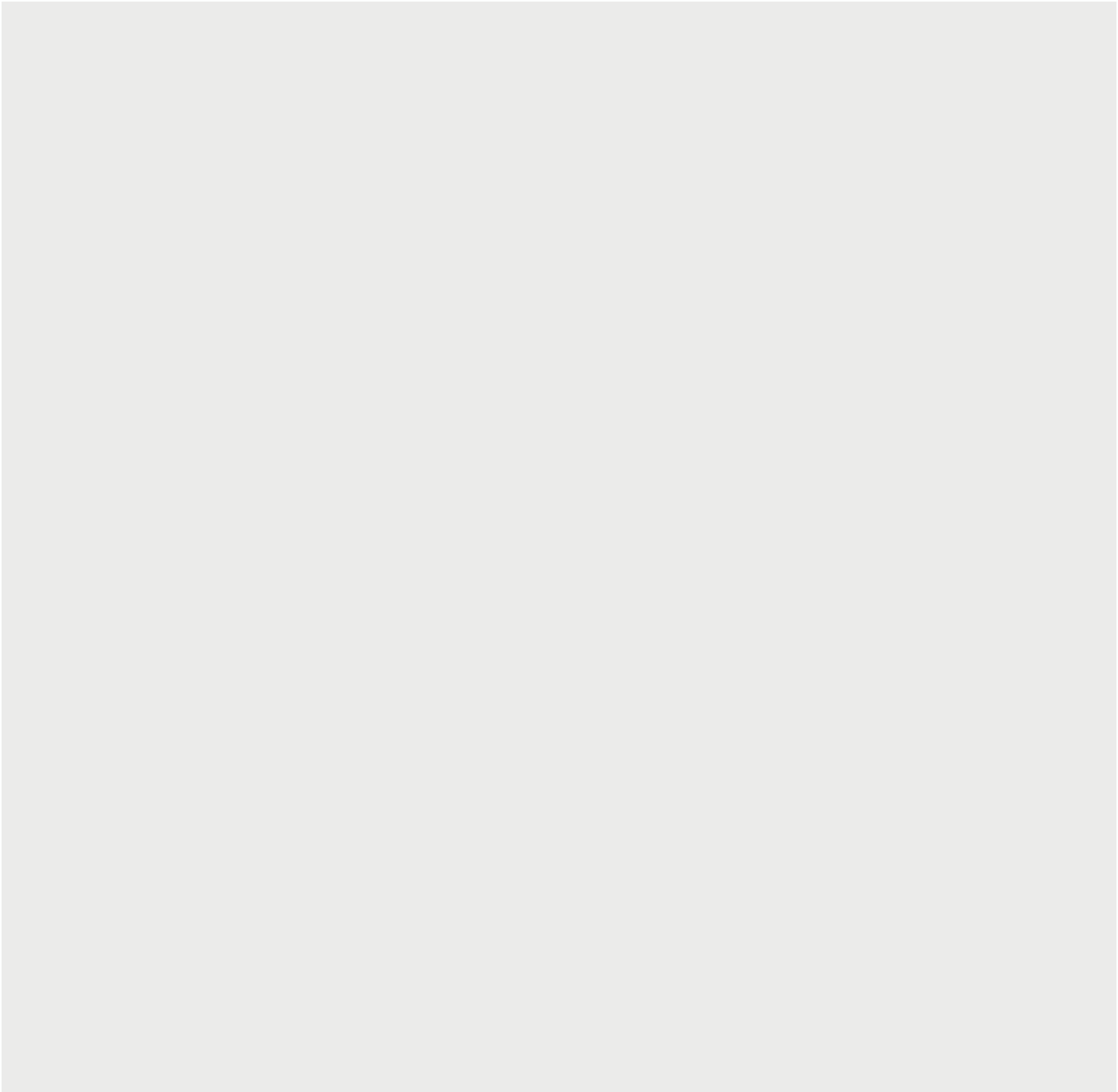


Comprehensive Disclosure

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 December 31, 2016.

This disclosure document can also be found at www.lch.com .

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1. Executive summary

LCH SA (referred to as “LCH” or “LCH SA” in the document) 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

This is the initial version of LCH SA’s disclosure document.

3. General background of LCH SA

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

LCH provides clearing services for major exchanges and platforms as well as OTC markets.

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

List of instruments:

- ITraxx Europe – Main, HiVol and CrossOver indices (3, 5, 7, 10-year tenors) – Senior Financials indices (5 and 10-year tenors) – from Series 6 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 Financial Corporate' transaction types, Euro-denominated,
- CDX Investment-grade indices (3, 5, 7 and 10-year tenors) from Series 7 onwards, US dollar-denominated,
- 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.

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

<http://www.lch.com/asset-classes/otc-credit-default-swaps/products>

3.1.2. EquityClear, Listed Commodities & Listed Derivatives

For Cash and Derivatives activities, LCH 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, Bond Match and Galaxy Trading System.

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

<http://www.lch.com/asset-classes/equityclear>

<http://www.lch.com/asset-classes/commodityclear>

3.1.3. RepoClear

For products relating to fixed income activity (including sell and purchase transactions as well as French, Italian, Spanish and sovereign debts and repos), LCH provides government debt securities clearing services to: Euro MTS, ICAP Electronic Broking Ltd, MTS, ETCMS and Tullett Prebon Trading System. LCH also provides a triparty clearing service called €GCPlus, based on a ECB eligible Euroclear pool of collateral, Euroclear acting as triparty agent.

Complete information on services provided by RepoClear can be found at: <http://www.lch.com/asset-classes/repoclear/products>

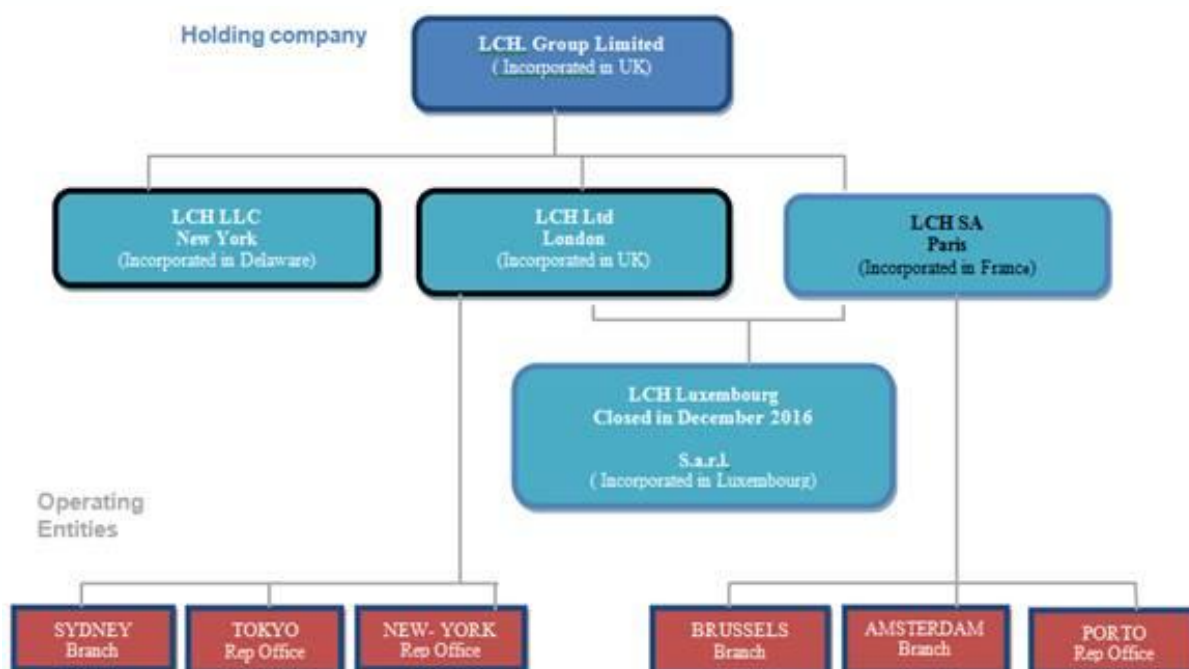
3.1.4. Key figures

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's disclosures against the CPMI-IOSCO Quantitative Disclosure Standards can be found at <http://www.lch.com/rules-regulations/cpmi-iosco>.

3.2. General Organisation of LCH SA

LCH is a wholly owned subsidiary of LCH Group Limited ("**LCH Group**"). LCH Group is 57.8 per cent owned by London Stock Exchange (C) Limited, a wholly-owned subsidiary of London Stock Exchange Group plc (LSEG), and 42.2 per cent owned by participants and exchanges.



3.3. Legal and regulatory framework

LCH 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 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 operates under robust governance arrangements, which provide an explicit responsibility and accountability structure. The LCH 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 serves major international exchanges and platforms, as well as a range of over-the-counter (OTC) markets. In its role as a central counterparty LCH 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 becomes counterparty to, and responsible for, trade obligations to clearing members. This principle is known as "novation" or "registration". LCH does not in its normal course of business assume any market risk in respect of the trades that it clears.

Regulatory Framework

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

LCH is authorized to offer clearing services in the European Union pursuant to the European Market Infrastructure Regulation (“**EMIR**”) which includes the supervision by a College of 18 European regulators and the ESMA.

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

LCH is registered in the US as a Derivatives Clearing Organization (“**DCO**”) with the US Commodity Futures Trading Commission (“**CFTC**”) under the US Commodity Exchange Act.

LCH is also registered in the US as a clearing agency under Section 17A of the Securities Exchange Act of 1934 1 (“**Act**”) and Rule 17Ab2–1 thereunder with the US Securities and Exchange Commission (“**SEC**”).

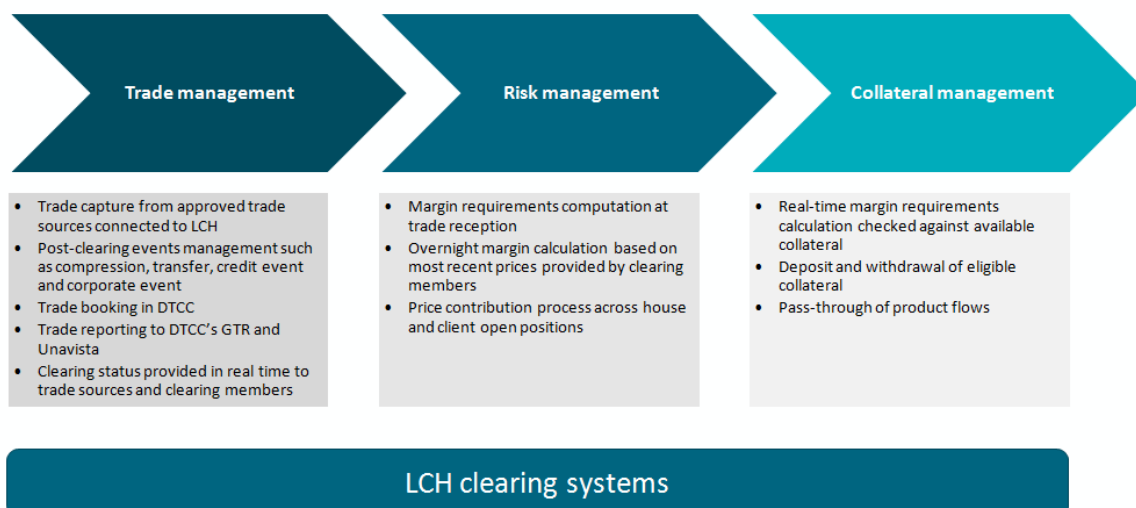
LCH is a credit institution as per the French Monetary and Financial Code (“**COMOFI**”) and regulated by the ACPR. It is therefore subject to all the European and French banking legislations. It is indirectly regulated by the European Central Bank (“**ECB**”) as a lesser important financial institution.

As branches of a credit institution, the activities of LCH 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 safeguards market integrity and offers to 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 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>Rule 17Ad-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>
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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 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) on the other hand.

The Clearing rules aim at covering all material aspects of LCH'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, the Clearing Rules also contain the CDS Clearing supplement and FCM CDS Clearing Regulations.

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

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'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 laws of France.

Each prospective clearing member must enter into an admission agreement with LCH, 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 publishes its Instructions/CDS Procedures and Notices, as part of the Clearing Rules, on its website at <http://www.lch.com/rules-regulations/rulebooks/sa>.

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 transactions between the Clearing Members and LCH. The CDS Clearing Supplement is based both on the 2003 ISDA Credit Derivatives Definitions and the 2014 ISDA Credit Derivatives Definitions but amends some of them to reflect the impact of multilateral clearing on the OTC CDS transaction. The CDS Clearing Supplement, the 2003 and 2014 ISDA Credit Derivatives 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 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 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 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.

The Clearing rules are consistent with applicable law. Should any inconsistencies with applicable law arise, such as on implementation of a new regulation, LCH 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'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 operates will involve a change to the Clearing Rules.

LCH 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>
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LCH operates under robust governance arrangements which provide a clear organisational structure, and set out the composition, role and responsibilities of the LCH Board and the LCH Board Committees. The Matters Reserved for the Board and Board Committee ToR are available on the LCH website.

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

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>
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LCH's risk management is governed by the LCH Group Risk Governance Framework, setting out the risks facing LCH, 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. It is annually reviewed and approved by the LCH Risk Committee and LCH Board.

Through regular business and risk management reviews, LCH assesses its performance against its objectives at both LCH 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>
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LCH 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 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>
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The LCH Board takes the advice of 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 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 website.

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

LCH'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 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'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 employees. LCH is committed to ensuring that its reward practices promote sound and effective risk management and do not create incentives to relax risk standards. The annual performance review for members of the Executive Committee also includes assessments by the Group Chief Risk Officer against their respective risk objectives and by Group Head of Internal Audit in respect of internal audit reports and closure of internal audit actions. Both assessments are presented to the Remuneration Committee.

LCH 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>
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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 and authorities and the procedures for their appointment. These arrangements also set out the process for ensuring accountability to stakeholders.

LCH provides accountability to owners, participants and other relevant stakeholders by including user, clearing member and client representatives in governance forums. LCH'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 Board Risk Committee where all material proposals are reviewed and approved prior to being submitted to the Board for approval.

LCH also adheres to a publicly available code of conduct, which sets out the minimum standards for engagement with stakeholders.

LCH's senior management is responsible, in general, for ensuring consistency of LCH's activities with the LCH 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 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>
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The objectives of LCH are clearly identified and publicly available on the group's website. LCH'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 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 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>
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The LCH 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>
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LCH's overarching approach to risk management is administered according to the LCH Risk Governance Framework. This framework seeks to comprehensively identify the range of risks to which LCH is potentially exposed and to designate responsibility for these risks. Through the framework, the LCH 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 22 risks defined within the Risk Governance Framework, which has been mandated by the LCH 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
- Business risk
- Operational risk
- Legal risk
- Regulatory and compliance risk
- Pension risk
- Project risk
- Business continuity
- Model risk
- Information security and cyber risk
- Investment risk
- Default management process
- Strategic risk
- Reputational risk

The framework is given effect by targeted and detailed LCH risk policies:

- Financial resource adequacy
- Collateral risk

- Contract & market acceptability
- Counterparty credit risk
- Liquidity risk
- Settlement, payment and custodian risk
- Investment risk
- Operational risk
- Model governance, validation & review
- Default management
- Procyclicality

These risk policies are managed by the LCH 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 remaining risks, such as business continuity, legal risk, etc., are managed by dedicated business functions. The CRO is responsible for ensuring that an appropriate framework is in place to measure and monitor the status of each of the 22 risks against the Board's appetite, which is reported to the Board on a quarterly basis.

LCH 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 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 Risk Committee, which makes recommendations related to the models to the LCH 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 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 is 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 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 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 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>
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In accordance with the October 2016 CPMI-IOSCO guidance, and the Bank Recovery & Resolution Directive (BRRD), LCH SA maintains a Recovery Plan. 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 its recognition order in the event that such continuity is threatened. 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.

LCH 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 to the framework. Through the execution of this framework, LCH identifies scenarios that may threaten its ability to continue to provide critical clearing services. In addition to the embedded risk framework in place, specific Recovery and Wind Down Planning exercises have taken place to document, for inclusion in the Plans themselves, high level scenarios that threaten LCH's ability to provide clearing services. Scenarios have been categorised into the following for the purposes of assessing the effectiveness of the recovery tools and to identify the actions required for the Wind Down Plan:

- Member default losses resulting in uncovered credit losses or liquidity shortfalls;
- Non-default losses that threaten LCH's solvency, arising from general business risks, custody and investment risks, and
- Uncovered liquidity shortfall associated to these 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 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 and where appropriate are aligned to existing annual market exercise regimes (e.g. annual fire drills) in order to simulate the implications of executing the Recovery and/or Wind Down Plans to ensure they remain relevant. Additionally, where the underlying business model of LCH 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.

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</i>
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	<i>to the board of directors.</i>
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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 S.A. and one team in the sister company LCH Ltd. 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 S.A. 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 Ltd only or to both, depending on the issue raised.

The team in LCH S.A. 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 Ltd. in London as well as on external auditing firms when required.

Issues arising from management not accepting or not implementing IA 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, respectively.</i>
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The roles and responsibilities of the LCH Board are clearly specified through the company’s Articles of Association.

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

The LCH Board has established an Audit Committee, and, as an advisory committee, a Risk Committee.

The composition of the LCH Board, Audit Committee and Risk Committee are publicly available. The terms of reference of the Audit 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 Board in the sound financial management and internal control management of the company. Its responsibilities include:

- assisting the LCH Board in fulfilling its responsibilities to review audited financial statements;

- appointing external auditors;
- reviewing the internal audit function;
- reviewing regulatory compliance; and
- reviewing the operational risk framework and reviewing the internal control environment.

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

The Risk Committee advises the LCH 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 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 based on their findings to the LCH Board for approval. 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 seven individuals: three INEDs, one of whom is the Chairman, three representatives of clearing members and one representative of clients of clearing members. The metric for determining which clearing member and clients are members of the Committee is based on factors including the asset classes cleared, volume 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 Board performs an annual review of its own performance and that of its Committees. The review includes consideration of the performance of LCH's Board members and the Chairman, and the LCH 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>
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The LCH S.A. 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 place adequate internal control systems that provide reasonable assurance that corporate objectives will be achieved and that the company complies with applicable regulatory requirements.

The Audit Committee comprises 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 director is appointed chairman 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>
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The LCH risk management framework is designed to measure, monitor, mitigate and manage risks posed to LCH and its clearing members. LCH maintains financial resources sufficient to cover the default of the two member groups with the largest exposures under extreme but plausible conditions. LCH's overall risk management framework sets out internal policies, procedures and processes to identify and manage current and potential future credit exposures that arise as a result of LCH's business activities and operations. As required by policies, variation margins are collected to manage current exposures and initial margins are collected to meet potential future exposures over conservative holding periods, at least a 99.7% level of confidence. The default fund resources are sized based on covering the defaults of the two largest members in a range of theoretical and historical stress scenarios. LCH assesses margin coverage, and calls margin where necessary, multiple times each day.

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>
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LCH uses variation margin, initial margin, a dedicated portion of its own resources and mutualised, service specific default funds, 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 is calibrated at 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.

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

LCH places a portion of its own resources, an amount at least 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.

Variation Margin liabilities must be covered by clearing members in cash. 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, or by pledge of securities issued or explicitly guaranteed by high quality sovereigns, supranationals and government agencies.

Contributions to default funds are only acceptable in cash, using prescribed currencies or Central Bank guarantees depending on the markets cleared.

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

As described above, LCH's Risk Appetite and policies establish that a confidence level of 99.7 percent is used to cover LCH'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 investigations, which may lead to a formal model review in accordance with LCH's model validation governance. Interim measures include amending configurable model parameters and/or calling additional margin from affected members until model remediation is complete.

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

LCH maintains policies covering each of the risk types and detailing how each risk is managed according to the LCH 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 Board. Financial resource holdings are covered by the Financial Resource Adequacy Policy.

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>
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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 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 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. Additional margin

(Default Fund Additional Margin or DFAM) is called from any member with a net stress loss above this limit in order to reduce its net stress exposure.

LCH 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 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 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, is 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>
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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>
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LCH’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 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’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>
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The first step in 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 is 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 Default Rules.

Rule 17Ad-22(e)(4)(vi)	<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 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></p>
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LCH 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 Board with recommendations made by the Risk Committee. "Flash reports" are sent to senior management daily and reports are made to each LCH Board meeting.

The LCH 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 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 prior to the launch of a new product.

In addition, reverse stress testing is carried out regularly. This 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.

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>
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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 Board's Risk Appetite. Independent validation is conducted by an LCH 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>
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All clearing members of CDSClear are bound by the CDSClear Rulebook. The CDSClear Rulebook contains, amongst other things, "Default Rules". If a clearing member defaults, then the Default 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 Default Funds,
3. A pro rata allocation of LCH'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. An unfunded contribution from each non-defaulter equal to the non-defaulter's funded contribution to the default fund(s) in which the defaulter has caused losses. Only one unfunded contribution may be called per default period,
6. A daily loss allocation to non-defaulters based either on cumulative gains, subject to a cap,
7. LCH may then invite non-defaulting clearing members to make voluntary payments,
8. If there are further losses, open contracts of an affected service are closed out with any shortfall being allocated pro rata across those clearing members who are owed funds from the service.

The process outlined above applies to both a single default and the default of multiple clearing members.

In the event that LCH borrows funds from a liquidity provider in order to manage a default, then the cost of funding and the repayment of the borrowed amount will be met through the resources in the default waterfall.

Following the completion of the default management process, each default fund may be replenished to the level of its floor, within 2 days, but it is otherwise held at its post-default level until the end of the cooling off period. During this time Default Fund Additional Margin (DFAM) is called to ensure that the waterfall is fully funded. At the end of the default 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.

Any capital expended by LCH 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>
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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>
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Only financial instruments that are of high quality, highly liquid, and with low credit and market risk can be considered for LCH's eligible collateral list. LCH'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 limits the assets it (routinely) accepts as collateral to those with low credit, liquidity, and market risks.

LCH 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 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 Credit Risk Management Committee (CRMC); issuers of securities must be approved by CRMC and have been assigned a minimum Internal Credit Score (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 Co) 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 establishes prudent valuation practices and develop haircuts that are regularly tested and take into account stressed market conditions.

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

LCH 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, 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, it shall be entitled to demand further collateral from such member.

LCH'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 a piece of collateral, appropriate lookback periods, attributes of issuers and price correlations.

LCH makes public a list of eligible collateral along with 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 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 if deemed necessary, to avoid excessively procyclical effects. LCH internal policies require that a 10 year price history be used in haircut calibrations 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 avoids concentrated holdings of certain assets where this would significantly impair the ability to liquidate such assets quickly without significant adverse price effects.

LCH monitors clearing member collateral holdings for concentration risk. Internal risk policy and the LCH Rulebook allow LCH to place concentration limits on particular asset types and to manage specific

concentrations within collateral portfolios, and takes into consideration the ability to realise the value of a piece of collateral during normal and volatile market conditions. For securities collateral that is delivered via either bilateral or triparty mechanisms, LCH specifies concentration limits on issuers in line with 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>
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The LCH 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>
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LCH's general framework of margining consists of the calculation and collection of intraday and end-of-day initial margin and variation margin. Initial and variation margin is collected from LCH's clearing members to cover the risk that members are unable to fulfil their obligations as set out within the LCH Rulebook and Clearing Member Agreement.

Initial margin performance is assessed on a daily basis through member portfolio backtesting. All of LCH's margin models have to pass both the regulatory defined minimum backtesting threshold and the thresholds established by LCH'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'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 will be applied to mitigate this risk. For example, LCH has the ability to apply liquidity and concentration risk margin for large positions.

LCH 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'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 fire drills.

LCH has fully documented the margin methodology for all of its clearing services. In addition, as required by LCH'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 may undertake, are subject to a review by LCH's internal risk governance, including an annual review by the LCH Board.

LCH 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'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>
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LCH 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:

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

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 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, 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 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 potential future exposure to participants in the interval between the last margin collection and the close out of positions following a participant default.</i>
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LCH'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 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 November 2004	5 days (7 days for client positions)

LCH 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; the use of exponentially weighted moving average volatility scaling; and the use of a percentile long-term quartile margin floor.

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 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 firedrill exercises have resulted in significant excess of margin (less than 30% erosion of defaulter's resources). LCH 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>
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LCH 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 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, “missing rules” will be used so as to derive 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 until a suitable replacement is found. If no suitable replacement exists the contract may not be eligible for clearing and can be suspended.

LCH’s policies 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 historical 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 describes 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 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 margin 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 require 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 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’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>
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LCH 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 CDSClear).

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 five 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'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 check 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 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>
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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 risk management function with monthly summaries shared at each LCH Risk Committee. If backtesting suggests the margin coverage target cannot be met, LCH 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 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 with quarterly reports made to the risk management function.

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

In that case, LCH 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 website.

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

Rule 17Ad-22(e)(6)(vii)	<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>
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LCH'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'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'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 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>
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LCH 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 and stress testing is performed using conservative assumptions. LCH does not rely on supplemental liquid resources in meeting 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>
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LCH 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 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 has full access to ECB central bank money in Euros to manage liquidity against available eligible collateral.

LCH's framework for the management of liquidity risk is set out in its Liquidity Risk Policy, which is reviewed by the LCH Risk Committee and approved by the LCH 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'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 to:
 - o Fulfil the settlement obligations of the defaulting clearing member(s) and,
 - o 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's books.

The size of LCH'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>
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LCH has robust arrangements for managing its liquidity risks during business-as-usual and during a default through its access to ECB facilities. LCH'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'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 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 undertakes an exercise of 'War Games' to test the assumptions. These activities test market/counterparty appetite for securities that LCH 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 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 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 also has prearranged funding arrangements with major (I)CSDs or commercial banks.

LCH's liquidity policy requires that a minimum buffer be maintained above the stress tested liquidity resource requirement on a cover two basis and 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>
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LCH's internal risk policy sets a preference for the use mainly of central bank services where available.

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 Euros intraday and overnight credit facilities provided by Banque de France. Furthermore, the cash that has not been invested through reverse repo transactions can be deposited with the central banks. For currencies other than the Euro, which concerns a small minority of transactions, LCH SA uses commercial payment bank services.

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

LCH maintains a Liquidity Plan that describes the tools that would be used to fund liquidity to meet operational or default liquidity needs. The 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). Some of the tools LCH would use to address a liquidity shortfall are applied on an ongoing basis as part of LCH's standard investment and liquidity management activities e.g. maturing investments, and the purchase and sale of securities. To ensure that it could access liquidity through using the tools that are not used on a day-to-day basis (e.g. repo, borrowing, FX swaps) LCH conducts regular 'war games'. As part of these tests, LCH also simulates the liquidation of a defaulting clearing member's collateral in fire drill exercise. These tests are conducted by the collateral and liquidity management team quarterly on a rolling basis, so that LCH tests its ability to apply each tool 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>
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On top of the above description LCH performs on regular basis dedicated operational capacity tests and dedicated firedrills in order to ensure the efficiency of the process and the capacity to access the relevant liquidity resources.

Rule 17Ad-22(e)(7)(vi)	<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</i>
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	<i>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>
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LCH 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 CaLM (Collateral and Liquidity Management), compliance, finance, and operations functions. The stress tests take a conservative set of assumptions about potential outflows and the ability of LCH 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 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 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'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 Board. The liquidity risk management framework is subject to independent validation annually by an LCH 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>
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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 actions 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>
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LCH 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 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 must take to invoke the plan and a number of recovery tools that are available to LCH. Each available tool is assessed for its impacts to LCH'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 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>
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To ensure it maintains sufficient liquid resources, the Liquidity Risk Policy requires LCH 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 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 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 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 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>
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LCH 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 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 Liquidity Coverage Ratio (LCR) and the liquidity buffer. The outcomes of the reverse stress tests is presented and approved by the risk governance.

LCH also models its liquidity to ensure it has sufficient resources to cover ongoing operations in a business as usual situation. With this respect, LCH carries out daily liquidity stress tests based which are reported to senior management within LCH'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>
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The CDS Clearing Documentation requires that all margins and clearing-related cash payments denominated in Euros are made via TARGET 2 within the mandatory timeframes established by the European Central Bank. TARGET 2 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 TARGET 2 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>
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LCH's internal risk policy sets a preference for the use of central bank services where available. 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 uses the euro Central Bank money (i.e Target 2) for the transfer of funds to and from clearing members. Clearing members must maintain a Target 2 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 sets out criteria for commercial banks, which include:

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

LCH 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 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'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 has unsecured exposure intraday limits for commercial banks. These limits are monitored intraday and capped to 75 per cent of LCH's capital base. LCH 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>
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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>
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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>
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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 settled by physical settlement. 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 second 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 make the cash payment 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>
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The LCH Rulebook contains default rule provisions that set out LCH'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.

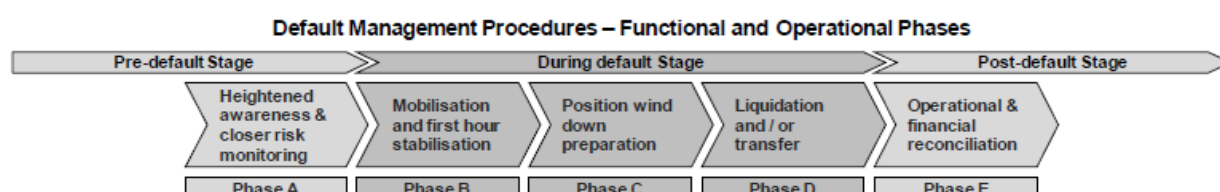
Rule 17Ad-22(e)(13)(i)	<i>Rule 17Ad-22(e)(13)(i) requires a covered clearing agency to establish, implement, maintain and enforce written policies and procedures reasonably designed to address the allocation of credit losses it may face if its collateral and other resources are insufficient to fully cover its credit exposures, including the repayment of any funds the covered clearing agency may borrow from liquidity providers.</i>
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LCH's Default Rules, contained in its Rulebook, set out that it is entitled to place a clearing member in default if it appears to LCH that the clearing member is unable, or is likely to become unable, to meet its obligations in respect of one or more contracts. The Default Rules also 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. LCH may (by circular to clearing members) specify criteria according to which an Automatic Early Termination Event will occur in respect of a clearing member if it becomes subject to any insolvency event.

The Default Rules set out the steps that LCH 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, auctioning the defaulter's proprietary portfolio to other clearing members (to include any client accounts of that clearing member which could not be ported to another clearing member), otherwise closing out any open contracts, and generally taking such action as LCH 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.

Subject to the obligation under EMIR to trigger the procedures for the transfer of the assets and positions held by the defaulting clearing member for the account of its clients to another clearing member, LCH has full discretion over the taking of these steps. All significant decisions will be taken by the LCH CEO or CRO.

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



On calling a default, the LCH CEO will convene a Default Crisis Management Team (DCMT) which will be responsible for the overall management of the default. All LCH clearing services have a Default Management Process (DMP) and a Default Fund Supplement annexed to the Default Rules. The DCMT will instruct the Head of each impacted clearing service to convene a Default Management Group (DMG), which comprises LCH executives and, for some services, clearing members. Where representatives of clearing members are seconded to a DMG of LCH for the purpose of default management, they act on behalf of LCH and appropriate confidentiality agreements are in place.

The DCMT will delegate decision making within prescribed limits to the DMG. All significant decisions will be referred to the DCMT for approval. The Default Rules set out how LCH shall meet any losses arising from a default, including the use of collateral provided by the defaulter, LCH's own funds and the default fund(s).

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

The Default Rules also set out the order in which LCH 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's own funds of an amount determined by LCH in accordance with the requirements relating to the calculation and the setting aside of dedicated own resources under the Own Resources Provision of the Default Rules. Thereafter losses are met by recourse to the indemnities given by clearing members other than the defaulter in respect of each default fund(s) to which it has contributed. The amount of such indemnity is limited to an aggregate amount not exceeding the amount of the non-defaulting clearing member's contribution to the default fund(s) in respect of such business type.

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>
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If 25 percent of the relevant default fund is used up in the management of the default, LCH has the right to call additional funds from non-defaulting service clearing members ('unfunded contributions'). The value of unfunded contributions LCH 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 will recalculate the default fund amount. If the default fund has fallen below the floor level, clearing members must restore the default funds to their respective floor levels within two days.

If another default occurs within the 25-day post-default period, the end of that post-default period is extended to the 25th 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 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 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 be exhausted, a service continuity phase will be implemented. In this phase clearing members of CDS Clear 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>
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All LCH clearing services involve external participants (such as clearing members, execution brokers etc), as required, in their default management firedrills. For CDSClear, 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 firedrill 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.

Following a firedrill 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. Services may also produce individual reports that are shared with their respective DMGs.

Each firedrill 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 firedrills 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).

A Group Default Crisis Management Team (Group DCMT) is convened in the event of both a Group-wide firedrill and for a real default. Its role is to consider coordination opportunities and offer advice to the LCH Group's CCP DCMTs, but has no decision making role.

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>
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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 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>
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LCH 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 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 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 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 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'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>
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LCH maintains both a Recovery Plan and a Wind Down Plan, which are reviewed annually, or following material changes.

The Recovery Plan sets out the steps that LCH should take in order to maintain the continuity of its services, should such continuity be threatened. 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. Both single and combined scenarios have been identified.

The Wind Down Plan sets out the steps it would be necessary to follow should LCH need to wind down its clearing services and shut down the company. The plan demonstrates how LCH can achieve an orderly wind down within six months.

LCH holds capital, funded by equity, equal to the operating expenses for the six month period required to wind down. LCH bases its calculation on the latest audited expenses.

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

In line with the Recovery Plan, 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 holds capital, funded by equity, equal to the operating expenses for the six month period required to wind down. The plan demonstrates that 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>
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LCH maintains a Recovery Plan which is approved by the LCH Board on an annual basis, or following material changes.

The Recovery Plan sets out the steps that LCH should take in order to maintain the continuity of its services, should such continuity be threatened. This plan takes into consideration and assesses a number of recovery tools that are available to LCH. This includes an equity capital raising strategy should it fall close to or below the required amount.

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>
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LCH'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 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'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 onsite due diligence reviews.

LCH 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 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 monitors intraday exposures and manages transactions such that its intraday exposure to the custodian bank remains below 75 percent of its capital. LCH 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's investment risk strategy is set by the LCH Board, on the advice of the Risk Committee, and in line with the LCH Board's Risk Appetite. The investment strategy is disclosed at an aggregate level on request to clearing members of LCH. How the total cash received from participants is held/deposited/invested is included in LCH'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 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 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 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 does not invest margin received from a clearing member in securities issued by that clearing member or its affiliates.

LCH maintains pre-arranged and highly reliable relationships with a wide range of high quality counterparties enabling execution of transactions with short-dated maturity. LCH 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>
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Operational risk management is a key component of the LCH risk management framework and encompasses appropriate tools and mechanisms to enable the effective identification, assessment and mitigation of such risk. The operational risk management arrangements incorporate a “three lines of defence” structure that has been endorsed by the LCH Board.

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>
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Operational risk forms part of the Risk Governance Framework of LCH, and is one of 22 types of risk which LCH faces. The LCH Board has set out through this framework its appetite for operational risk.

LCH 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 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 are provided by a dedicated operational risk management function. This function is also responsible for providing aggregated reporting to internal senior executive committees as well as the LCH Board and its Committees. LCH’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 Board approves the policy annually. The Audit Committee 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. The policy also includes requirements to complete scenario analysis, stressing these operational risks through workshop-based exercises. Such exercises and oversight ensure operational procedures are implemented appropriately.

Typical sources of operational risk exist at LCH including manual processes, system configurations and change management. Single points of failure in LCH’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 ERCO, LMC and Audit Committee.

LCH 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

employees, including agency staff and consultants, are subject to pre-screening checks before their employment can begin.

LCH 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 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 business line maintains oversight of its change portfolio through governance meetings, commonly known as project and programme boards. A central committee, Project SteerCo, maintains a holistic view of change management at LCH, whilst the senior executive management committee maintains a strategic oversight of the change portfolio within the strategy of the LCH Board.

LCH reviews and tests its systems, policies and procedures with its clearing members in a number of ways. LCH involves its clearing members in testing before the launch of new products and systems. An annual business continuity test is carried out, in which all clearing members, external providers and other third parties (as identified in Business Impact Assessments (BIAs)) are invited to participate. 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 actively requests feedback in order that any weaknesses may be addressed.

LCH'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>
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The Business Continuity and Security (BCS) activity is under the responsibility of the head of BCS Department.

The purpose of the Information Security Policy is to protect LCH SA information assets from all threats, whether internal or external, deliberate or accidental.

The group Information Security Policy, adopted by LCH SA is compliant with the international norm ISO/IEC 27001 and security standards. This framework provides LCH SA with protection from unauthorized disclosure, and ensures data **confidentiality, integrity and availability**.

The LCH SA security policy library is composed of General Security Policies, supported by Standards, Procedures and Operational Guidelines, which cover the sections of the ISO 27002:2013:

- Security Policy;
- Organization of Information Security;
- Human Resources Security;
- Asset Management;
- Access Control;
- Cryptography;
- Physical And Environmental Security;
- Operations security;
- Communications Security;

- Information Systems Acquisition, Development, Maintenance;
- Supplier Relationships;
- Information Security Incident management;
- Information Security Aspects of Business Continuity;
- Compliance.

Confidentiality is maintained throughout an Access Control Policy.

The Logical Access Information Security standard outlines unauthorized disclosure and ensures data accuracy and integrity. The access rules include:

- The Company Logical Access Policy – based on a “Need to Know” Policy;
- The business requirements for access control to systems, services and the components that underpin them;
- The Information Classification;
- The roles of the individuals requiring access - Role Based Access Control (RBAC) Policy;
- The technology specific access control guidelines for each platform;
- Periodic physical and logical access reviews.

Data **integrity** is maintained throughout the Information System on the following principles:

- For real-time messaging with external and internal stakeholders secure protocol guarantees transmission integrity and message sequence;
- For file transfers between each application of the Information System the use of secure file transfer protocols (and related checksum on data).

Availability is maintained throughout supplier contractual high Service Level Agreement, Backup policy and Business Continuity Policy.

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 each to test outbound defenses or internal security measures.

Outsourcers:

In addition, SA’s IT Services suppliers are contractually bound to enforce SA 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 protect and set up strong security measures on assets configurations.

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 have implemented security measures, as an increase of their Internet Network Capacity, pre-filtering on edge Internet routers, scrubbing and the implementation 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 LCH SA's information security system. The penetration/intrusion tests simulate potential attacks on SA's information systems and are designed to identify the vulnerabilities in 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 all SA front-end architecture and on a weekly basis a Web Application Scan, based on OWASP standards is performed on the web applications. Daily reports are analysed and impacts assessed and needed correctives actions taken to close any 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 per clearing systems and network of LCH SA IT capacity systems assessment for which recommendations are proposed toward capacity increase in regard of the 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 on 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 toward those target volumes in case of 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 and approved by the different stakeholders: business teams, internal IT teams, project team, third party IT suppliers. This procedure follows ITIL V3 2011 standards.

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

LCH SA brings to its members a connectivity service offering 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>
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As part of our ongoing commitment to have a resilient business, LCH SA operates a Business Continuity Management (BCM) programme. The BCM programme meets internal business requirements, legal and regulatory requirements and is in line with best practices.

Key objectives of the BCM programme are:

- The safety and welfare of staff;
- To recover and 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 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 adherence to the policy. In addition there are several committees in place within LCH 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 Business Impact Analysis (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.

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 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 staff;
- Cross-trained staff in alternate locations who 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 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>
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LCH's participation requirements are designed to be the least restrictive while ensuring that risk to LCH and the markets it serves is minimised. Participation criteria are publicly available through the LCH Rulebook and website, and clearing members are monitored for ongoing compliance with the requirements. The LCH Rulebook contains provisions to manage circumstances where a clearing member no longer meets the criteria.

Participation requirements

The requirements for participation in LCH 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 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 website and are included in the LCH Rulebook and sum up herebelow:

- All new members are also subject to an internal LCH 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 a 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 a direct or indirect access to Target 2, to pay and receive cash obligations to and from LCH. Typically, this requires appropriate systems to manage the clearing member'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 onboarding function deems it necessary.

All applicants for membership must provide an opinion which must be provided 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's regulatory obligations.

Monitoring of compliance with the participation requirements

To achieve a balance between open access and risk, LCH 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 monitors compliance with participation requirements on a continuous basis. The clearing membership Agreement requires clearing members to notify LCH if they no longer meet the participation requirements.

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

The Rulebook outlines the actions that LCH 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 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, LCH 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>
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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 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>
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LCH 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 risk management framework. They are subject to rigorous detailed due diligence and rigorous internal governance processes.

There is no interoperability link within CDS 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>
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LCH's participation requirements are designed to mitigate the risks that LCH 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 a 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 the service being applied to clear, and 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 website and are included in the LCH Rulebook.

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>
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LCH 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 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>
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LCH has carried out a number of reviews of its operating model with a view to improving efficiency and effectiveness. LCH have 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>
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LCH 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's commitment to the horizontal model ensures a clear growth path for clearing across multiple markets, exchanges, venues and geographies.

LCH is committed to working closely with its members and the markets it serves to provide clearing solutions and adheres to a publicly available code of conduct, which sets out the minimum standards for engagement with stakeholders.

LCH Group Ltd is partly owned by the clearing members of its operating CCPs. LCH ensures a fair representation of members and clients on its governance committees. The LCH Board and the Risk Committee include user, client and independent representation. LCH also has a number of advisory and risk working groups, which relate to specific products or projects and through these forums and member consultation ensures consideration of clearing member needs in terms of products and technology.

Any change which may fundamentally affect the way LCH operates will involve a change to the LCH Rulebook. Changes to the Rulebook 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 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 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 client management functions collect and collate enhancement and change requests from members and provides 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>
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LCH 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 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 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 three 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 (both in terms of trades outstanding and daily volumes).

- **Incidents:**

LCH's management sets a tolerance level of incidents, aiming to minimise disruption to the clearing services.

With this respect, LCH 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:

Relations with service providers are monitored based on formalized third party management process (Supplier Relationship Management/SRM) ensuring that the adopted objectives and approaches are harmonised through all LCH Group entities. 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 performs a close monitoring of the service:

- The IT department conducts daily monitoring of the IT systems. The Security department manages security-related aspects, and the Legal department monitors legal clauses and overall consistency.
- LCH's IT suppliers report monthly capacity and metrology metrics to show the actual 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 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 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.

Furthermore, ahead of the implementation of any new product or system change, LCH performs testing to provide assurance that system capacity will be, or will remain, adequate for normal and stressed volumes.

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

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

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

As well as providing proprietary reporting to Clearing Members, LCH provides wherever possible standards based reporting.

LCH is developing further SWIFT standard interfaces for custodians and (I)CSDs in order to remove the need for proprietary interfaces. Where industry standards interfaces are not available LCH will either develop the third party specifications or define a proprietary interface.

All Clearing Gateways share the same background in terms of technical reliability:

- For clearing, LCH 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 solution.

For more details please refer to the connectivity guide available at LCH.com

5. Definitions of Key Terms and Abbreviations

Abbreviation	Full name
ATS	Automated Trading System
BCM	Business Continuity Management
BCP	Business Continuity Planning
BIA	Business Impact Assessment
BRRD	Bank Recovery & Resolution Directive
CaLM	Collateral and Liquidity Management
CCP	Central counterparty
CDS	Credit Default Swap transaction
CDS Clearing	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

Documentation	Swaps” at http://www.lch.com/rules-regulations/rulebooks/sa
CFTC	US Commodity Futures Trading Commission
CMS	Collateral Management System
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
DVP	Delivery Versus Payment
EMIR	European Markets Infrastructure Regulation
FCM	Futures Commission Merchant
FINMA	Swiss Financial Market Supervisory Authority
FMI	Financial Market Infrastructure
GCM	General Clearing Member
ICSD	International Central Securities Depository
ICS	Internal Credit Score
ISA	Individually Segregated Account
LCR	Liquidity Coverage Ratio
LSEG	London Stock Exchange Group
LSOC	Legally Segregated Operationally Commingled
MTF	Multilateral Trading Facility
NCA	National Competent Authority
OTC	Over-The-Counter
OSA	Omnibus Segregated Account
Reserved Matters	Certain matters which must be approved by the LCH Board, and which cannot be delegated to the LCH executive.
RTS	Regulatory Technical Standards
Rulebook	The LCH Rulebooks and the procedures contained therein (the LCH Procedures)
SCSC	Security and Continuity Sub Committee

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
Target2	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.

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