit exposures. These consist of margins provided by clearing members in respect of their outstanding positions; capital contributions from LCH SA and segregated, mutualised default funds of prefunded contributions from clearing members. These resources would be used in the following order to cover loss due to a clearing member’s default: the defaulting clearing member’s margin and default fund contributions; LCH SA’s capital contribution; and contributions to the relevant default fund from non-defaulting clearing members.

Rule 17Ad-22(e)(4)(v)	<i>Rule 17Ad-22(e)(4)(v) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to maintain the financial resources required under Rules 17Ad-22(e)(4)(ii) through (iii), as applicable, in combined or separately maintained clearing or guaranty funds.</i>
-----------------------	---

LCH SA assesses the sufficiency of the default funds through daily stress testing. Sufficiency is assessed with reference to the sum of the two largest stress test losses under extreme but plausible scenarios, plus the stress test losses of the relevant members’ affiliates and clients. This process involves the daily revaluation of each clearing member’s portfolio using a set of historical and theoretical stress test scenarios incorporating price and volatility shifts to estimate a worst-case loss in excess of that clearing member’s initial margin.

Stress test results are continually reviewed and monitored by the risk management function, with formal approval sought on changes to the framework as necessary from the LCH SA Board with recommendations made by the Risk Committee.



The LCH SA Chief Risk Officer is responsible for implementing and maintaining the framework, making recommendations as necessary to maintain a robust framework and reporting to, or seeking approval as necessary from, the LCH SA Board.

The stress testing framework is independently reviewed annually, with a full review of the coverage of the contracts cleared, model assumptions and parameters. This process also involves a review of stress test scenarios to ensure their plausibility and accuracy. In addition, ad hoc reviews are carried out when it is deemed that a change in the market may have a material impact on any scenario’s plausibility, or on the launch of a new product.

The monthly sizing process for a given Default Fund is to calculate for each clearing member group the potential loss on their cleared portfolio under every stress scenario for each day in the lookback period (3 months for CDSClear). No netting of Client and House portfolios, nor across Client accounts, nor affiliated entities are permitted. Secondly, the potential losses for each account are reduced by the margin liability for that account on that day. Negative outcomes (i.e. where the modelled portfolio loss exceeds margins held) are summed per scenario for each clearing member group. Thirdly, for each day and for each scenario, the largest two negative net stress outcomes are aggregated; these figures represent the daily ‘cover 2’ requirement for each scenario. Finally, the Default Fund value is computed as the largest such ‘cover 2’ requirement – over the lookback period - multiplied by 1.1, in order to include a 10 percent buffer. This process is performed separately for each of the service specific default funds.

The CDSClear default fund contribution per member is subject to the application of a floor (€10mm), as prescribed in the service-specific Supplement to the LCH SA Default Rules.

In addition, reverse stress testing is carried out regularly which examines whether plausible scenarios may exist which would produce more extreme results than those of the current suite of scenarios. The results, together with any recommended actions, are reported to the Risk Committee quarterly.

An internal policy sets out all the relevant steps relating to a new or changed model from initiation to independent validation, encompassing a regular model performance review and ensuring that any model changes are within the LCH SA Board’s Risk Appetite. Independent validation is conducted by an LCH SA internal independent specialist team or by external specialist independent firms at least annually. The results of the reviews are analysed internally and shared with the Risk Committee and regulators, together with recommendations of the independent teams and actions taken.

<p>Rule 17Ad–22(e)(4)(vi)</p>	<p><i>Rule 17Ad–22(e)(4)(vi) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to test the sufficiency of its total financial resources available to meet the minimum financial resource requirements under Rules 17Ad–22(e)(4)(i) through (iii), as applicable, by conducting a stress testing of its total financial resources at least once each day using standard predetermined parameters and assumptions. Rule 17Ad–22(e)(4)(vi) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to conduct a comprehensive analysis on at least a monthly basis of the existing stress testing scenarios, models, and underlying parameters and assumptions, and consider modifications to ensure they are appropriate for determining the covered clearing agency’s required level of default protection in light of current market conditions. When the products cleared or markets served by a covered clearing agency display high volatility or become less liquid, and when the size or concentration of positions held by the entity’s participants increases significantly, the rule requires a covered clearing agency to have policies and procedures for conducting comprehensive analyses of stress testing scenarios, models, or underlying parameters or assumptions more frequently than monthly. Rule 17Ad–22(e)(4)(vi) would also require a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for the reporting of the results of this analysis to the appropriate decision makers at</i></p>
-------------------------------	---

	<i>the covered clearing agency, including its risk management committee or board of directors, and to require the use of the results to evaluate the adequacy of and to adjust its margin methodology, model parameters, and any other relevant aspects of its credit risk management policies and procedures, in supporting compliance with the minimum financial resources requirements in Rules 17Ad-22(e)(4)(i) through (iii), as applicable.</i>
--	---

LCH SA maintains a record of historical stress test scenarios covering financial crises and exceptional trading days in the last 30 years. These are a well recognised set of past stresses in use today by most financial institutions. Any changes are subject to approval by the Executive Risk Committee and are reported to the LCH SA Risk Committee. Such changes will lead to the inclusion of scenarios covering new periods of increased market volatility which are added to the set of historical stress-test scenarios as soon as practicable.

In addition, LCH SA maintains and regularly reviews a suite of theoretical scenarios which entail either a remodelling of historically observed scenarios, with more extreme movements and/or de-correlation, or hypothetical scenarios including for example a sovereign downgrade, price changes and yield curve shifts.

Together, the scenarios suite covers historical, antithetic, theoretical and de-correlation stresses. The stress scenario suite, together with the default fund sizing methodology, is independently validated at least annually.

Rule 17Ad-22(e)(4)(vii)	<i>Finally, Rule 17Ad-22(e)(4)(vii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to require a conforming model validation for its credit risk models not less than annually or more frequently as may be contemplated by the covered clearing agency's risk management policies and procedures.</i>
-------------------------	---

The Model Governance, Validation and Review Policy sets out all the relevant steps relating to a new or changed model from initiation to independent validation, encompassing a regular model performance review and ensuring that any model changes are within the LCH SA Board's Risk Appetite. Independent validation is conducted by an LCH SA internal independent specialist team or by external specialist independent firms at least annually, and reported to the Chief Risk Officer. The results of the reviews are analysed internally and shared with the Risk Committee and regulators, together with recommendations of the independent teams and actions taken.

Rule 17Ad-22(e)(4)(viii)	<i>Rule 17Ad-22(e)(13)(i) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to address the allocation of credit losses it may face if its collateral and other resources are insufficient to fully cover its credit exposures, including the repayment of any funds the covered clearing agency may borrow from liquidity providers.</i>
--------------------------	---

All clearing members of LCH SA are bound by the Clearing rules. If a clearing member defaults, then the Clearing rules establish a waterfall to allocate the losses arising from the default. They are allocated in the following order:

1. Defaulter's margin
2. Defaulter's contribution to all LCH SA Default Funds
3. A pro rata allocation of LCH SA's capital calculated in accordance with Article 35 of Commission Delegated Regulation (EU) No 153/2013 RTS supplementing EMIR

4. Non-defaulters' funded contributions to the relevant default fund that covers the service(s) in which the defaulter has caused losses
5. A Refill/Assessment of the defaulting clearing from each non-defaulter equal to the non-defaulter's funded contribution to the default fund(s) in which the defaulter has caused losses. For exchange traded markets, €GCPlus and Repoclear, only one Refill may be called per default, and no more than three Refill contributions can be called in a six month period. For CDS, LCH SA can only call one assessment independently of the number of defaults during the post-default period (25 business days after issuance of notice)
6. Service continuity is either a daily loss allocation to non-defaulters based on cumulative gains, or daily allocation of losses pro rate the default fund contributions. Service continuity contributions are subject to a cap depending on the relevant service (CDS higher of 100M and Default fund contribution and other market the cap is equal to the Default fund contribution)
7. Finally, if service continuity contributions are not sufficient, LCH SA may invite non-defaulting clearing members to make voluntary contributions for service continuity

If there are further losses, - not covered by the previous phases of the waterfall, LCH SA will start the service closure phase when it will close out open contracts of the affected service and allocated any shortfall across those clearing members active on this segment. The process outlined above applies to both a single default and the default of multiple clearing members.

LCH SA has four default funds and waterfall in place for its markets (EquityClear/CommodityClear, CDSClear, Repoclear and €GCPlus).

Following the completion of the default management process, the relevant default fund enters a 30 calendar day "cooling off period". During the cooling off period, each default fund may be refilled to the level of its floor except for CDS market where the assessment is strictly limited to one-time default fund contribution during the post default period of 25 business days.

If the default fund during this time is not sufficient to cover the relevant risks, DFAM is called to ensure that the waterfall is fully funded and meets the cover 2 standard. At the end of the cooling off period, the relevant default fund is subject to a full recalculation and it is funded up to its recalculated level.

At all times, each non-defaulting clearing member is appropriately margined and a non-defaulter's margin is not used for default management.

Where a clearing members whose net stress losses exceed 45 percent of the default fund value are required to post daily DFAM, are applied at all times including during the management of a member default when the default fund value may be decreasing.

Cassa di Compensazione e Garanzia (CC&G), with which LCH SA has an interoperable link on the Italian debt, does not contribute to the Repoclear default fund. The Surviving CCP will set a price for the Inter CCP position and will retrieve the margins it has provided to the Defaulting CCP. The Surviving CCP will then perform cash settlement and liquidate the in-flight settlement. If the collateral deposited by the Defaulting CCP is not sufficient to run the cash settlement, the outstanding losses will be shared among Members active on the Italian segment through a loss allocation based on the positive close-out values.

Any capital expended by LCH SA as part of the default management process would be replenished from its own resources, as described in the Recovery Plan.

Rule 17Ad-22(e)(4)(ix)	<i>Rule 17Ad-22(e)(13)(ii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to describe its process to replenish any financial resources it may use following a member default or other event in which use of such resources is contemplated.</i>
------------------------	---

Please refer to Summary Narrative Disclosure of Rule *Rule 17Ad-22(e)(13)(ii)*.



## 4.5. Standard 5: Collateral

Rule 17Ad-22(e)(5)	<i>Rule 17Ad-22(e)(5) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to limit the assets it accepts as collateral to those with low credit, liquidity, and market risks, and set and enforce appropriately conservative haircuts and concentration limits if the covered clearing agency requires collateral to manage its own or its participants' credit exposures. In addition, Rule 17Ad-22(e)(5) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to include a notless-than-annual review of the sufficiency of a covered clearing agency's collateral haircuts and concentration limits.</i>
--------------------	--

Only financial instruments that are of high quality, highly liquid, and with low credit and market risk can be considered for LCH SA's eligible collateral list. LCH SA's risk policies take such criteria into consideration and set the standards for the acceptance of collateral. This policy framework, along with underlying procedures, incorporates development of appropriate haircuts, addresses the need for pro-cyclical adjustments and application of concentration limits and monitoring, and provides for responsive and comprehensive operational systems and processes.

### **LCH SA limits the assets it (routinely) accepts as collateral to those with low credit, liquidity, and market risks.**

LCH SA has a policy in place that sets out the criteria for collateral it deems eligible, which must take the form of instruments that are high quality, highly liquid and with low credit and market risk. The policy includes requirements that collateral must be in a currency in which LCH SA clears products, for which there is an established FX market with a published FX rate, and the domicile of the issuer must be approved by its Executive Risk Committee (ERCO); issuers of securities must be approved by Executive Risk Committee and have been assigned a minimum ICS; the security must have sufficient market liquidity, and it must be possible to establish mark-to-market value daily using observed prices from published sources.

Further, the policy incorporates a section on the management of exceptions to the policy. Any exceptions require a formal request to the Executive Risk Committee (ERCo) (with notification to Risk Committee) from the appropriate sub-committee of ERCo detailing:

- The exact nature of the exception requested,
- The grounds for an exception to be granted,
- How long the exception is needed,
- An action plan for transition to policy compliance, if appropriate, along with a target date.

### **LCH SA establishes prudent valuation practices and develop haircuts that are regularly tested and take into account stressed market conditions.**

LCH SA marks its collateral holdings to market daily, using observed market prices from published sources in accordance with internal LCH SA policy.

LCH SA is entitled to give any instrument or security lodged as collateral a zero value if it is found in any way to be unacceptable. Further, if, in the opinion of LCH SA, any asset which has been transferred to it by a clearing member as collateral is no longer either of sufficient value or otherwise acceptable to LCH SA, it shall be entitled to demand further collateral from such member.

LCH SA's internal policies define its collateral haircut framework. Collateral haircuts are made up of a base haircut as well as add-ons, and cover market risk, credit risk, wrong-way risk and FX risk in addition to concentration and liquidity risk. The methodology used takes into consideration various factors including the ability to realise the value of an asset posted as collateral, appropriate lookback periods, attributes of issuers and price correlations.

LCH SA makes public a list of eligible collateral assets along with their related haircuts on its website.

The collateral framework includes quarterly monitoring and review of haircuts, and a stress testing regime that includes extreme but plausible scenarios.

**In order to reduce the need for procyclical adjustments, LCH SA establishes stable and conservative haircuts that are calibrated to include periods of stressed market conditions, to the extent practicable and prudent.**

During the review of haircuts, the Executive Risk Committee may defer or phase changes to haircuts to avoid excessively procyclical effects, if deemed necessary. LCH SA internal policies require that a 10-year price history be used in haircut calibrations, including a stress period, thereby reducing the need for procyclical adjustments. A test for procyclicality of margin collateral haircuts is performed, on a quarterly basis, as part of every margin collateral haircut.

**LCH SA avoids concentrated holdings of certain assets where this would significantly impair the ability to liquidate such assets quickly without significant adverse price effects.**

LCH SA monitors clearing member collateral holdings for concentration risk. Internal risk policy and the LCH SA Clearing rules allow LCH SA to place concentration limits on particular asset types and to manage specific concentrations within collateral portfolios, it takes into consideration the ability to realise the value of an asset posted as collateral during normal and volatile market conditions. For securities collateral that is delivered via either bilateral or triparty mechanisms, LCH SA specifies concentration limits on issuers in line with the internal risk policy.

## 4.6. Standard 6: Margin

Rule 17Ad–22(e)(6)	<i>Rule 17Ad–22(e)(6) requires a covered clearing agency that provides CCP services to establish, implement, maintain and enforce written policies and procedures reasonably designed to cover its credit exposures to its participants by establishing a risk-based margin system that is monitored by management on an ongoing basis and regularly reviewed, tested, and verified.</i>
--------------------	--

The LCH SA risk management framework incorporates policies, which set out risk-based standards for margin models, as well as procedures and processes to calculate a clearing member’s risk position and initiate margin calls. The framework requires monitoring of clearing member positions, in addition to mark-to-market calculations and the collection of margin intraday if necessary. Margin levels are backtested daily, to assess whether the models are performing at the desired level of confidence (99.7%).

Rule 17Ad–22(e)(6)(i)	<i>Rule 17Ad–22(e)(6)(i) requires a covered clearing agency that provides CCP services to establish, implement, maintain and enforce written policies and procedures reasonably designed to result in a margin system that, at a minimum, considers and produces margin levels commensurate with the risks and particular attributes of each relevant product, portfolio, and market.</i>
-----------------------	---

LCH SA’s general framework of margining consists of the calculation and collection of intraday and end-of-day initial margin; add-ons and variation margin. Initial, add-ons and variation margin are collected from LCH SA’s clearing members to cover the risk that members are unable to fulfil their obligations as set out within the LCH SA Clearing rules and Clearing Member Agreement.

Initial margin performance is assessed on a daily basis through member portfolio backtesting. All of LCH SA’s margin models have to pass both the regulatory defined minimum backtesting threshold and the thresholds established by LCH SA’s Risk policies and procedures.

Credit exposures arise from latent market risk. Adverse changes in the value of the contracts and products can be attributed to a wide range of risk factors such as interest rates, FX rates, equity prices, commodity prices, credit spreads and implied volatility. Further credit exposures can arise from the cost of securing liquidation for concentrated positions and/or illiquid contracts.

LCH SA’s margin models are specifically designed to capture the key risk factors that affect the value of the contracts. The changes in the values of each risk factor and combinations of risk factors are assessed over a wide range of possible outcomes. The initial margin reflects the worst of these outcomes given a pre-defined confidence interval and holding period.

In instances where it is not possible to model all the risk factors that contribute to the potential adverse change in the value of a contract or product, an additional margin (ie. Add-ons) will be applied to mitigate this risk. For example, LCH SA has the ability to apply liquidity and concentration risk margin for large positions or some potential Wrong Way Risk.

LCH SA has processes in place to calculate and make regular margin calls. By having regular intraday margin calls, the period for which there is an uncovered exposure is minimised and therefore the risk of a clearing member payment failure leading to a large margin shortfall is mitigated.

Clearing member payment failure is, prima facie, an event of default. This is likely to trigger LCH SA’s default management process, which entails a wide range of measures that not only prevent the risk increasing but reduce and eliminate all open positions. The default management process is regularly rehearsed through default firedrills.

LCH SA has fully documented the margin methodology for all of its clearing services. In addition, as required by LCH SA’s risk policies, all margin models are annually reviewed by independent model validation specialists, as well as following either material changes or the introduction of a new model.

The results of the respective independent margin model validation, including any actions that LCH SA may undertake, are subject to a review by LCH’s internal risk governance, including an annual review by the LCH SA Board.

LCH SA discloses key components of the respective margin model on its public website. In addition, further information is made available to clearing members and is routinely discussed at LCH SA’s Risk Committee or in Product Advisory or Risk Working Groups, which have clearing member participation.

Rule 17Ad–22(e)(6)(ii)	<i>Rule 17Ad–22(e)(6)(ii) requires a covered clearing agency that provides CCP services to establish implement, maintain and enforce written policies and procedures reasonably designed to ensure that the margin system would mark participant positions to market and collect margin, including variation margin or equivalent charges if relevant, at least daily, and include the authority and operational capacity to make intraday margin calls in defined circumstances.</i>
------------------------	---

LCH SA marks clearing members’ positions to market and collects variation margin for all clearing services every day at minimum.

Variation margin for OTC contracts such as CDS is defined as:

$$(today's\ net\ present\ value - yesterday's\ net\ present\ value)$$

The net present value is the sum of the discounted cash-flows. The discount factors and forward rates are derived from zero coupon pricing curves; the hazard rates are derived from CDS Par Spread curves. The pricing curves are constructed using a bootstrapping approach with pre-defined interpolation methods such as linear or cubic spline from valid market data.

LCH SA has the authority and operational capability to make intraday margin calls for each clearing service. All intra-day margin calls account for adverse changes in both variation margin and initial margin. Margin calculations are based on intraday positions and valuations.

For the CDSClear service specifically, with the exception of contracts resulting from Swaption exercise, all trades are pre-margined such that a trade can only be accepted for clearing by CDSClear if both parties to the trade have enough excess collateral to cover for any potential margin increment due to the addition of such position to their portfolio. This incremental margin includes CDSClear Initial Margin amount as well as some additional margins. Therefore, all CDSClear members need to have a pre-set amount of excess collateral in order to be able to clear trades in intraday. This amount is replenished three times a day:

- During the first margin run (8:30am CET)
- At the first intraday margin call (11am CET)
- At the second intraday margin call (3pm CET)

LCH SA has also the authority and operational capability to make extraordinary margin calls accordingly with Section 4.2.4 of the CDS Clearing Rulebook and Section 2.17 of the Procedures to account for the potential VM impact on any member’s portfolio coming from sharp market moves since the last market data refresh.

Rule 17Ad–22(e)(6)(iii)	<i>Rule 17Ad–22(e)(6)(iii) requires a covered clearing agency that provides CCP services to establish, implement, maintain and enforce written policies and procedures reasonably designed to calculate margin sufficient to cover its</i>
-------------------------	--



	<i>potential future exposure to participants in the interval between the last margin collection and the close out of positions following a participant default.</i>
--	---

LCH SA’s initial margin model consists of both analytical (Value at Risk (VaR)-like) models and empirical models. The confidence interval and minimum level of coverage is determined by the LCH SA Board Risk Appetite and is set at 99.7 percent for all initial margin models.

**Analytical models:**

The key assumptions under the analytical models include a combination of the following:

- Return assumptions;
- Holding period assumptions;
- The empirical distribution of historical returns of each individual risk factor reflects a reasonable and likely distribution of potential outcomes over the holding period;
- Scaling of returns improves predictive power of the history;
- The choice of Exponentially Weighted Moving Average (EWMA) decay factor represents the most appropriate speed of adjustment to changes in market volatility;
- There is equal probability of scenario occurrence; and
- The defaulter’s portfolio is held constant over the chosen holding period.

CDSClear uses an analytical model as follows:

Market	Margin method used	Look-back period	Holding period
CDSClear	Portfolio Approach to Credit Par Spreads Scenarios (maximum between a historical simulation with and without volatility scaling)	Fixed start date of April 2007	5 days (7 days for client positions)

LCH SA also applies additional margins by clearing member to cover further credit, liquidity, and concentration risks that exceed the assumptions of the base calculation.

Procyclical margining changes are mitigated through features such as averaging the largest losses, the application of counter-cyclical buffer and the use of long-term margin floor. For example, the risk of overly procyclical margining in the CDSClear model is mitigated through features such as the averaging of the largest simulated losses; the use of a relatively long look-back period and the use of exponentially weighted moving average volatility scaling. The procyclicality is assessed through a yearly review, notified in Risk Committees.

**Empirical models:**

The key assumptions under the empirical models are:

- Return assumptions;
- Holding period assumptions;
- Historical correlations continue to hold true under normal market conditions;
- Log returns follow a normal distribution and constant volatility;
- There is equal probability of scenario occurrence;

- Offsets are applied only to offsetting positions and positions in the same direction are assumed to have unit correlation; and
- The defaulter’s portfolio is held constant over the chosen holding period.

**For all models:**

Margin rates may be adjusted to account for contracts which are affected by external events in the period under review, such as political, seasonal, and economic. All material adjustments to margin rates must be approved by the Executive Risk Committee and will be notified to the Board Risk Committee.

The additional margins such as concentration and liquidity margins are threshold based. The thresholds are calibrated using market data such as observed volumes and open interest on public exchanges or using survey derived data from participants in OTC markets. Thresholds derived from surveys are benchmarked to internal cleared trading data and subjected to regular review by the respective Default Management Group (“DMGs”).

CDSClear margin assumes a 5 day close out period for members, and 7 days for clients. The incremental 2 days for clients is to allow an opportunity to port to backups, though the formal legal porting window is only 24 hours. During fire drill exercises, the DMG is explicitly instructed to assume stressed markets for both the construction and pricing of the relevant hedge trades. In all exercises, the DMG has indicated that bulk of risk can be mitigated in the first day. The costs given by the DMG are compared against both external counterparties and survey results.

All CDSClear fire drill exercises have resulted in significant excess of margin (less than 30% erosion of defaulter’s resources). LCH SA is therefore comfortable that even a significant risk position could be closed out within margin levels inside the assumed close out period.

Rule 17Ad–22(e)(6)(iv)	<i>Rule 17Ad–22(e)(6)(iv) requires a covered clearing agency that provides CCP services to establish, implement, maintain and enforce written policies and procedures that uses reliable sources of timely price data and that use procedures and sound valuation models for addressing circumstances in which pricing data are not readily available or reliable.</i>
------------------------	--

LCH SA uses prices from public venues or exchanges, should price discovery occur at such venues, for all its clearing services. For clearing services where price discovery is based on reliance on broker-dealer quotes in OTC markets, such quotes are required. The broker-dealer prices can be obtained directly and via published composite or multi-contributor sources.

The same sources are used to build price history data that comprise the market input for the margin models.

LCH SA has policies and procedures that require prices to be available both intraday and at end of day and set out criteria for the quality and reliability of price sources used. There are price validation controls in place to identify when prices have become stale, changed value excessively or the provider ceases to publish price information.

Where a price is not readily available or reliable, CDSClear will utilise an alternative price source. In the event all sources become unreliable, the “missing rules” procedure will be followed; these involve deriving a price based on the previous day’s prices as well as broader market moves; such derived price will then be used as the input into the margin requirement calculations until a suitable replacement price source is found. If no suitable replacement exists, the contract may not be eligible for clearing and can be suspended.

LCH SA’s polices define the approach to ensuring the presence and coverage of price sources. If reliable price sources are not readily available this may constitute a barrier to enabling clearing for the respective product. If reliable prices are available but not hirstorical prices, for example in the case of a new issue that has not traded before, a proxy price will be used to generate the risk factor estimate required for the margin model. The LCH Group Risk Contract and Market Acceptability Policy describe the principles and factors to be considered prior to the acceptance of any new contract or market. For new cleared Contracts which are already traded, historical price moves and volatility levels should be assessed to ensure the product can be adequately valued, margined

and subjected to stress testing. New margin calculations may be introduced to manage the risk, or margins may be set in line with a similar highly correlated product. It must be demonstrated that any new margining methodology provides coverage in line with that expected of existing cleared markets.

The use of proxy data series must adhere to the principles above and requires supporting analysis to undergo peer review at the Model Working Group (MWG), internal risk approval and independent model validation. Usually such an initiative will require regulatory approval and therefore the proxy data methodology would form part of that application and subsequent review. Finally, all margin models are subject to independent review by an LCH SA internal independent specialist team or by an external specialist independent firm at least annually, and reported to the Chief Risk Officer and to the Executive Risk Committee. The review scope includes an evaluation of pricing models, market data and the use of proxies should they be used. The findings of the review are subject to LCH SA's risk governance review.

Rule 17Ad-22(e)(6)(v)	<i>Rule 17Ad-22(e)(6)(v) requires a covered clearing agency that provides CCP services to establish, implement, maintain and enforce written policies and procedures reasonably designed to ensure the use of an appropriate method for measuring credit exposure that accounts for relevant product risk factors and portfolio effects across products.</i>
-----------------------	--

LCH SA permits offsets within certain classes of products and only within a common default fund.

Where an offset does exist it must meet the following three criteria:

1. There must be an economic rationale for the offset;
2. The key risk factor correlations must be significant; and
3. The default management procedures must ensure the offsets are enduring.

Offsets are implemented directly by spread margins or inter-commodity spread credits between two contracts or indirectly by portfolio margin methods.

The estimate of the potential future exposure (PFE) is determined from an empirical model or an analytical historic simulation such as VaR or expected shortfall (used by CDS/Clear).

The analytical historic simulation method does not rely upon a single estimated measure of correlation. Rather, implicit temporal correlations are utilised for simulating potential loss scenarios. A sufficiently long look-back period includes periods of extreme volatility and associated breakdown in the long term correlations. The margin calculation is based on an average of extreme simulated tail losses and ensures that the most punitive scenarios relevant to any portfolio over the look-back period are used for estimating the PFE at the portfolio level. The PFE at the product level is measured from the tail loss for each product separately i.e. the non-diversified portfolio loss. The analytical (VaR Type) models are subject to a model risk framework containing the following three requirements:

- Reliable and representative price data on all contracts in the portfolio;
- Ability to price the portfolio across a wide range of historical and hypothetical scenarios;
- Portfolio margining aligned with default management procedures.

The robustness of LCH SA's portfolio margin methodologies is measured daily through margin erosion and backtesting analysis. Model performance is assessed at member portfolio level, risk factor level and stylised portfolio level. The stylised (hypothetical) portfolios validate margin performance for positions that contain a high degree of price dependency such as stylised calendar spreads and relative value positions. Regular sensitivity testing evaluates changes in recent correlations.

Rule 17Ad-22(e)(6)(vi)	<i>Rule 17Ad-22(e)(6)(vi) requires a covered clearing agency that provides CCP services to establish, implement, maintain and enforce written policies and</i>
------------------------	--

	<p><i>procedures reasonably designed to regularly review, test, and verify its risk-based margin system by conducting backtests at least once each day and conducting a sensitivity analysis of its margin model and its parameters and assumptions for backtesting at least monthly, and considering modifications to ensure the backtesting practices are appropriate for determining the adequacy of its margin model. Rule 17Ad-22(e)(6)(vi) also requires a covered clearing agency's policies and procedures to include conducting a sensitivity analysis more frequently than monthly when the products cleared or markets served display high volatility or become less liquid, or when the size or concentration of positions held by participants increases or decreases significantly. Rule 17Ad-22(e)(6)(vi) also requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to report the results of such sensitivity analysis to appropriate decision makers at the covered clearing agency, including its risk management committee or board of directors, and use these results to evaluate the adequacy of and adjust its margin methodology, model parameters, and any other relevant aspects of its credit risk management policies and procedures.</i></p>
--	--

Initial margin coverage is backtested on a daily basis by comparing the portfolio initial margin with ex post clean profit and loss. The backtest results are reviewed daily by the LCH SA risk management function with monthly summaries shared at each LCH SA Risk Committee. If backtesting suggests the margin coverage target cannot be met, LCH SA will conduct further investigation into the performance of the margin model. Additional analysis is performed on a monthly basis to investigate underlying causes of margin coverage breaches and identify any model weaknesses with respect to specific products, risk factors and market conditions.

LCH SA performs sensitivity tests for the CDSClear analytical model. The tests for the analytical models examine sensitivities to certain portfolio types, volatility scaling assumptions, risk factor return assumptions, risk factor level dependence, EWMA decay factor sensitivity and wrong way risk parameters changes.

Tests are performed daily on a continuous basis and quarterly reports are shared with the risk management function.

Potential shortcomings may arise for a number of different reasons such as the model does not capture all the risk factors, the model is overly procyclical, the model does not respond to new volatility patterns, the model exhibits excessive ghosting effects, model backtesting breaches are excessive or clustered, or market conditions breach the model assumptions.

In those cases, LCH SA will call additional margin for portfolios exhibiting excessive margin erosion until the model is updated and performance issues are addressed.

Backtesting results by service are disclosed on the LCH SA website.

The results of the sensitivity tests are for internal purposes only and are not disclosed to members or clients.

<p>Rule 17Ad-22(e)(6)(vii)</p>	<p><i>Rule 17Ad-22(e)(6)(vii) requires a covered clearing agency that provides CCP services to establish, implement, maintain and enforce written policies and procedures reasonably designed to require not less than annually a conforming model validation of the covered clearing agency's margin system and related models.</i></p>
--------------------------------	--

LCH SA's margin models are validated on an annual basis considering data over the past year. The independent review of margin models considers all available backtesting and stress testing results. In addition, it tests the

performance of the models across various levels of confidence, and tests and calibrates the underlying parameters of models. In addition, LCH SA's risk policies and outcomes are reviewed on a regular basis by the LCH Risk Committee.

The model review evaluates the validity of the margin model in theory and its performance in practice, and also appraises its parameters and assumptions. The review considers any changes in market practice and recent market conditions.

Material changes to margin methodology are subject to LCH SA's internal risk governance process, which includes both internal review and independent validation of the model, and must receive approval from both the Executive Risk Committee and the LCH Board.

The model validation report and recommendations, for each LCH SA clearing service, are notified to internal risk governance, the Internal Audit department and to relevant Regulators.

## 4.7. Standard 7: Liquidity Risk

Rule 17Ad–22(e)(7)	<i>Rule 17Ad–22(e)(7) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to effectively measure, monitor, and manage the liquidity risk that arises in or is borne by it, by meeting, at a minimum, the ten requirements specified in the rule.</i>
--------------------	---

LCH SA has robust arrangements for the management of liquidity risk during business-as-usual and in a default situation. An operational liquidity target is set and closely monitored by LCH SA and stress testing is performed using conservative assumptions. LCH SA does not rely on supplemental liquid resources to meet its stressed liquidity needs.

Rule 17Ad–22(e)(7)(i)	<i>Rule 17Ad–22(e)(7)(i) requires that a covered clearing agency’s policies and procedures be reasonably designed to ensure that it maintains sufficient liquid resources in all relevant currencies to effect same-day and, where appropriate, intraday and multiday settlement of payment obligations with a high degree of confidence under a wide range of potential stress scenarios that includes the default of the participant family that would generate the largest aggregate payment obligation for it in extreme but plausible market conditions.</i>
-----------------------	---

LCH SA has robust arrangements for the management of liquidity risk during business-as-usual and in a default situation. An operational liquidity target is set and closely monitored by LCH SA and stress testing is performed using conservative assumptions, including the default of the two member groups that would generate the largest liquidity need, to determine the adequacy of its liquid resources. Given its banking licence, LCH SA has full access to ECB central bank money in Euros to manage liquidity against available eligible collateral.

LCH SA’s framework for the management of liquidity risk is set out in its Liquidity Risk Policy, which is reviewed by the LCH SA Risk Committee and approved by the LCH SA Board. The policy sets out the framework within which liquidity risks must be managed, including setting out sources of liquidity and liquidity needs, the nature and frequency of liquidity assessment, limits and stress testing.

The framework is further detailed in a series of underlying detailed internal procedures.

LCH SA’s liquidity policy considers two key sources of liquidity needs, as well as other potential outflows that might further deplete liquidity resources. The two main sources of liquidity needs are:

- Outflows that arise in the normal course of operations (i.e. not due to member default), such as repayment of excess cash upon clearing member request, overall reduction in initial margin resulting from clearing members’ reduction or close-out of positions, clearing member request to substitute non-cash collateral for cash collateral or to facilitate settlement (including for settlement fails); and
- The potential liquidity need in the event of clearing member default(s), thereby requiring LCH SA to:
  - Fulfil the settlement obligations of the defaulting clearing member(s) and,
  - Pay variation margin to non-defaulting clearing members on the positions held by the defaulting clearing member(s). There may also be hedging costs and potential losses due to the liquidation of the defaulting clearing member(s) cleared positions and/or collateral lodged with respect to those cleared positions.

The liquidity policy also considers other potential liquidity needs such as those generated by payment delays or disruptions, as well as the failure of an investment counterparty to return cash at the maturity of an investment.

Note that in the absence of a clearing member default, cashflows arising from the clearing activity itself are matched across LCH SA's books.

The size of LCH SA's liquidity requirement is an aggregate of the sources of liquidity needs, which are assessed on a daily basis. Liquidity risk is managed on a centralised basis taking into consideration the aggregate liquidity needs across all services.

Rule 17Ad-22(e)(7)(ii)	<i>Rule 17Ad-22(e)(7)(ii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to ensure that it holds qualifying liquid resources sufficient to meet the minimum liquidity resource requirement in each relevant currency for which the covered clearing agency has payment obligations owed to clearing members.</i>
------------------------	--

LCH SA has robust arrangements for managing its liquidity risks during business-as-usual and during a default through its access to ECB facilities. LCH SA's primary liquid resources consist of cash and highly marketable securities (including those provided by a defaulted member as collateral and received as settlement of the defaulter's cleared positions). LCH SA's liquid resources are managed in compliance with its internal investment and liquidity policies to ensure capital preservation and availability of liquidity to meet stressed liquidity requirements. Investments are managed such that maturing investment cash flows each day are sufficient to cover estimated operational needs. A further proportion of the portfolio is maintained in highly liquid government securities that can be sold or used as repo collateral to generate further liquidity as required.

LCH SA has processes that can be invoked in stressed environments to raise liquidity. These processes make assumptions around some activities, which are not utilised in a Business as Usual environment, and hence care has to be taken to ensure that these assumptions are realistic. To ensure that this is the case, LCH SA undertakes an exercise of 'War Games' to test the assumptions. These activities test market/counterparty appetite for securities that LCH SA do not actively invest in or sizes/concentrations of exposures that are outside the day to day activity. The output from these scenarios is used for the quarterly review of the liquidity plan and provides the basis for the draw down assumptions.

In addition, LCH SA has prearranged funding arrangements in the form of completed Global Master Repurchase Agreements (GMRA) with a number of high quality counterparties, including counterparties with particular expertise and capacity in specific collateral markets. LCH SA engages in reverse repurchase transactions for investment purposes, and has a regular programme of test repurchase transactions, which are reported through the risk governance process. LCH SA also has prearranged funding arrangements with major (I)CSDs or commercial banks.

LCH SA's liquidity policy requires that a minimum buffer be maintained above the stress tested liquidity resource requirement on a cover two basis and that remedial action be taken if the buffer is eroded.

Rule 17Ad-22(e)(7)(iii)	<i>Rule 17Ad-22(e)(7)(iii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to ensure it uses accounts and services at a Federal Reserve Bank, pursuant to Section 806(a) of the Clearing Supervision Act, or other relevant central bank, when available and where determined to be practical by the board of directors of the covered clearing agency, to enhance its management of liquidity risk.</i>
-------------------------	---

LCH SA's internal risk policy sets a preference for the use mainly of central bank services where available.

As a French banking institution, LCH SA has access through the Eurosystem to the Central Bank open market operations and to the standing facilities.

LCH SA has access to the central bank facilities of the Eurosystem for Euros, which enable clearing business related payments and settlement to be conducted in central bank money.

LCH SA has access to the Banque de France 3G credit line provided by Banque de France which can be used for intraday need requirements and access to liquidity on an intraday basis if needed. Furthermore, the cash that has not been invested is deposited in overnight with the Banque de France.

For currencies other than the Euro, which concerns a small minority of transactions, LCH SA uses commercial payment bank services.

LCH SA uses each of the above accounts to facilitate its payment and settlement activity in the relevant currency.

Rule 17Ad–22(e)(7)(iv)	<i>Rule 17Ad–22(e)(7)(iv) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to ensure it undertakes due diligence to confirm that it has a reasonable basis to believe each of its liquidity providers, whether or not such liquidity provider is a clearing member, has sufficient information to understand and manage the liquidity provider’s liquidity risks, and the capacity to perform as required under its commitments to provide liquidity.</i>
------------------------	---

The main objectives of the Collateral and Liquidity Management team are liquidity and capital preservation. All products are invested in very liquid government issuances, supranational and agencies securities with short term maturities according to principles and rules of LCH Group policies. The portfolio securities are exclusively in ECB eligible assets for reverse repo and asset purchases.

LCH SA does not rely on specific liquidity providers to meet its minimum required qualifying liquidity resources as it holds sufficient qualifying resources by way of highly marketable collateral held in custody and investments, as well as the Banque de France facilities.

LCH SA carries out appropriate ongoing due diligence on counterparties as required by its Counterparty Credit Risk Policy.

LCH SA maintains a Liquidity Plan that describes a range of options to generate liquidity if the shortfall is not fully met with maturing transactions. The choice and prioritisation of use will depend on timing and duration of liquidity requirements and market conditions. For short term liquidity requirements funding is likely to focus on ECB liquidity, repo and other borrowing mechanisms. For longer term or structural changes to the liquidity profile the recourse is likely to be to the sale of assets. In terms of Euro management, LCH SA has access to the ECB liquidity through the open market operations and standing facilities. In addition, LCH SA takes title to non-cash collateral which can be used to generate liquidity.

Some of the options LCH SA would use to address a liquidity shortfall are applied on an ongoing basis as part of LCH SA’s standard investment and liquidity management activities e.g. maturing investments, and the purchase and sale of securities. To ensure that it could raise liquidity through using the tools options that are not used on a day-to-day basis (e.g. reverse repo in bilateral orin triparty, securities sales...). LCH SA conducts regular exercise of ‘war games’. These tests trades are undertaken by the collateral and liquidity management team. The output from these scenarios is used on a quarterly basis to review the liquidity plan at least once a year.

Rule 17Ad–22(e)(7)(v)	<i>Rule 17Ad–22(e)(7)(v) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to ensure that the covered clearing agency maintains and, on at least an annual basis, tests with each liquidity provider, to the extent practicable, its procedures and operational capacity for accessing each type of relevant liquidity resource.</i>
-----------------------	---



On top of the above description LCH SA performs on regular basis dedicated operational capacity tests and dedicated fire drills in order to ensure the efficiency of the process and the capacity to access the relevant liquidity resources.

<p>Rule 17Ad-22(e)(7)(vi)</p>	<p><i>Rule 17Ad-22(e)(7)(vi)(A) through (C) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to determine the amount and regularly test the sufficiency of the liquid resources held for purposes of meeting the minimum liquid resource requirement of Rule 17Ad-22(e)(7)(i) by (A) conducting a stress test of its liquidity resources at least once each day using standard and predetermined parameters and assumptions; (B) conducting a comprehensive analysis of the existing stress testing scenarios, models, and underlying parameters and assumptions used in evaluating liquidity needs and resources, and considering modifications to ensure they are appropriate for determining the covered clearing agency's identified liquidity needs and resources in light of current and evolving market conditions at least once each month; and (C) conducting a comprehensive analysis of the existing stress testing scenarios, models, or underlying parameters or assumptions used in evaluating liquidity needs and resources more frequently when products cleared or markets served display high volatility or become less liquid, when the size or concentration of positions held by participants increases significantly, or in other circumstances described in the covered clearing agency's policies and procedures. Rule 17Ad- 22(e)(7)(vi)(D) also requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to result in reporting the results of the analyses performed under Rule 17Ad-22(e)(7)(vi)(B) and (C) to appropriate decision makers, including the risk management committee or board of directors, at the covered clearing agency for use in evaluating the adequacy of and adjusting its liquidity risk management framework.</i></p>
-------------------------------	--

LCH SA carries out daily and intraday liquidity stress testing which compares stress needs for liquidity against the stressed resources available.

A daily liquidity stress testing report is provided each day to senior risk management including the Chief Risk Officer. It is also circulated to the Collateral and Liquidity Management ("CaLM"), compliance, finance, and operations functions. The stress tests take a conservative set of assumptions about potential outflows and the ability of LCH SA to liquidate assets, and assume the default of the two largest members, along with their affiliates and clients, that have the largest liquidity requirements. In addition to the cover two liquidity stress tests, LCH SA also runs several additional extreme but plausible stress-test scenarios, such as the impact of a regional economic crisis, large margin outflows and the default of multiple clearing participants. The results of these additional stress tests are used for management information.

The liquidity stress tests take into account liquidity risks arising from the different relationships LCH SA has with the entities, or members of the same group, and assume that they may simultaneously default in their capacities as clearing member, as investment counterparty, and as correspondent or custodian. LCH SA's stress testing seeks to ensure that it is able to settle its payment obligations on time in this circumstance. As part of the quarterly liquidity reverse stress testing scenario suite, both the availability of the liquid assets and the size of the liquid liabilities are stressed in different ways to determine whether it would be plausible to be left with a liquidity deficit (i.e. the Liquidity Coverage Ratio is under 100%).

The liquidity risk policy and liquidity plan are reviewed annually with any changes reviewed and approved by the Risk Committee and the LCH SA Board. The liquidity risk management framework is subject to independent validation annually by an LCH SA internal independent specialist team or by external specialist independent firms, and reported to the Chief Risk Officer.

Rule 17Ad-22(e)(7)(vii)	<i>Rule 17Ad-22(e)(7)(vii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to result in performing an annual or more frequent model validation of its liquidity risk models.</i>
-------------------------	---

All liquidity risk models are reviewed at least annually during the yearly independent model validation review. All outcomes and recommendations may lead to a dedicated action plan and are circulated to internal Risk governance.

Rule 17Ad-22(e)(7)(viii)	<i>Rule 17Ad-22(e)(7)(viii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to address foreseeable liquidity shortfalls that would not be covered by its liquid resources and seek to avoid unwinding, revoking, or delaying the same-day settlement of payment obligations.</i>
--------------------------	---

LCH SA maintains a Recovery Plan reviewed at least annually, or following material changes and approved by the Board. The Recovery Plan sets out the steps that LCH SA should take in order to maintain the continuity of its services, should such continuity be threatened. This plan takes into consideration the triggers for such a plan, the governance steps LCH SA must take to invoke the plan and a number of recovery tools that are available to LCH SA. Each available tool is assessed for its impacts to LCH SA’s clearing members. From a liquidity perspective, the Recovery Plan considers possible constraints on access to each source of liquidity, including whether they would be available during periods of market stress or during a ‘liquidity crisis’ (a liquidity crisis can reflect market-wide conditions, or be linked to a particular market). LCH SA incorporates restricted access to liquidity sources in its liquidity stress testing.

Rule 17Ad-22(e)(7)(ix)	<i>Rule 17Ad-22(e)(7)(ix) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to describe its process for replenishing any liquid resources that it may employ during a stress event.</i>
------------------------	--

To ensure it maintains sufficient liquid resources, the Liquidity Risk Policy requires LCH SA to maintain a minimum liquidity buffer above its total liquidity requirement. This ensures that the CCP has sufficient liquidity to meet intraday and daily liquidity needs following the default of the two clearing members (with their affiliates and clients) with the largest liquidity requirements. The actions that LCH SA would take to address uncovered liquidity shortfall or replenish its liquidity resources are described in the Liquidity Plan and Recovery Plan. The Liquidity Plan covers the tools that could be used to fund operational and default liquidity needs. LCH SA typically holds a substantial buffer of liquid resources in excess of its liquidity coverage ratio (“**LCR**”) required to meet the projected operational and default liquidity requirement. The Liquidity Plan and the Recovery Plan consider possible constraints on access to each source of liquidity, including whether they would be available during periods of market stress or during a ‘liquidity crisis’ (a liquidity crisis can reflect market-wide conditions, or be linked to a particular market). LCH SA incorporates restricted access to liquidity sources in its liquidity stress testing.

Rule 17Ad-22(e)(7)(x)	<i>Finally, Rule 17Ad-22(e)(7)(x) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to ensure that it, at least once a year, evaluates the feasibility of maintaining sufficient liquid resources at a minimum in all relevant currencies to effect same-day and, where appropriate, intraday and</i>
-----------------------	--

	<p><i>multiday settlement of payment obligations with a high degree of confidence under a wide range of foreseeable stress scenarios that includes, but is not limited to, the default of the two participant families that would potentially cause the largest aggregate payment obligation for the covered clearing agency in extreme but plausible market conditions if the covered clearing agency provides CCP services and is either systemically important in multiple jurisdictions or a clearing agency involved in activities with a more complex risk profile.</i></p>
--	---

LCH SA liquidity monitoring always considers the liquidity needs that would be generated in the event of default of the two largest clearing member groups, including affiliates and investment exposures, in extreme but plausible market conditions, to ensure sufficient liquidity resources are maintained to cover this requirement. LCH SA runs reverse stress test scenarios, on a quarterly basis, in order to stress the main liquidity risk drivers such as margin outflows or sovereign downgrades and their impact on the LCR and the liquidity buffer. The outcomes of the reverse stress tests are presented and approved by the risk governance.

LCH SA also models its liquidity to ensure it has sufficient resources to cover ongoing operations in a business as usual situation. With this respect, LCH SA carries out daily liquidity stress tests based which are reported to senior management within LCH SA's risk and CaLM functions.

#### 4.8. Standard 8: Settlement Finality

Rule 17Ad-22(e)(8)	<i>Rule 17Ad-22(e)(8) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to define the point at which settlement is final to be no later than the end of the day on which the payment or obligation is due and, where necessary or appropriate, intraday or in real time.</i>
--------------------	---

The CDS Clearing Documentation requires that all margins and clearing-related cash payments denominated in Euros are made via TARGET2-Securities (“T2S”) within the mandatory timeframes established by the European Central Bank. T2S has been notified by the French government to the European Commission as a designated payment system for the purposes of the Settlement Finality Directive. In accordance with French law provisions implementing the Settlement Finality Directive, payment instructions submitted to a designated system are irrevocable and final when such instructions are effected (i.e., when the relevant account is credited or debited within the payment system on the basis of the power of attorney issued by the relevant clearing member in favour of LCH SA).

In addition, clearing-related cash payments denominated in USD are settled through Bank of New York Mellon: debiting or crediting the relevant accounts will basically occur at the same time slots as some of those applicable to payments via T2S and in any case, crediting the relevant clearing member’s account will occur by no later than 16:30 CET on that day. LCH SA has implemented specific contractual arrangements and procedures to secure the settlement in USD.

## 4.9. Standard 9: Money Settlements

Rule 17Ad–22(e)(9)	<i>Rule 17Ad–22(e)(9) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to conduct its money settlements in central bank money, where available and determined to be practical by the board of directors of the covered clearing agency, and minimizes and manages credit and liquidity risk arising from conducting its money settlements in commercial bank money if central bank money is not used by the covered clearing agency.</i>
--------------------	--

Practical considerations are, for example, the existence of policy determinations by the central bank of the currency or local legal frameworks that do not permit access to central bank accounts by CCPs, or else restrict the provision of such accounts to domestic CCPs or those deemed to be systemically important in that jurisdiction.

LCH SA uses the euro Central Bank money (i.e T2S) for the transfer of funds to and from clearing members. Clearing members must maintain a T2S accounts directly or indirectly through a payment agent.

For money settlement purposes, commercial banks are subject to specific credit and operational criteria as laid out in LCH SA's internal policy. The rules governing the commercial banks ensure that LCH SA does not have credit exposure to these banks. LCH SA sets out criteria for commercial banks, which include:

- A minimum ICS calculated in accordance with and as required by LCH SA's internal policies;
- Operational requirements around SWIFT messaging; and
- Adherence to LCH SA procedures.

LCH SA reserves the right to apply more stringent criteria when, in its assessment, a Commercial bank's financial resources or operational capability are not commensurate with its level of business.

LCH SA calculates ICSs for its commercial banks. The score is calculated using quantitative and qualitative factors that include creditworthiness and capitalisation, the bank's regulation, supervision, access to liquidity and operational reliability. Each commercial bank's rating is subject to a formal assessment at least once per year. Other factors are taken into account during the wider on-boarding process. LCH SA's risk management policies set the standards for the selection of commercial banks, and monitoring of exposures that arise from commercial bank activities on a daily (and where appropriate, intraday) basis.

LCH SA has unsecured exposure intraday limits for commercial banks. These limits are monitored intraday and capped to 75 per cent of LCH SA's capital base. LCH SA does not conduct money settlements on its own books.

#### 4.10. Standard 10: Physical Delivery Risks

Rule 17Ad-22(e)(10)	<i>Rule 17Ad-22(e)(10) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to establish and maintain transparent written standards that state its obligations with respect to the delivery of physical instruments and operational practices that identify, monitor, and manage the risk associated with such physical deliveries.</i>
---------------------	---

Upon the occurrence of a credit event with respect to a reference entity underlying a CDS cleared by LCH SA, it is possible that the relevant ISDA Credit Derivatives Determinations Committee determines not to hold an auction, in which case the relevant CDS may be settled by physical settlement as further described under “Standard 12” section (Rule 17Ad-22(e)(12) : Exchange-of-Value Settlement Systems). The process for effecting physical settlement upon the occurrence of a credit event is set out in full in the CDS Clearing Documentation.

#### 4.11. Standard 11: CSDs

Rule 17Ad-22(e)(11)	<p><i>Rule 17Ad-22(e)(11)(i) requires a covered clearing agency that provides CSD services to establish, implement, maintain and enforce written policies and procedures reasonably designed to maintain securities in an immobilized or dematerialized form for their transfer by book entry, ensure the integrity of securities issues, and minimize and manage the risks associated with the safekeeping and transfer of securities.</i></p> <p><i>Rule 17Ad-22(e)(11)(ii) requires a covered clearing agency that provides CSD services to establish, implement, maintain and enforce written policies and procedures reasonably designed to implement internal auditing and other controls to safeguard the rights of securities issuers and holders, prevent the unauthorized creation or deletion of securities, and conduct periodic and at least daily reconciliation of securities issues it maintains.</i></p> <p><i>Finally, Rule 17Ad-22(e)(11)(iii) requires a covered clearing agency that provides CSD services to establish, implement, maintain and enforce written policies and procedures reasonably designed to protect assets against custody risk through appropriate rules and procedures consistent with relevant laws, rules, and regulations in jurisdictions where it operates.</i></p>
---------------------	---

LCH SA does not provide any CSD services.

#### 4.12. Standard 12: Exchange-of-Value Settlement Systems

Rule 17Ad-22(e)(12)	<i>Rule 17Ad-22(e)(12) requires a covered clearing agency, for transactions that involve the settlement of two linked obligations, to establish, implement, maintain and enforce written policies and procedures reasonably designed to eliminate principal risk by conditioning the final settlement of one obligation upon the final settlement of the other, regardless of whether the covered clearing agency settles on a gross or net basis and when finality occurs.</i>
---------------------	---

A situation involving the settlement of linked obligations would arise upon the occurrence of a credit event with respect to a reference entity underlying a CDS cleared by LCH SA. It is possible that if the relevant ISDA Credit Derivatives Determinations Committee determines not to hold an auction, the relevant CDS may be physically settled. Physical settlement involves the exchange of a credit obligation, for example a bond or a loan, against a cash payment under the terms of the CDS trade.

LCH SA has implemented two processes to eliminate principle risk relating to physical settlement.

- Where a bond must be delivered and a delivery versus payment settlement system is available, this system must be used to ensure that settlement of both the asset transfer and the cash payment occur.
- Where an asset such as a loan must be delivered and no delivery versus payment system is available, LCH SA will act as an escrow agent to ensure the transaction is successful. In this situation, the cash payer will transfer the funds to LCH SA; which, in turn, will inform the loan holder that the funds have been received and that the loan can be transferred. The cash payer will then confirm receipt of the loan to LCH SA which will then make the cash payment to the CDS buyer (that transferred the loan) to complete the transfer.

The process for conducting physical settlement upon the occurrence of a credit event is set out in full in the CDS Clearing Documentation.

#### 4.13. Standard 13: Participant-Default Rules and Procedures

Rule 17Ad-22(e)(13)	<i>Rule 17Ad-22(e)(13) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to ensure that the covered clearing agency has the authority and operational capacity to take timely action to contain losses and liquidity demands and continue to meet its obligations in the event of a participant default.</i>
---------------------	---

The LCH SA Clearing rules contains default rule provisions that set out LCH SA’s rights and obligations in the event of a clearing member default. It contains provisions in relation to the management of the defaulter’s positions and the allocation of losses.

Rule 17Ad-22(e)(13)(i)	<i>Rule 17Ad-22(e)(13)(i) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to address the allocation of credit losses it may face if its collateral and other resources are insufficient to fully cover its credit exposures, including the repayment of any funds the covered clearing agency may borrow from liquidity providers.</i>
------------------------	---

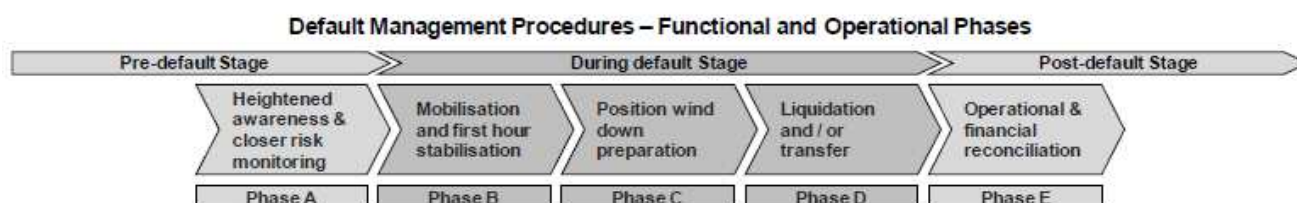
LCH SA’s Default Rules, contained in its Clearing rules, set out that it is entitled to place a clearing member in default if it appears to LCH SA that the clearing member is unable, or is likely to become unable, to meet its obligations in respect of one or more contracts. The Clearing rules set out a non-exhaustive list of events which may show that a clearing member is or is likely to become unable to meet its obligations and maybe declared in default. If a clearing member becomes subject to any insolvency event, it will also be declared in default.

The Clearing rules set out the steps that LCH SA may take in respect of a defaulter, including entering into contracts to hedge market risk, selling any security, porting client accounts of that clearing member to another clearing member, liquidating the defaulter’s proprietary portfolio and/or any client accounts of that clearing member which could not be ported to another clearing member) and generally taking such action as LCH SA may deem necessary for its protection. The sequence of actions will be determined by a number of factors, including size and characteristics of the defaulted member’s portfolio and the market environment.

All LCH SA clearing services have a Default Management Process (“DMP”) and a specific default management instruction or annex, which is part of the overall Clearing rules.

All significant decisions will be taken by the LCH SA CEO supported by the Default Crisis Management Team (“DCMT”).

The functional and operational phases of default management can be shown as follows:



On calling a default, the LCH SA CEO will convene the DCMT, which will be responsible for the overall management of the default.

The DCMT will instruct the head of each impacted clearing service to convene a DMG, which comprises LCH SA staff and, for some services, clearing members. Where representatives of clearing members are seconded to a



DMG of LCH SA for the purpose of default management, they act on behalf of LCH SA and appropriate confidentiality arrangements are in place.

DMGs will request approval for all significant decisions to the DCMT. The Default Rules set out how LCH SA shall meet any losses arising from a default, including the use of collateral provided by the defaulter, LCH SA's own funds and the default fund(s) and the remainder of the waterfall.

The non-defaulting members are incentivised to participate in the DMP and in auctions to safeguard their own default fund contributions and to ensure the continued operation of the markets.

The Clearing rules also set out the order in which LCH SA shall reduce or bear its losses. In the first instance, losses are met by applying any collateral provided by the defaulter and then by recourse to the defaulter's contribution to the default fund(s). If those are exhausted, then further losses are met by payment from LCH SA's own funds (also referred to as skin in the game). Thereafter losses are met the non-defaulting clearing member's contribution to the default fund(s) in respect of the relevant default fund.

Subsequently LCH SA will request a refill/assessment of the default fund contribution of non-defaulting clearing member. For CDS Clear, Refill is performed as soon as the loss exceeds the resources of the defaulter and the CCP's skin in the game.

The value of Refill/Assessment contributions LCH SA may call from each service clearing member in respect of one default is capped at an amount equal to that clearing member's funded contribution to the relevant default fund at the time of the default.

Should all Refill/Assessment contributions available to LCH SA be exhausted, a service continuity (loss distribution phase) phase will be triggered. The tool will charge each non-defaulting member on a daily basis a Loss Distribution Charge if there are any uncovered credit losses.

For CDS Clear, VM haircutting applies by reducing the cumulative net gains due to non-defaulting members during the loss distribution period by the Distribution Haircut fraction (LCH SA Uncovered Loss / Total Cash Gains) in order to allocate uncovered credit losses incurred from the member default. For CDS the loss distribution charges are based upon a VM haircut process and the limits is the higher of 100 million Euro and Default contribution.

The voluntary service continuity phase could be triggered when the losses accumulated from the default cannot be covered by default fund, assessment and service continuity phase. Upon this trigger, all non-defaulting members will be informed that all relevant resources are eroded and requested to provide additional resources in order to avoid a Service Closure phase on a voluntary basis.

If all resources from service continuity are eroded and the additional resources from a voluntary service continuity are not sufficient to cover the relevant loss, LCH SA will start the Service Closure phase. Within this phase, LCH SA will cease clearing activities and perform cash settlement. LCH SA will perform a final allocation of losses to its clearing members based upon gains haircutting. On successful completion of the default management process, a cooling-off period or post default period is triggered. The default fund will remain unchanged during this period.

For CDS Clear, LCH SA can only use one assessment of the default fund throughout the post default period. If the default fund is below the required size, LCH SA will request additional margin so that overall coverage will remain at the adequate level.

Rule 17Ad-22(e)(13)(ii)	<i>Rule 17Ad-22(e)(13)(ii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to describe its process to replenish any financial resources it may use following a member default or other event in which use of such resources is contemplated.</i>
-------------------------	---

For CDS Clear, Refill is performed as soon as the loss exceeds the resources of the defaulter and the CCP's skin in the game, LCH SA has the right to call additional funds from non-defaulting service clearing members ('unfunded contributions'). The value of unfunded contributions LCH SA may call from each service clearing member in

respect of a given default is capped at that clearing member's funded contribution to the relevant default fund at the time of the default.

On successful completion of the default management process, LCH SA will recalculate the default fund amount.

If another default occurs within the 25-day post-default period, the end of that post-default period is extended to the 25<sup>th</sup> business day following that other default, the DMP will be implemented again and there will be no replenishment; accordingly, service clearing members would be obliged to participate in the loss distribution process if applicable.

LCH SA will continue to stress test the service default funds as usual throughout the DMP and during the 25-day cooling-off period. If any service clearing member's stress-test losses exceed 45 percent of the remaining default fund, LCH SA will call for additional margin from those clearing members to cover the excess stress-test losses. Clearing members with weaker credit scores are subject to lower thresholds.

Should all funded and unfunded resources available to LCH SA be exhausted, a service continuity phase will be implemented. In this phase clearing members of CDSClear will be subject to variation margin gain haircutting.

Rule 17Ad-22(e)(13)(iii)	<i>Finally, Rule 17Ad-22(e)(13)(iii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to require the covered clearing agency's participants and, when practicable, other stakeholders to participate in the testing and review of its default procedures, including any close-out procedures, at least annually and following material changes thereto.</i>
--------------------------	---

All LCH SA clearing services involve external participants (such as clearing members, execution brokers etc), as required, in their default management fire drills. For some services (notably those serving the OTC markets), the DMGs have representatives from clearing member firms and they are consulted on changes to the default management procedures.

A Group-wide (i.e. all CCPs and services within the LCH Group) default management fire drill takes place at least annually and more frequently if there are substantive changes to process which mean that further testing is required. In addition, service-specific tests are held as and when required, for example if there are changes to rules and procedures within that service. Such tests may include external participants who would be involved in the DMP. Each external participant rehearses their role in an actual default event. For example, a broker will be given orders to simulate hedging or liquidation of positions, and clearing members will participate in the DMG to review a synthetic portfolio, recommend hedging and liquidation strategies and submit bids in a dummy auction.

LCH SA also hold a CCP wide fire drill, where the process is tested internally (without participation of external parties) and several recommendations for improvements are tested, as such two fire drill are performed per year.

Following a fire drill test a report is produced that evaluates the exercise and identifies areas for improvement and change. The reports are shared with the Audit Committee and regulators following internal review. Each fire drill has specific objectives to ensure that all aspects of default management are covered by the range of different tests performed. Some tests include external clearing members; others seek to test internal routines or close-out assumptions and procedures.

The Group-wide fire drills generally cover the scenario of a clearing member defaulting across all CCPs and services simultaneously. Scenarios may be introduced where the defaulting entity also acts as a counterparty of a different type (for example payment agent or investment counterparty).

Firedrills may be coordinated with other major CCPs in order to test the ability of clearing members to provide staff to more than one CCP DMG at the same time, which more realistically simulates the default of an institution which has exposures at multiple clearing houses.

#### 4.14. Standard 14: Segregation and Portability

Rule 17Ad-22(e)(14)	<i>Rule 17Ad-22(e)(14) applies only to a covered clearing agency that is either a security-based swap clearing agency or a complex risk profile clearing agency. Rule 17Ad-22(e)(14) requires such a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to enable the segregation and portability of positions of a member's customers and the collateral provided to the covered clearing agency with respect to those positions, and effectively protect such positions and related collateral from the default or insolvency of that member.</i>
---------------------	--

LCH SA offers two models of client segregation arrangements to meet the regulatory requirements of each jurisdiction in which it is authorised, and maintains its books and records, and segregated accounts where relevant, in accordance with those requirements. Pursuant to the CDS Clearing Documentation, individually segregated client accounts are available as well as gross and net omnibus client accounts. LCH SA also offers an LSOC compliant account structure in order to satisfy US/CFTC/SEC requirements. The CDS Clearing Documentation also provides for the conditions that would apply to the porting of client positions and as the case may be, associated collateral, in the event the relevant carrying and receiving clearing members are not in default. In the event of a default occurring in respect of a clearing member, client positions and associated collateral will be either ported to a backup clearing member or liquidated pursuant to the CDS Clearing Documentation. The arrangements for porting and returning amounts due in respect of the liquidation values of the client positions and associated collateral rely upon some form of protective mechanisms which entitles LCH SA to mitigate the risk that such arrangements be challenged by a defaulting clearing member's insolvency officer. Legal opinions are made available pursuant to these arrangements.

#### 4.15. Standard 15: General Business Risk

Rule 17Ad–22(e)(15)	<i>Rule 17Ad–22(e)(15) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to identify, monitor, and manage its general business risk and hold sufficient liquid net assets funded by equity to cover potential general business losses so that the covered clearing agency can continue operations and services as a going concern if those losses materialize.</i>
---------------------	---

LCH SA identifies its business risks by considering the general business conditions which are likely to impair its financial position as a consequence of decline in its revenues or an increase in its expenses resulting in a loss that must be charged against its capital. Examples of reasonable foreseeable drivers of business risk for LCH SA include cost overruns (including project overspends), impacts of competition on its revenue, volume and mix of collateral held or regulatory change.

In order to identify the specific business risks, it faces, LCH SA identifies the drivers of business risk, reviews its existing control framework and quantifies the potential financial impact of reasonably foreseeable adverse loss events. Business risk drivers are considered both with and without financial impact-reducing mitigants in place. Business drivers are also considered for potential impact of simultaneous occurrence.

The drivers of business risk are monitored throughout the year, and a detailed calculation is performed once a year or on a significant change to the business. Business risk is reported to the LCH SA Board through the Internal Capital Adequacy Assessment Process. Annual budgeting, medium term financial plan, and quarterly forecasting processes assist in identifying any change to business risk drivers and in evaluating the impact of these changes.

LCH SA holds liquid net assets funded by equity so that it can continue operations and services as an ongoing concern if it incurs general business losses. LCH SA’s agreed minimum regulatory capital requirement includes a specific provision for business risk, which must be at a minimum equal to three months’ operating expenses.

Rule 17Ad–22(e)(15)(i)	<i>Rule 17Ad–22(e)(15)(i) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to determine the amount of liquid net assets funded by equity based upon its general business risk profile and the length of time required to achieve a recovery or orderly wind-down, as appropriate, of its critical operations and services if such action is taken.</i>
------------------------	--

LCH SA maintains both a Recovery Plan and a Wind Down Plan, both of which are LCH SA Board-approved documents and which are reviewed at least annually, or following material changes.

The Wind Down Plan sets out the steps it would be necessary to follow should LCH SA need to wind down its clearing services. This plan takes into account the impact on members and the markets of such a wind down. The plan demonstrates how LCH SA can achieve an orderly wind down within six months.

The Recovery Plan sets out the steps that LCH SA should take in order to maintain the continuity of its services, should such continuity be threatened. This plan takes into consideration the triggers for such a plan, the governance steps LCH SA must take to invoke the plan and a number of recovery tools that are available to LCH SA. Each available tool is assessed for its impacts to LCH SA’s clearing members.

LCH SA holds capital, funded by equity, equal to the operating expenses for the six-month period required to wind down. LCH SA bases its calculation on the latest audited expenses. LCH SA invests its capital including the capital used to cover general business risks and the wind down plan in very high quality, very liquid instruments with low market risk. LCH SA capital is held on the balance sheet of LCH SA separately from the resources designated to cover clearing member defaults.

Rule 17Ad-22(e)(15)(ii)	<i>Rule 17Ad-22(e)(15)(ii) requires a clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for holding liquid net assets funded by equity equal to the greater of either six months of its current operating expenses or the amount determined by the board of directors to be sufficient to ensure a recovery or orderly wind-down of critical operations and services of the covered clearing agency, as contemplated by the plans established under Rule 17Ad-22(e)(3)(ii). Additionally, Rule 17Ad-22(e)(15)(ii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for monitoring its business operations and reducing the likelihood of losses.</i>
-------------------------	--

LCH SA maintains both a Recovery Plan and a Wind Down Plan.

In line with the Recovery Plan, LCH SA monitors that sufficient “surplus/buffers capital” is available to assure recovery of the CCP from both Clearing Member default and non-Clearing Member Default losses.

As required by EMIR regulation, LCH SA holds capital, funded by equity, equal to the operating expenses for the six-month period required to wind down. The plan demonstrates that LCH SA can achieve an orderly wind down within 6 months and includes an estimate of the wind down costs. These costs include, among others, exit payments that would need to be paid to external suppliers where relevant.

Rule 17Ad-22(e)(15)(iii)	<i>Finally, Rule 17Ad-22(e)(15)(iii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for maintaining a viable plan, approved by the board of directors and updated at least annually, for raising additional equity should its equity fall close to or below the amount required by the rule as discussed above.</i>
--------------------------	--

LCH SA has in place an LCH SA Board approved strategy setting guidelines for capital management and to act as a recovery planning step following a shock loss or other stress event. The strategy requires that material business decisions be assessed against capital position requirements, cash flow and liquidity and profitability, in order that LCH SA can generate capital via retained earnings. It also lays out other options that would be available to LCH SA and its Board in the event of a short term need for capital.

As a 88.9% owned subsidiary of LCH Group, the LCH SA strategy has been concluded in conjunction with the strategy of its parent.

The LCH SA Board is given regular updates on the capital position of LCH SA through regular reporting from the Chief Financial Officer.

#### 4.16. Standard 16: Custody and Investment Risks

Rule 17Ad-22(e)(16)	<i>Rule 17Ad-22(e)(16) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to safeguard its own and its participants' assets and minimize the risk of loss and delay in access to these assets. Rule 17Ad-22(e)(16) also requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to invest such assets in instruments with minimal credit, market, and liquidity risks.</i>
---------------------	---

LCH SA's internal risk policy on payment, settlement and custody sets a preference for safeguarding collateral (whether this is securities provided by members, held as investments, or as collateral received in reverse repos) in accounts at central securities depositories (including international central securities depositories). Where an (I)CSD is not able to be used (normally because of time zone or regulatory constraints), LCH SA uses a custodian bank or banks. In each case, the entity holding the collateral must meet standards set in the policy, including criteria in relation to creditworthiness and operational reliability.

All (I)CSDs and custodian banks are subject to the requirements described in the internal risk policy on payment, settlement and custody, as well as the criteria set out in the internal risk policy on counterparty credit risk. These include a minimum internal credit score, legal review, operational due diligence and the application of exposure limits.

LCH SA's monitoring of compliance with its criteria, and the overall suitability of (I)CSDs and custodians, is via a regular programme of due diligence which reviews every entity at least every two years. This requires that (I)CSDs and custodians complete a template covering all matters referenced in the policy and provide evidence where necessary. (I)CSDs and custodians are also subject to periodic due diligence reviews.

LCH SA ensures it has prompt access to its assets by only maintaining custody arrangements with high quality (I)CSDs and custodians, as determined under its policy and through its due diligence programme; commissioning legal opinions on all jurisdictions; and by maintaining multiple custody relationships.

In relation to collateral, LCH SA satisfies itself via the due diligence process and legal review that it would have access to the assets in the event of the custodian bank's default. Where cash balances are held on account at a custodian bank temporarily in connection with investment activity, LCH SA monitors intraday exposures and manages transactions such that its intraday exposure to the custodian bank remains below 75 percent of its capital. LCH SA uses a range of (I)CSDs and custodian banks to diversify where collateral is held.

Risk exposures to custodian banks are aggregated with risk exposures to the same entities arising from investment, clearing or payments activity and monitored against credit limits set per entity.

LCH SA's investment risk strategy is set by the LCH SA Board, on the advice of the Risk Committee, and in line with the LCH SA Board's Risk Appetite. The investment strategy is disclosed at an aggregate level on request to clearing members of LCH SA. How the total cash received from participants is held/deposited/invested is included in LCH SA's disclosures against the CPMI-IOSCO Quantitative Disclosure Standards. The primary objectives of the investment strategy are capital preservation and liquidity provision, and these objectives are captured in the LCH SA Investment Risk Policy. The Investment Risk Policy's key features are to restrict investments to (i) high quality counterparties, (ii) reverse repurchase arrangements against very high quality and liquid collateral using appropriate haircuts, (iii) the purchase of short term high quality, low credit risk and highly liquid securities, (iv) Banque De France overnight deposit, and (v) keeping unsecured lending and deposits in commercial bank to a minimum.

The Investment Risk Policy dictates the composition of the overall investment portfolio based on investment type and maturity dates, and emphasises the preference for secured transactions and highly marketable securities. Further, the Investment Risk Policy also specifies liquidity risk as an objective and sets investment concentration limits and appropriate haircuts for reverse repurchase collateral. Additionally, the Policy requires that investment limits are reviewed regularly to ensure that they remain in line with risk appetite.

The concentration limits for LCH SA investment activities include restrictions on: exposures to particular counterparties, measured at the counterparty group level; the proportion of investments representing an exposure to a particular issuer; and exposures to reverse repo collateral, by security type and issuer. Additionally, LCH SA sets exposure limits specified at the investment counterparty level by transaction type and by maturity.

Intraday and overnight exposures are monitored against the applicable limits and any breaches are escalated, reported and remediated through internal governance processes.

LCH SA does not invest margin received from a clearing member in securities issued by that clearing member or its affiliates.

LCH SA maintains pre-arranged and highly reliable relationships with a wide range of high quality counterparties enabling execution of transactions with short-dated maturity. LCH SA also tests the ability to liquidate such financial assets with little, if any, adverse price effect with these counterparties according to a regular programme.

#### 4.17. Standard 17: Operational Risk Management

Rule 17Ad–22(e)(17)	<i>Rule 17Ad–22(e)(17) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to manage the covered clearing agency’s operational risk. In proposing Rule 17Ad–22(e)(17), the Commission noted that operational risk involves, among other things, the likelihood that deficiencies in information systems or internal controls, human errors or misconduct, management failures, unauthorized intrusions into corporate or production systems, or disruptions from external events such as natural disasters, would adversely affect the functioning of a clearing agency.</i>
---------------------	---

Operational risk management is a key component of the LCH SA risk management framework and encompasses appropriate tools and mechanisms to enable the effective identification, assessment and mitigation of such risk. LCH SA defined proper Operational Risk Policy which is reviewed annually. The operational risk management arrangements incorporate a “three lines of defence” structure that has been endorsed by the LCH SA Board and places responsibility for managing operational risk on the business as the first line of defence, ensuring that an Accountable Executive from the business is appointed as Risk/Control Owner. The resilience risk team, the second line of defence, provides oversight, training, support and challenge to the first line of defence as well as producing aggregated risk reporting for internal governance. They draft, maintain and support the Operational Risk Framework and also provide oversight, support and challenge to the first line of defence in relation to risk management activity. Internal audit, the third line of defence, is responsible for developing and delivering a programme of assurance aimed at validating the effective management of key business risks and the effectiveness of governance arrangements overseeing these risks.

Rule 17Ad–22(e)(17)(i)	<i>Rule 17Ad–22(e)(17)(i) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to identify the plausible sources of operational risk, both internal and external, and mitigate their impact through the use of appropriate systems, policies, procedures, and controls.</i>
------------------------	---

Operational risk forms part of the Risk Governance Framework of LCH SA, and is one of 23 types of risk which LCH SA faces. The LCH SA Board has set out through this framework its appetite for operational risk.

LCH SA has in place an Operational Risk Management policy, which is supported by an Operational Risk Manual and Group Core Control Methodology. Together, these policies and procedures form the framework through which operational risk is managed throughout LCH SA at an enterprise level.

The Operational Risk Management policy clearly sets responsibilities across first, second and third lines of defence for the identification, assessment, monitoring and management of operational risks.

In general, the first line of defence is responsible for the day to day management operational risks, including maintaining an effective system of internal controls. The first line is within the business lines and support functions. The second line oversight, support and challenge 1<sup>st</sup> line in their day-to day management of operational risks. Operational Risk is also responsible for providing aggregated reporting to internal senior executive committees as well as the LCH SA Board and its Committees. LCH SA’s independent internal audit function provides the third line of defence by delivering a programme of assurance.

The Operational Risk Policy is reviewed annually and the results of the review are reviewed by senior internal executive level committees as well as Board-level committees. The LCH SA Board approves the policy annually. The Audit Committee and Board receives quarterly reporting on any operational risks outside appetite, including



actions planned or taken to mitigate these risks, and major incidents, including remediation planned or taken to prevent reoccurrence.

The policy sets a framework through which operational risks can be identified, including through review of audit findings, loss events and near misses, external events which may give rise to increased vulnerabilities and changes to systems or processes.

Typical sources of operational risk exist at LCH SA including manual processes, system configurations and change management. Single points of failure in LCH SA's operations are documented and recorded in the operational risk management system. Where single points of failure exist additional controls are in place to mitigate this risk: these include controls on change processes.

Each operational risk is recorded in the operational risk management system. The system also includes records of risk assessments, controls in place and any actions being taken to further reduce the risk exposure associated with any operational risks. Operational risks are monitored through regular review and reporting to the Resilience Risk Committee, ERCO, LMC and Audit Committee.

LCH SA has both operational risk and compliance policies in place designed to identify potential sources of fraud, which set the standards within which potential fraud should be managed. These policies and procedures identify potential sources of fraud, key mitigation techniques and the procedures to follow should a fraud or potential fraud be reported. The Recruitment Policy and procedures require that all prospective LCH SA employees, including agency staff and consultants, are subject to pre-screening checks before their employment can begin.

LCH SA has a policy and governance framework for change management. This framework mitigates the risks that changes and major projects inadvertently affect the smooth functioning of LCH SA by setting out a flexible (by size and complexity of change) structure for delivery of change. The framework sets out a methodology of categorising change; the category of change then determines the appropriate governance, reporting, minimum testing requirements and finally go-live approvals. Each LCH SA business line maintains oversight of its change portfolio through governance meetings, commonly known as project and portfolio boards. A central committee at LCH Group level, LCH Group Investment Committee, maintains a holistic view of change management at LCH SA across the different portfolios, whilst the senior executive management committee maintains a strategic oversight of the change portfolio within the strategy of the LCH SA Board.

LCH SA reviews and tests its systems, policies and procedures with its clearing members in a number of ways. LCH SA involves its clearing members in testing before the launch of new products and systems. An annual disaster recovery test (datacenter failover) is carried out, in which all clearing members, external providers and other third parties (as identified in Business Impact Analysis ("BIAs")) are invited to participate. In addition, business continuity plan is also regularly tested. Clearing members are also active in annual default management fire drills, in which the management of a default scenario is rehearsed. In each of these cases, LCH SA actively requests feedback in order that any weaknesses may be addressed.

LCH SA's independent audit function conducts regular reviews of the Operational Risk Framework. The internal audit function also reviews the application of the operational risk framework as part of all its reviews, with an annual review of a sample of key controls.

Rule 17Ad-22(e)(17)(ii)	<i>Rule 17Ad-22(e)(17)(ii) requires a covered clearing agency to establish, implement, maintain, and enforce written policies and procedures to ensure that systems have a high degree of security, resiliency, operational reliability, and adequate, scalable capacity.</i>
-------------------------	---

Information Security is the protection of information and information systems from unauthorised access, use disclosure, disruption, modification or destruction in order to provide confidentiality, integrity and availability (NIST Definition). LCH SA define Cyber Security as the defence of the threats, both internal and external, that target these systems.

In order to protect our data and assurance of financial assets, LCH SA implemented controls that protect the confidentiality, integrity and availability of the Company assets including preventing unauthorised use or modification.

The Board has identified Cyber Security as one of its top priorities. As part of their commitment every Board meeting contains an update on Cyber Security to both proactively engage with the Cyber Security Strategy and challenge the implementation.

### **Risk Appetite**

LCH SA has no appetite for a material compromise of the security or availability of our Information and Financial Assets which could result in financial, regulatory or reputational impacts to the Group.

LCH SA has developed an Information Security Risk Management framework defining how cyber risks are managed within the Group's Risk Appetite. Risk Appetite as defined above is divided into five risk components:

- Denial of Service risks
- Insider Breach/internal Events
- External Breaches
- Supply Chain Security
- Physical Security Breach/Event

Each of these risk components is aligned to a series of policies and standards that set out the minimum requirements for the management of those risks along with a control framework benchmarked against NIST/BIS- IOSCO /ISO27001.

The business units and first line Information Security teams are expected to assess these risks in line with the framework and manage these risks to within the defined appetite. Business units are required to develop metrics/key risk indicators that allow the effective management of risks within agreed tolerance levels. The second line risk team provide oversight and assurance of the effective execution of the framework by the first line.

LCH SA computing and networking are operated in closed facilities with controlled access only for authorized personnel. They are protected from environmental, physical or logical security threats to ensure its continued availability.

Permanent controls on key points of the security requirements, as physical and logical access reviews, hardening guidelines conformity reviews, firewall policies, anti-virus tests and signatures date reviews, are realized on a periodic basis to check the effectiveness and efficiency of the implemented security controls.

Penetration tests are realized regularly to test outbound defenses or internal security measures.

### Outsourcers:

In addition, LCH SA's IT Services suppliers are contractually bound to enforce LCH SA's information system security requirements. Third parties' Information Security Requirements are defined and contractually formalized.

To protect the confidentiality and integrity of LCH SA information systems, several security measures have been implemented, such as strong network segregation. Network security filters (IDS) examine the external inbound flows.

A patch management policy and a vulnerability management are implemented, along with a vulnerability scan tool, able to raise alerts and vulnerability reports on all critical information systems.

Detection, prevention and recovery controls to protect against malware are implemented, combined with appropriate user awareness

Hardening guidelines, based on international best practices, set up strong security measures on component configurations in order to protect them

A Security Operational Center monitors all security event and incidents.

To protect the availability of LCH SA information systems, especially against a DDoS based attack, our service provider has implemented security measures, such as an increase in their Internet Network Capacity, pre-filtering on edge Internet routers, scrubbing and the installation of anti-DDoS appliance.

The Information Security Policy requires, among other things, the performance of penetration/intrusion tests to identify vulnerabilities of LCH SA's information system from external attacks and perform an annual assessment of its information security system. The penetration/intrusion tests simulate potential attacks on LCH SA's information systems and are designed to identify the vulnerabilities in LCH SA's information infrastructure as well as assess LCH SA's Internet-based applications, network security and remote access to SA's information systems.

Daily vulnerability tests are performed on LCH SA's front-end architecture and on a weekly basis, additionally a Web Application Scan, based on OWASP standards is performed on the web applications. Daily reports are analysed, impacts are assessed and needed correctives actions taken in case of issues.

Risk of System unavailability

Operational risk arising from system malfunctions presents a major risk for LCH SA. Monitoring this risk via availability and incident management indicators is key to prevention.

Performance and capacity

A Yearly Capacity Plan is produced to provide an overview of LCH SA IT systems capacity, per clearing systems and network, recommendations for capacity increase following this assessment are made depending on expected Business volume growth.

The IT systems are technically organized to support upon market request resilience and scalability through the redundant architecture. The capacity covers performances of real time and batch processing. The system is designed and configured to be able to process more volume than the actual Business need.

Benchmarks are carried out to assess the behavior of the Systems towards those target volumes in case of a major release or upgrade of the Systems.

All the different network areas are fully redundant.

Availability of Clearing Systems

To minimize the risk of Clearing systems' unavailability, a change management procedure describes the different steps and policies of Release, Change and Deployment management in place at LCH SA. The change management procedure is approved by the different stakeholders: business teams, internal IT teams, project teams and third party IT suppliers. This procedure follows ITIL V3 2011 standards.

The aim is to guaranty the effective delivery of new functionality required by business or any improvement to the technical infrastructures while protecting the integrity of existing services and mitigating the risks on the IT systems.

LCH SA brings to its members, connectivity services that offer performance, security and resiliency. For more details, please refer to the Connectivity Guide.

Rule 17Ad-22(e)(17)(iii)	<i>Finally, Rule 17Ad-22(e)(17)(iii) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to provide for a business continuity plan that addresses events posing a significant risk of disrupting operations.</i>
--------------------------	---

As part of our ongoing commitment to run a resilient business, LCH SA operates a Business Continuity Management ("BCM") programme. The BCM programme meets internal business, legal and regulatory requirements and is in line with best practices.

Key objectives of the BCM programme are:

- To provide safety and welfare of staff;
- To maintain critical clearing services to members;
- To comply with legal and regulatory requirements.

A global BCM policy is in place, which details the minimum required standards of the BCM programme; the LCH SA Audit Committee and Board approve this global BCM policy on an annual basis.

A BCM team is in place to manage and oversee the BCM program activities and their adherence to the policy. In addition, there are several committees in place within LCH SA which the BCM team report into, these committees provide governance and oversight of the operational activities conducted throughout the calendar year.

Each department completes a BIA on at least an annual basis and following significant change. This captures at a minimum; critical activities, associated staffing and resource requirements, applications, dependencies, risks, recovery time objectives and recovery point objectives. In addition, BIA also includes confidentiality and integrity assessment. Then BIA are challenged by Resilience team and then subject to validation by the Local Management Committee.

Threats and risks to LCH SA are captured on an annual basis and then regularly monitored. This helps the business to determine the most appropriate recovery strategy.

LCH SA has a number of recovery strategies in place that are regularly tested. These are listed below

- Alternate work area recovery locations that are accessible immediately;
- Resilient and geographically diverse data centres which allow recovery of all critical infrastructure and services within 2 hours;
- Remote Access capability for the majority of the staff;
- Cross-trained staff in alternate locations that can carry out critical activities.

Departmental business continuity plans are in place across the business detailing the recovery strategies that are in place. These are reviewed and updated on a quarterly basis.

A Global Crisis Management Team (“**CMT**”) structure and plan is in place to ensure effective and timely response to an incidents or crisis.

Regular testing takes place throughout the year as per the policy; the following tests/exercises are part of the annual testing schedule:

- Data centre testing (involving members and third parties);
- Work area recovery site testing;
- Remote access testing;
- Cross training testing;
- Crisis management testing;
- Call notification testing.

The company also participates in external market-wide exercises.

Mandatory BCM training is in place for employees. Awareness activities and events are organised to help promote BCM within the organisation on an annual basis.

#### 4.18. Standard 18: Access and Participation Requirements

Rule 17Ad-22(e)(18)	<i>Rule 17Ad-22(e) (18) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to establish objective, risk-based, and publicly disclosed criteria for participation, which permit fair and open access by direct and, where relevant, indirect participants and other FMUs. Rule 17Ad-22(e)(18) also requires that a covered clearing agency establish, implement, maintain and enforce written policies and procedures reasonably designed to require participants to have sufficient financial resources and robust operational capacity to meet obligations arising from participation in the clearing agency and to monitor compliance with participation requirements on an ongoing basis.</i>
---------------------	--

LCH SA's participation requirements are designed to be the least restrictive while ensuring that risk to LCH SA and the markets it serves is minimised. Participation criteria are publicly available through the LCH SA Clearing rules and website, and clearing members are monitored for ongoing compliance with the participation requirements. The LCH SA Clearing rules contain provisions to manage circumstances where a clearing member no longer meets the criteria.

##### **Participation requirements**

The requirements for participation in LCH SA are based on risk-based principles, and are designed to ensure that all clearing members are of suitable financial standing with sufficient operational capabilities e.g. access to relevant trading and settlement venues, and to have necessary regulatory permissions. Final approval for all participation applications rests with the Executive Risk Committee, subject to the LCH SA Risk Committee being notified of approvals. Where the Executive Risk Committee refuses an application, the applicant may appeal to the Risk Committee.

Different criteria apply depending on the nature of membership being applied for. Broadly, criteria may be differentiated by the service being applied to clear, and whether the applicant would be clearing only for itself or additionally for clients. The differing nature of risk being brought by the applicant is determined by these elements, and criteria are set in a manner proportionate to the risk. The participation criteria, including restrictions in participation are publicly disclosed on the LCH SA website and are included in the LCH SA Clearing rules and summed up hereunder:

- All new members are also subject to an internal LCH SA credit assessment.
- A minimum level of net capital and default fund contributions are required as part of the clearing member admission criteria. The Net capital requirements ensure that clearing members have adequate financial resources to withstand unexpected losses. The default fund contributions for each relevant service are determined with reference to a clearing member's initial margin requirements, which are in turn determined with reference to the nature and scale of that clearing member's cleared activity. The floor for default fund contributions seeks to ensure that all clearing members have enough capital at risk such that they have an appropriate incentive to monitor and control the risks that they bring to the service.
- In terms of operational capability, all clearing members must have adequate back office infrastructure to support a high volume of transactions, and must have direct or indirect access to T2S, to pay and receive cash obligations to and from LCH SA. Typically, this requires appropriate systems to manage the clearing members's clearing activities, and staff with sufficient knowledge and experience with the systems. Prior to going live, all clearing members receive operational capability training if the LCH SA onboarding function deems it necessary.

All applicants for membership must provide an opinion by an independent external legal adviser practising in the relevant jurisdiction confirming that it has all necessary permissions and capacity to undertake its obligations as a member in accordance with its and LCH SA's regulatory obligations.

### **Monitoring of compliance with the participation requirements**

To achieve a balance between open access and risk, LCH SA continuously monitors a wide range of credit indicators for members e.g credit spread, share price, external rating, media comments including capital-to-risk ratios, and applies real-time risk management controls such as concentration limits and margin multipliers, rather than relying solely on hurdle-based participation criteria. In addition, the Default Management Process seeks to ensure that a member's contingent obligations in the event of default are commensurate with the nature and scale of its cleared activity. LCH SA monitors compliance with participation requirements on a continuous basis. The clearing membership Agreement requires clearing members to notify LCH SA if they no longer meet the participation requirements.

The LCH SA Clearing rules contain notification and disclosure requirements to ensure compliance with the financial requirements for participation in each service. All clearing members must provide LCH SA with their annual accounts, and must promptly notify LCH SA of any development which would materially affect the clearing member's ability to comply with the participation requirements.

The Clearing rules outline the actions that LCH SA can take if there is an indication that a member no longer meets the membership requirements or if its risk profile deteriorates, including: more detailed monitoring, increased margin requirements, prior authorisation for trades above a specified size, position reduction, position transfer to other members, trading for liquidation only, and the declaration of default. LCH SA has the authority to declare a member in default as soon as it has grounds to suspect the membership requirements are breached or are likely to be breached. Where a clearing member is in breach of the membership requirements, but has not defaulted on payments to LCH SA, LCH SA may allow a grace period for the clearing member to remedy the breach before issuing a Default Notice. Once a default notice has been issued, withdrawal of the member occurs in accordance with the Default Procedures.

#### 4.19. Standard 19: Tiered Participation Arrangements

Rule 17Ad–22(e)(19)	<i>Rule 17Ad–22(e)(19) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to identify, monitor, and manage the material risks to the covered clearing agency arising from arrangements in which firms that are indirect participants in the covered clearing agency rely on the services provided by direct participants in the covered clearing agency to access the covered clearing agency’s payment, clearing, or settlement facilities (hereinafter “tiered participation arrangements”).</i>
---------------------	--

LCH SA primarily uses a principal-to-principal model of clearing participation, which means that LCH SA has no direct exposure to the default of a clearing member’s client. LCH SA requires clearing members who clear for clients to hold segregated house and client accounts for positions and collateral accounts (as further described under “Standard 14” section (Rule 17Ad–22(e)(14): Segregation and Portability). Pursuant to the CDS Clearing Documentation, clearing members are required to include a set of mandatory client clearing provisions by reference in their client clearing agreements with their clients.

The material risk arising at LCH SA from tiered participation is the default of a client, which disrupts or materially adversely affects a clearing member.

In the event of a clearing member default, LCH SA could port positions and collateral held for clients of that defaulting clearing member. If porting could not occur, LCH SA would face risks but in these circumstances, LCH SA could liquidate client positions and apply collateral in the same way as for house accounts. Following the completion of default-management processes (the closing or transfer of positions and the realisation of collateral) LCH SA may apply surpluses in a clearing member’s house account(s) to offset losses in the clearing member’s client account(s), but not vice versa. The enforceability of those provisions is covered by the legal opinion obtained by LCH SA for each new jurisdiction in which services are offered.

#### 4.20. Standard 20: Links

Rule 17Ad–22(e)(20)	<i>Rule 17Ad–22(e)(20) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to identify, monitor, and manage risks related to any link with one or more other clearing agencies, FMUs, or trading markets.</i>
---------------------	--

LCH SA has multiple and varied FMI links as links with (I)CSDs, Trade Repositories, Exchanges or Payment Systems. All such arrangements are governed by contractual agreements and considered within the LCH SA risk management framework. They are subject to rigorous detailed due diligence and rigorous internal governance processes.

There is no interoperability link within the CDSClear service.

#### 4.21. Standard 21: Efficiency and Effectiveness

Rule 17Ad–22(e)(21)	<i>Rule 17Ad–22(e)(21) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to ensure that it is efficient and effective in meeting the requirements of its participants and the markets it serves.</i>
---------------------	---

LCH SA's participation requirements are designed to mitigate the risks that LCH SA faces as a CCP in a way that ensures the least restrictive access that circumstances permit.

Net capital requirements ensure that clearing members have adequate financial resources to withstand unexpected losses.

Default fund contributions for each relevant service are determined with reference to a clearing member's initial margin requirements, which are in turn determined with reference to the nature and scale of that clearing member's cleared activity. The floor for default fund contributions seeks to ensure that all clearing members have enough capital at risk such that they have an appropriate incentive to monitor and control the risks that they bring to the service.

Membership requirements are risk-based, including the need to have all necessary operational capabilities e.g. access to relevant trading and settlement venues, and to have necessary regulatory permissions.

Different criteria apply depending on the nature of membership being applied for. Broadly, criteria may be differentiated by service, and according to whether the applicant would be clearing only for itself or also for clients. The differing nature of risk being brought by the applicant is determined by these elements, and criteria are set in a manner proportionate to the risk.

The participation criteria, including restrictions in participation are publicly disclosed on the LCH SA website and are included in the LCH SA Clearing rules.

Rule 17Ad–22(e)(21)(i)	<i>Rule 17Ad–22(e)(21)(i) requires a covered clearing agency's management to regularly review the efficiency and effectiveness of its clearing and settlement arrangements.</i>
------------------------	---

LCH SA maintains an operating structure that considers its clearing members, the products cleared as well as its settlement and payment arrangements. The mechanisms within this operating structure are subject to periodic reviews to ensure that they remain efficient and effective, and continue to facilitate the goals and objectives of participants and the markets it serves.

The policy sets out the Group standards for the management of central counterparty (CCP) risk towards the intermediaries LCH SA uses for settlement, payment and custody activities. This policy is owned by Group Risk Management and is reviewed at least annually.

This policy aims to mitigate the risks arising from the default or operational failure of the intermediaries:

- The credit risk from direct unsecured exposure;
- The increase in clearing member exposures due to failed or delayed margin payments; and
- Liquidity risk from delayed access to securities held as collateral or investments.

All intermediaries used by LCH SA should have an ICS and be approved by internal governance.



Rule 17Ad-22(e)(21)(ii)	<i>Rule 17Ad-22(e)(21)(ii) requires a covered clearing agency's management to regularly review the efficiency and effectiveness of its operating structure, including risk management policies, procedures, and systems.</i>
-------------------------	--

LCH SA has carried out a number of reviews of its operating model with a view to improve efficiency and effectiveness. LCH SA has already implemented a range of initiatives and continues to review its operating models to ensure they are fit for purpose to support the business whilst being lean and efficient. This includes organisation design reviews of all operating units with expected streamlining to spans of controls and layers.

The Group risk policies are reviewed and approved by the risk governance and the Board on an annual basis.

Besides the ongoing self-assessment process, embedded in the day-to-day operation of each function, LCH SA performs an annual Risk & Control Self-Assessment (R&CSA) to review all key processes and ensure a good coverage of the control framework. Where the design and/or operational effectiveness of controls are considered insufficient, additional measures/controls are defined and closely monitored.

In addition, an operational risk analysis is systematically performed for all projects and new products prior to their launch in order to assess the impact on LCH SA's risk profile and determine if new controls need to be implemented to mitigate the risk.

Rule 17Ad-22(e)(21)(iii)	<i>Rule 17Ad-22(e)(21)(iii) through (iv) requires a covered clearing agency's management to regularly review the efficiency and effectiveness of its scope of products cleared, or settled.</i>
--------------------------	---

LCH SA is a global multi-asset class clearing house, serving a broad number of major exchanges and platforms as well as a range of OTC markets. LCH SA's commitment to the horizontal model ensures a clear growth path for clearing across multiple markets, exchanges, venues and geographies.

LCH SA is partly owned by Euronext and its members via LCH Group and as a consequence, the exchange and the members are part of the governance process and are represented on relevant committees. The LCH SA Board, Risk Committee and Audit Committee include Euronext, users and independent representation. LCH SA also has a number of advisory and risk working groups, which relate to specific products or projects and, through these fora and member consultations ensures consideration of clearing members' needs in terms of products and technology.

Any change which may fundamentally affect the way LCH SA operates will involve a change to the LCH SA Clearing rules. Changes to the Clearing rules are considered by the Rule Change Committee, which includes representatives of the compliance and legal functions and a clearing business representative. This Committee will independently assess changes. In the specific case of CDSClear it will engage member consultation through the Legal Focus Group. Feedback received from clearing members is assessed and any further changes will be considered by the Rule Change Committee before it can be made live.

Further, LCH SA is an active market participant, providing thought leadership into industry-wide initiatives to promote financial stability and to improve the effectiveness and efficiency of the markets.

Any significant changes that fundamentally affect the way that LCH SA operates are made, in the case of CDSClear, after member consultation through the Operational Focus Group. Additionally, members are involved in the development and testing of new releases of technology relating to new products or systems.

The LCH SA client management functions collect and collate enhancement and change requests from members and provides them to senior management for consideration.

Rule 17Ad-22(e)(21)(iv)	<i>Rule 17Ad-22(e)(21)(iv) requires a covered clearing agency's management to regularly review the efficiency and effectiveness of its use of technology and communication procedures.</i>
-------------------------	--

LCH SA has an objective to be the most trusted clearing house and recognises to achieve this it must have resilience and efficiency. The Board sets a Risk Appetite and endorses a Risk Management Framework to manage reliance, reliability and stability of the CCP, which is cascaded throughout the firm. LCH SA has further defined service levels based on the following key performance indicators.

- **Service availability:**

The Board has set a monthly service availability tolerance level of 99.7%. LCH SA tracks any periods of normal operation during which critical clearing services suffer interruption and are not available.

- **Capacity:**

Each clearing service must demonstrate that IT systems can handle volumes larger than twice the peak of the last two years capacity; each clearing service will ensure arrangements are in place to warrant the minimum system capacity (including third-party for open offer) is at least two times the historically observed peak (outstanding and daily volumes based on two year lookback).

- **Incidents:**

LCH SA's management sets a tolerance level of incidents, aiming to minimise disruption to the clearing services. With this respect, LCH SA defines the escalation category of any incident. All incidents with a 'High' or above materiality rating are escalated to the executive management team. These incidents are investigated fully including a root causes analysis. Actions plans are identified to prevent reoccurrence.

**Services providers monitoring:**

Significant contracts have a dedicated governance and their various clauses are regularly revised and improved.

Contracts include best practices (ITIL V3 2011 standards for IT contracts), Service Level Agreements, and specific clauses covering contingency planning, security policy and audits.

The Service Level Agreements ("SLAs") and financial rules allowing for potential service demerits have been put in place based on key performance indicators (KPIs) to verify the good performance, capacity and availability of our systems. They include such criteria as rates of availability, resilience of infrastructure and applications, number of incidents; transaction integration rates, etc.

**Monitoring of the IT production:**

In order to ensure that services level agreements are being met, LCH SA performs a close monitoring of the service:

- The IT department conducts daily monitoring of the IT systems. The IT Security department manages security-related aspects, and the Legal department monitors legal clauses and overall consistency.
- LCH SA's IT suppliers provides with capacity and metrology metrics to show the resource usage of the IT systems with regard to the service levels agreements.

In conjunction with the daily monitoring, a large number of consistency checks have been implemented within each application to ensure that the most efficient controls are in place.

The adequacy of the information system is reviewed in the framework of the Technology Refresh Plan (TRP) and action plans are defined in order to continuously maintain the adequacy of information technology systems in line with the market standards and Board risk appetite.

In addition, LCH SA information system capacities and performances are regularly reviewed on all components, and particular attention is given to clearing and associated systems.

**Regular service reviews:**

Each LCH SA clearing service is subject to monthly service reviews based on key performance indicators. During these reviews, average/peak daily volumes and projections over a twelve period are compared to the capacity against which each clearing system has been tested. Corrective actions plans are defined where required.

LCH SA performs testing to provide assurance that system capacity will be, or will remain, adequate for normal and stressed volumes.

Capacity tests are regularly performed in compliance with CMAP Policy.

LCH SA critical systems are subject to regular independent reviews by the internal audit function, at least annually.

#### 4.22. Standard 22: Communication Procedures and Standards

Rule 17Ad-22(e)(22)	<i>Rule 17Ad-22(e)(22) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to ensure that it uses, or at a minimum accommodates, relevant internationally accepted communication procedures and standards in order to facilitate efficient payment, clearing, and settlement.</i>
---------------------	--

LCH SA works to internationally recognised procedures and standards wherever possible.

For payments and settlements, LCH SA uses SWIFT ISO 15022 and ISO20022 standards for all payment instructions. For securities settlement, LCH SA uses a combination of SWIFT ISO 15022 and ISO20022 standards and the CSD/Custodian's proprietary GUI interfaces.

Clearing Members may provide settlement instructions to LCH SA either through LCH SA's proprietary GUI interfaces (CMS) or via SWIFT ISO 20022 standard Collateral Proposal message. LCH SA sits on the ISO 20022 Securities Evaluation Group and contributes to defining international standards.

As well as providing proprietary reporting to Clearing Members, LCH SA provides wherever possible standards based reporting. All Clearing Gateways share the same background in terms of technical reliability:

- For clearing, LCH SA uses internationally recognized standards such as FpML and XML.
- CDSClear has implemented the ClearLink API to provide open access to the system and facilitate connectivity with any other Authorised Matching Platform (AMP).
- ClearLink provides an interface allowing market participants (Trade Provider and Clearing Members) to interact with CDSClear. ClearLink messages are based on Financial Products Markup Language (FpML) which is an industry standard protocol for describing complex financial products.

Members reporting can be accessed via Member Portal (CDSClear specific) using Sftp or a REST API solution.

For more details, please refer to the connectivity guide available at [LCH.com](http://LCH.com)

## 5. Definitions of Key Terms and Abbreviations

Abbreviation	Full name
ACPR	Autorité de Contrôle Prudentiel et de Résolution
AMF	Autorité des Marchés Financiers
BCM	Business Continuity Management
BIA	Business Impact Analysis
BRRD	Bank Recovery & Resolution Directive
CaLM	Collateral and Liquidity Management
CCP	Central counterparty
CDS Clearing Documentation	This term shall have the meaning ascribed to it in the CDS Clearing Rule Book available on LCH SA's website, under Section "Over-the-counter Credit Default Swaps" at <a href="https://www.lch.com/resources/rules-and-regulations/sa-rulebooks">https://www.lch.com/resources/rules-and-regulations/sa-rulebooks</a>
CFTC	US Commodity Futures Trading Commission
CMT	Crisis Management Team
CRMC	Credit Risk Management Committee
CSD	Central Securities Depository
DCMT	Default Crisis Management Team
DCO	Derivatives Clearing Organization
DFAM	Default Fund Additional Margin
DMG	Default Management Group
DMP	Default Management Process
ECB	European Central Bank
EMIR	European Markets Infrastructure Regulation
FCM	Futures Commission Merchant
FINMA	Swiss Financial Market Supervisory Authority
FMI	Financial Market Infrastructure
ICSD	International Central Securities Depository
ICS	Internal Credit Score
LCH Group	LCH Group Holdings Limited
LCH SA	Banque centrale de compensation
LCR	Liquidity Coverage Ratio

LSEG	London Stock Exchange Group
LSOC	Legally Segregated Operationally Commingled
OTC	Over-The-Counter
Reserved Matters	Certain matters which must be approved by the LCH SA Board, and which cannot be delegated to the LCH SA executive.
RTS	Regulatory Technical Standards
Clearing rules	LCH SA Rulebooks, Instructions/Procedures and Notices
SEC	Securites Exchange Commission
Settlement Finality Directive	Directive 98/26/EC of the European Parliament and of the Council of 19 May 1998 on settlement finality in payment and securities settlement systems
SLA	Service Level Agreement
T2S	TARGET2-Securities: The Trans-European Automated Real-time Gross Settlement Express Transfer System 2
TOR	Terms of Reference
VaR	Value-At-Risk

## 6. List of publicly available resources

Unless otherwise stated, all LCH SA documents listed in the table below can be found at [www.lch.com](http://www.lch.com).

Area	Resources
Governance & Organisation	<ul style="list-style-type: none"> <li>- Composition of the Board of Directors; and committees;</li> <li>- Ownership structure;</li> <li>- Terms of reference of the Board and Committees;</li> <li>- CRD IV Pillar 3 disclosure</li> </ul>
Clearing Activities	<ul style="list-style-type: none"> <li>- List of Clearing Members and information related to Membership:               <ul style="list-style-type: none"> <li>o Fees charged to clearing members,</li> <li>o Admission, suspension and exit criteria for clearing membership.</li> <li>o Rights and obligations of clearing members and clients</li> </ul> </li> <li>- List of Cleared Products and CCP's current clearing services, Clearing volumes and Open interests;</li> <li>- Price data sources.</li> </ul>
Clearing -Rules	<ul style="list-style-type: none"> <li>- Rulebook, instructions, notices;</li> <li>- Proposed Rules changes;</li> <li>- Regulatory Responses</li> </ul>
Information on Risk Framework	<ul style="list-style-type: none"> <li>- Risk Governance;</li> <li>- Risk Disclosure;</li> <li>- Collateral management and Haircuts;</li> <li>- Default Management Waterfall.</li> </ul>
Financial Statements and Reports	<ul style="list-style-type: none"> <li>- Annual reports including Audited Financial Statements;</li> <li>- CPSS IOSCO Qualitative assessment of LCH SA</li> <li>- CPMI IOSCO Quantitative Disclosures of LCH SA</li> </ul>