Assessment of LCH Limited's SwapClear Service

December 2020

Contents

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Executive Summary

Purpose

This report presents the Reserve Bank of Australia's (the Bank's) annual Assessment of LCH Limited's (LCH Ltd's) SwapClear service, which operates in Australia under an overseas clearing and settlement (CS) facility licence. It details LCH Ltd's compliance with the *Financial Stability Standards for Central Counterparties* (CCP Standards) and with the obligation to do all other things necessary to reduce systemic risk over the 12 months ending 30 September 2020.

As a systemically important CS facility operated under an overseas licence, LCH Ltd is subject to ongoing assessment against the CCP Standards over a rolling four-year period. This work complements the work carried out by the Bank of England (BoE) as LCH Ltd's primary regulator. The CCP Standards assessed this year were Credit Risk (CCP Standard 4), Margin (CCP Standard 6) and Participant Default Rules (CCP Standard 12).

Conclusion

In the assessment period, LCH Ltd has either met or made progress towards meeting the regulatory priorities identified by the Bank in its previous Assessment. The Bank therefore concludes that LCH Ltd has conducted its affairs in a manner that causes, or promotes, overall stability in the Australian financial system.

Progress Towards 2019/20 Priorities

During the assessment period, LCH Ltd provided the Bank with a plan to further extend its operating hours over the medium term. LCH Ltd also made improvements to its Protected Payment System (PPS) contingency arrangements and demonstrated operational and efficiency gains in its preferred solution.

Other Material Developments

Other material developments relevant to the Bank's oversight of LCH Ltd that occurred during the assessment period include:

- overseeing LCH Ltd's handling of the operational and financial risk management challenges posed by the COVID-19 pandemic;
- changes to LCH Ltd's governance arrangements to simplify its structure and reflect the London Stock Exchange Group's (LSEG's) increased ownership stake;
- improvements to key aspects of LCH Ltd's resilience framework for managing operational risks, including cyber risk; and
- LCH Ltd's management of risks associated with global benchmark reforms, including the transition away from the London Interbank Offered Rate (LIBOR).

Priorities for 2020/21

The Bank's practice is to set regulatory priorities where it expects LCH Ltd to conduct additional work to enhance its observance of the CCP Standards. This assessment carries over the priorities from 2019/20 regarding the extension of SwapClear's operating hours and improvements to LCH Ltd's PPS contingency arrangements.

In its supervision of LCH Ltd in the next 12 months, the Bank will also review: how LCH Ltd manages cyber risks; a new LCH Ltd Australian legal opinion; and the governance of LCH Ltd's model validations.

1. Summary of Regulatory Priorities

This section summarises progress on the Bank's current regulatory priorities and areas of supervisory focus and outlines the focus of the Bank's supervisory activity for the next assessment period.

As a systemically important overseas CS facility, LCH Ltd is assessed against the CCP Standards over a rolling four-year period.[1] Certain standards may be reviewed more frequently depending on market and business developments, as well as the priorities of the Bank. These detailed compliance assessments are not published.

The Bank made the decision to defer the assessment of a number of standards this year, recognising the potential financial and operational risk management challenges presented to LCH Ltd by the COVID-19 pandemic.

1.1 Review of 2019/20 Regulatory Priorities

The Bank sets regulatory priorities for LCH Ltd based on its annual assessment. These priorities reflect the Bank's expectations regarding actions that LCH Ltd should take to enhance its observance of the CCP Standards and promote stability in the Australian financial system.

1.1.1 Extension of operating hours

Extension of operating hours. LCH Ltd's future business developments (including the transition to risk-free benchmarks) should not negatively affect operating hours. Further extensions to the operating hours of the SwapClear service are expected to be delivered in the medium term while maintaining the resilience of its operations. In the coming period, LCH Ltd must provide the Bank with an approved timeline for the initial phase of work and keep the Bank informed of its progress by providing regular updates.

CCP Standards 6 (Margin) and 16 (Operational risk)

LCH Ltd provided the Bank with a plan to address this regulatory priority over the medium term. Through the year, the Bank received regular updates on the technical and risk management challenges involved in extending the operating hours of the SwapClear service. LCH Ltd also continues to investigate the potential impact of business developments, including the transition to risk-free benchmarks (section 2.3), on its operating hours. As this work is ongoing, the Bank has carried this regulatory priority forward to the 2020/21 assessment period (section 1.3.1).

The SwapClear service is officially open from 6am UK time to 7pm New York time, but can open two hours earlier at LCH Ltd's discretion.[2] In practice, LCH Ltd opened the service at 4am UK time on most

1 For more information see *the Reserve Bank's Approach to Supervising and Assessing Clearing and Settlement Facility Licensees*. Available at <https://www.rba.gov.au/payments-and-infrastructure/financial-market-infrastructure/clearing-and-settlement-facilities/standards/approach-to-supervising-and-assessing-csf-licensees.html>.

2 The official opening hours correspond to 3pm-9am AEST in the Australian winter, and 5pm-11am AEDT in the Australian summer. Differences in when the Australian states, New York and the UK transition in and out of daylight savings may affect these times.

business days during the assessment period despite ongoing business developments and challenges associated with COVID-19. Even so, the service remains closed for at least four hours of the Australian business day and until 3pm AEDT on Mondays during the Australian summer. Until the SwapClear service opens and trades can be novated, firms are required to manage bilateral credit risk exposures. A further extension to LCH Ltd's operating hours would mitigate this risk. In the next assessment period, LCH Ltd is expected to deliver on its plan, and continue to provide the Bank with regular updates on its progress while maintaining the safety and resilience of its operations.

1.1.2 Protected Payment System contingencies

> **Protected Payment System contingencies.** LCH Ltd should continue to implement its plans to enhance the effectiveness of its PPS contingencies, enabling the expected service level to be achieved in the event of a PPS bank outage or failure. During the next assessment period LCH Ltd should formally test its PPS contingency arrangements.
>
> CCP Standard 9 (Money settlements)

LCH Ltd has developed enhancements designed to improve the effectiveness of its PPS contingency arrangements. At this stage, the enhancements are yet to be fully embedded in its processes and scalability has not been demonstrated through a wide-scale test. Accordingly, this regulatory priority has been carried forward to the 2020/21 assessment period (section 1.3.2).

LCH Ltd operates the PPS to settle cash payments to and from participants. LCH Ltd calls funds from, or pays funds to, clearing participants across the books of PPS banks (commercial settlement banks) acting on behalf of those participants. PPS banks then make or receive payments to or from the LCH Ltd 'concentration bank' via the relevant real-time gross settlement system for each currency.

In the event of a PPS bank outage, LCH Ltd requires its participants to have access to contingency arrangements so that they can continue to make and receive payments. The default contingency method, direct funding, involves participants paying directly into LCH Ltd's concentration bank account to meet calls; LCH Ltd would similarly make payments to participants directly from its concentration bank account.

During the assessment period, LCH Ltd conducted a test of improvements that have been made to its direct funding contingency arrangements with a small group of participants. Compared with previous tests, this test demonstrated a reduction in the time taken by LCH Ltd to issue and process margin calls to participants across major currencies (GBP, USD and EUR). LCH Ltd continues to explore complementary contingencies, such as utilising existing commercial relationships or establishing backup PPS banking arrangements, to allow participants flexibility as individual circumstances may dictate.

In the next assessment period, LCH Ltd has plans to make further enhancements to its direct funding contingency arrangements and to conduct a larger test. LCH Ltd should demonstrate that its enhanced arrangements have been embedded in its processes and that it has the capacity to meet service targets in the event of a PPS bank outage.

1.2 Progress in 2019/20 Areas of Supervisory Focus

Areas of supervisory focus describe matters that the Bank currently considers to be an important part of its supervision of LCH Ltd's SwapClear service. This may be due to changes underway at LCH Ltd, updates to regulatory standards, or other developments such as changes to the broader risk environment.

1.2.1 Operational and cyber risk management

Operational and cyber risk management. LCH Ltd's work to embed operational risk management changes (including to its oversight of outsourcing and critical service provider arrangements), as well as further enhancements to its cyber risk management.

CCP Standards 2 (Governance) and 16 (Operational risk)

During the assessment period, LCH Ltd took steps to improve its management of operational and cyber risks. Adjustments to policies and procedures covering key aspects of its resilience framework for managing distinct types of operational risk have been embedded (Appendix B), including for its management of related entities and outsourced critical service providers. LCH Ltd has also completed several action items from its resilience program related to cyber risk. As the work to improve cyber resilience is ongoing, the Bank will continue to monitor LCH Ltd’s management of cyber risk in the next assessment period (section 1.4.1).

LCH Ltd has made enhancements to the management of its relationship with LSEG’s Business Services Limited (BSL), a critical service provider. This has included embedding changes to its service level agreement and demonstrating that these changes have been effective. Additionally, LCH Ltd improved risk controls governing its relationship with BSL, enhancing its oversight of this critical service provider. Following these developments and the updating of operational risk policies and procedures, the operational aspect of this area of supervisory focus has been closed.

LCH Ltd has continued to refine its approach to cyber risk management and is working to embed relevant policies and controls to mitigate key areas of cyber risk. The Bank will continue to monitor LCH Ltd’s cyber risk management, including its work to sustain improvements to its cyber resilience. The Bank will continue to engage regularly with the BoE on this issue.

1.2.2 Model validations

Model validations. The governance of LCH Ltd’s independent model validation processes, including the appropriate documentation of LCH Ltd’s benchmarking process against industry practice.

CCP Standards 2 (Governance) and 6 (Margin)

During this assessment period, LCH Ltd demonstrated that it performed annual model validations in line with its policies, and benchmarked its high importance models against industry practice. LCH Ltd is working towards documenting its policy regarding its criteria for benchmarking its models.

LCH Ltd’s benchmarking processes and procedures should be appropriately documented to minimise key-person risk and to allow review by LCH Ltd’s internal audit function and governance processes. This documentation should include the frequency at which benchmarking is undertaken and the criteria used to determine appropriate benchmarking standards. LCH Ltd has sought to undertake these changes, and the Bank will assess updates to LCH Ltd’s model validation procedures in the next assessment period (section 1.4.2).

1.3 2020/21 Regulatory Priorities

1.3.1 Extension of operating hours

Extension of operating hours. LCH Ltd should continue its work to extend the operating hours of the SwapClear service over the medium term, while maintaining the resilience of its operations; it should keep the Bank informed of its progress. LCH Ltd's future business developments (including the transition to risk-free benchmarks) should not negatively affect operating hours.

CCP Standards 6 (Margin) and 16 (Operational risk)

The regulatory priority on extending SwapClear's operating hours has been carried forward from the 2019/20 assessment period as the SwapClear service remains closed for at least four hours of the Australian business day (section 1.1.1). In the next assessment period, LCH Ltd should continue the implementation of its plan to extend SwapClear's operating hours.

1.3.2 Protected Payment System contingencies

Protected Payment System contingencies. LCH Ltd should continue to implement its plans to enhance the effectiveness of its PPS contingencies, enabling the expected service level to be achieved in the event of a PPS bank outage or failure.

CCP Standard 9 (Money settlements)

This regulatory priority has been carried forward from the 2019/20 assessment period. While LCH Ltd has made progress in improving its PPS contingency arrangements, there remains work to be done to embed relevant processes and improve operational efficiency during a PPS outage (section 1.1.2). During the next assessment period, LCH Ltd should conduct a large scale test of its PPS direct funding contingency arrangements to ensure processes are sufficiently understood and embedded.

1.4 2020/21 Areas of Supervisory Focus

1.4.1 Cyber risk management

Cyber risk management. LCH Ltd's ongoing work to enhance its cyber risk management.

CCP Standard 16 (Operational risk)

This area of supervisory focus has been amended from the 2019/20 area of supervisory focus on operational and cyber risk management (section 1.2.1). During the next assessment period, the Bank will monitor the outcomes of ongoing work by LCH Ltd to enhance the effectiveness of its cyber risk management.

1.4.2 Model validations

Model validations. The governance of LCH Ltd's independent model validation processes, including the appropriate documentation of LCH Ltd's benchmarking process against industry practice.

CCP Standards 2 (Governance) and 6 (Margin)

This area of supervisory focus has been carried forward from the 2019/20 assessment period (section 1.2.2). The Bank will monitor steps to address this area in the next assessment period.

1.4.3 Legal basis

Australian legal opinion. A new legal opinion from external advisers to LCH Ltd addressing Australian law issues arising through its operations in Australia, including the extent to which LCH Ltd's rules and related contracts are enforceable under Australian law.

CCP Standard 1 (Legal Basis)

The Bank intends to conduct a targeted review into certain aspects of LCH Ltd's legal basis, commencing in the next assessment period. The Bank intends to limit the scope of the review to Australian law issues, which will need to be addressed in a new Australian legal opinion. The Bank will continue to liaise with LCH Ltd and other regulators throughout the review.

2. Other Material Developments

During the assessment period, there were a number of other material developments relevant to the Bank's supervision of LCH Ltd's SwapClear service to the Australian market. Some of these have been driven by changes to SwapClear's global product offering, risk management arrangements and governance, while others are the result of changes to the regulatory environment and international developments.

2.1 COVID-19

A pandemic environment, such as that created by COVID-19, has the potential to cause substantial operational disruption at financial market infrastructures (FMIs); it could affect the ability of the FMI, its participants and service providers to offer service continuity, fulfil risk management obligations, and to recover normal operations in the event of an outage. COVID-19 presented similar types of challenges to LCH Ltd's SwapClear service, including disruptions to normal working arrangements, increases in trading activity, and heightened volatility in financial markets.

LCH Ltd has managed the operational and financial risk management challenges associated with the COVID-19 pandemic very well. In March, LCH Ltd responded to the increased risk posed by the spread of COVID-19 by successfully activating business continuity measures to maintain operations while minimising risks to staff. This involved transitioning almost all of its workforce to remote working arrangements, with only a small number of critical staff required to attend an LCH Ltd office for routine physical maintenance or in the event of an operational incident.[3]

The SwapClear service has operated without disruption throughout the pandemic, and successfully cleared a record US$142 trillion in notional values across almost 800,000 trades in March with no degradation in performance or stability (Appendix A). Internal incidents for the SwapClear service have been at historically low levels, and the incidents that have occurred were unrelated to COVID-19 operating arrangements.

LCH Ltd did not make any unscheduled margin calls or unplanned changes to the SwapClear margin models due to the pandemic environment. As the pandemic unfolded, heightened market volatility and increased trading activity flowed through to higher initial margin levels and larger variation margin flows (Appendix A). Margin backtesting breaches, which are an indicator of whether current price volatility is captured in a central counterparty's (CCP's) margin model, increased at the SwapClear service during the March quarter but remained within LCH Ltd's threshold (which is more conservative than the regulatory minimum).[4]

There were a few episodes of late margin payments from some participants that experienced operational constraints when their staff were working from home. These issues were closely monitored by LCH Ltd and have been resolved as participants have adapted to working remotely.

3 LCH Ltd has offices in London, New York and Sydney.

4 A 'backtesting breach' occurs if the initial margin requirement for a portfolio would have been insufficient to cover losses on the portfolio from historical prices movements over a specified period of time.

With many of LCH Ltd's and participants' staff working remotely, LCH Ltd has been reviewing its processes for managing a default to ensure they remain effective. In light of this, LCH Ltd has established and tested remote working contingency arrangements for the Rates Service Default Management Group (DMG) in the event it is unable to convene physically.[5] LCH Ltd also made rule changes to enable it to effectively operate the DMG in circumstances where not all DMG members can be convened.[6] No SwapClear participant was called into default during the assessment period.

The Bank will continue to maintain a close engagement with LCH Ltd on matters related to the impact of the COVID-19 pandemic over the coming assessment period.

2.2 Brexit

LCH Ltd's SwapClear service is licensed in Australia under section 824B(2) of the *Corporations Act 2001,* which provides licensing for an overseas-based CS facility subject to requirements and supervision in its home country that are considered sufficiently equivalent to those in Australia. LCH Ltd is incorporated in the UK, and is primarily regulated by the BoE under UK and EU legislation.

The UK officially left the EU on 31 January 2020. A transition period, under which EU law continues to have effect in the UK, lasts until 31 December 2020.[7] During this transition period, LCH Ltd will continue to be supervised under the European Market Infrastructure Regulation (EMIR).[8] As LCH Ltd's home regime will remain unchanged during this period, there will be no impact on SwapClear's operations in Australia.

In September, the European Commission announced an 18-month, time-limited equivalence decision to enable UK CCPs, including LCH Ltd, to provide their services to the EU after the end of the transition period.[9] This decision is contingent on close cooperation between the BoE and the European Securities and Markets Authority (ESMA), and is open to reassessment following any changes to the UK's regulatory or supervisory framework affecting the provision of clearing services. This decision will give ESMA time to conduct a comprehensive review of the importance of UK CCPs to the EU. Following this announcement, ESMA completed the tiering and recognition assessments required for recognition of LCH Ltd as a foreign or 'third-country' CCP under EMIR.[10]

The Australian Securities and Investments Commission (ASIC) and the Bank will similarly consider any changes to LCH Ltd's home regime and the sufficient equivalence of the regime at the end of the transition period; LCH Ltd can continue to operate in Australia while this assessment is being

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5 The Rates Service DMG oversees the default management processes for the SwapClear and Listed Rates services, and consists of LCH Ltd's Head of Business Risk, a director of the Risk Management department, and traders seconded from clearing participants.

6 For further information, see LCH Limited, 2020, *LCH Limited Self-Certification: Amendments to the Rates and ForexClear Default Management Groups*. Available at <https://www.lch.com/system/files/media_root/LCHLTD%20Self-Cert_Rates%20and%20FX%20DMG%20changes%20v1.pdf>.

7 For further information regarding the transition period, see *Brexit in brief - Transition period*. Available at <https://ec.europa.eu/info/european-union-and-united-kingdom-forging-new-partnership/brexit-brief/transition-period_en>.

8 EMIR is the European regulatory regime for CCPs (Appendix B). It is also known as *Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories.*

9 For further information, see *Commission Implementing Decision (EU) 2020/1308.* Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020D1308>.

10 For more information on ESMA's decision, see *ESMA to Recognise Three UK CCPs from 1 January 2021.* Available at <https://www.esma.europa.eu/press-news/esma-news/esma-recognise-three-uk-ccps-1-january-2021>.

undertaken. To date, legislative and regulatory changes in the UK are 'not intended to make policy changes, other than to reflect the UK's new position outside the EU, and to smooth the transition'.[11] Subject to there being no significant changes to this approach, the Bank expects the regime to be sufficiently equivalent.

2.3 Benchmark reform

Following recommendations made by the Financial Stability Board (FSB) in 2014, there has been substantial international work to reform the benchmark reference rate regime based on interbank offered rates (IBORs). This has involved the establishment of alternative risk-free rates (RFRs) and, in some cases, reforms to existing reference rate methodologies, such as the Bank Bill Swap Rate (BBSW) in Australia.[12] With widespread recognition that some existing reference rates, such as LIBOR, will be discontinued, a key focus over the past few years has been on developing more robust fall-back methodologies for IBORs and agreement on 'pre-cessation triggers' (where a regulatory body determines an existing benchmark to be non-representative).[13]

As the largest clearer of over-the-counter (OTC) interest rate derivatives (IRD) globally, LCH Ltd has an important role in facilitating benchmark reforms. LCH Ltd has been supporting international initiatives through its work to increase its offering of products referencing RFRs, to switch to discounting in RFRs, and to automatically adopt fall-back arrangements in the event of a pre-cessation trigger. LCH Ltd has been working to mitigate the operational risks associated with a pre-cessation event involving a large-scale conversion of IBOR swaps to RFR swaps, as the end-of-day processing of newly-registered RFR swaps is computationally more intensive than for IBOR swaps.

Trading activity in products referencing new RFRs has continued to increase, but remains low as a share of total OTC IRD registered in most currencies.[14] During the assessment period, SwapClear began clearing swaps referencing the Euro Short-Term Rate (€STR) in October 2019, the New Zealand short-term rate (NZIONA) in November 2019, and the Singapore Overnight Rate Average (SORA) in May 2020, and accepts a range of products for clearing referencing other new RFRs, such as the Secured Overnight Financing Rate (SOFR). Additionally, LCH Ltd transitioned its discounting and calculation of price alignment for swaps settled in EUR to €STR in July 2020 and for swaps settled in USD to SOFR in October 2020. The Bank will continue to monitor global work on benchmark reform initiatives, including at LCH Ltd.

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11 For further information, see *The Central Counterparties (Amendment, etc., and Transitional Provision) (EU Exit) Regulations 2018*. Available at <https://www.legislation.gov.uk/uksi/2018/1184/contents/made>; and The Over the Counter Derivatives, Central Counterparties and Trade Repositories (Amendment, etc., and Transitional Provision) (EU Exit) Regulations 2019. Available at <https://www.legislation.gov.uk/uksi/2019/335/made/data.xht?view=snippet&wrap=true>.

12 For further information, see G Debelle, 2019, *Progress on Benchmark Reforms* at ISDA's 34th Annual General Meeting, Hong Kong. Available at <https://www.rba.gov.au/speeches/2019/sp-dg-2019-04-11.html>.

13 For further information, see ISDA's website on *Benchmark Fallback Consultations*. Available at <https://www.isda.org/2020/05/11/benchmark-reform-and-transition-from-libor/>.

14 By contrast, trading activity in products referencing established RFRs, such as the Australian Overnight Index Average (AONIA) and the Sterling Overnight Index Average (SONIA), are large and regularly exceed 50 per cent of the total notional value of trades registered in their respective currencies.

2.4 Changes to governance arrangements

During the assessment period, LCH Ltd and LCH Group Holdings Limited (LCH Group) implemented a number of changes to simplify governance arrangements and to remove the risk of duplication in board decision-making. This involved terminating the Relationship Agreement between LCH Group and LSEG, making the LCH Group Board an internal-only board, and disbanding most of the LCH Group Board Committees.[15,16]

LCH Ltd also implemented changes to the LCH Ltd management structure designed to improve leadership and oversight. The LCH Ltd Local Management Committee (LMC) has been replaced with two teams:

- The LCH Ltd Management Team: provides support and advice to the Chief Executive Officer (CEO) of LCH Ltd on strategy, setting common objectives, priorities and leading the commercial agenda.
- The LCH Ltd Operating Committee: oversees the operational management of LCH Ltd, acting as an advisory to the LCH Ltd Management Team.

There were also a number of changes made to the reporting lines of senior SwapClear executives:

- The Head of SwapClear and Listed Rates now reports directly to the CEO of LCH Ltd.
- The Head of Operations for Rates, Repos and Equities now reports directly to the CEO of LCH Ltd.
- The Head of Risk for Rates now reports to the Head of SwapClear and Listed Rates.

Additionally, LCH Ltd appointed a new Chief Technology Officer (CTO) in July 2020. LCH Ltd's previous CTO moved to the role of Chief Information Officer of LSEG. There were also a number of changes in the directors of LCH Ltd.

2.5 Refinitiv acquisition

In August 2019, LCH Ltd's ultimate parent company, LSEG, announced its proposed acquisition of Refinitiv. Refinitiv is a market data and trading provider, and the acquisition is expected to enhance LSEG's product offering in data and analytics. LSEG shareholders approved the transaction in November 2019.

The acquisition is subject to anti-trust and regulatory clearances in a number of jurisdictions. LSEG intends to complete the transaction in the first quarter of 2021, and has stated that it is continuing to make progress on regulatory approvals. These approvals include ongoing competition reviews in a number of jurisdictions, including the EU and Singapore.[17] Competition reviews have been completed

15 An internal-only board is comprised only of representatives of LSEG and LCH Group, with no independent directors.

16 For further information, see LCH Limited, 2020, *LCH Limited Self-Certification: Governance Arrangements*. Available at <https://www.lch.com/system/files/media_root/LCH%20Limited%20Self-Certification%20-%20Governance%20Arrangements%20-%2018%20AUG%202020.pdf>.

17 Ongoing competition reviews include: an in-depth merger investigation by the European Commission. Available at <https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1140>; and a Phase 2 review by the Competition and Consumer Commission Singapore. Available at <https://www.cccs.gov.sg/public-register-and-consultation/public-consultation-items/public-consultation-lse-refinitive-april-20>.

in a number of jurisdictions, including the US, Canada and Australia, concluding that the acquisition is unlikely to harm competition.[18]

The acquisition is not expected to result in any changes to the jurisdiction, governance or operation of any regulated LSEG or Refinitiv entity, including LCH Ltd. The Bank will continue to monitor LSEG's acquisition of Refinitiv, including any potential impact on LCH Ltd.

2.6 Product offering

During the assessment period, LCH Ltd made the following changes to its product offering within the SwapClear service:

- Overnight index swaps (OIS) and basis swaps referencing €STR were introduced following the introduction of €STR in October 2019 (section 2.3).
- NZD OIS and basis swaps with tenors out to 5.5 years were introduced in November 2019. LCH Ltd also increased the maximum tenor of AUD OIS and basis swaps and ZAR interest rate swaps (IRS) to 31 years.
- SGD OIS and basis swaps with tenors out to 5.5 years were added in May 2020, referencing SORA.
- In March, LCH Ltd broadened the eligibility of inflation products to include standard coupon inflation vs fixed which reference the European, French, UK and US inflation indices.[19]
- ILS IRS and forward rate agreements (FRA) were added in September 2020. These swaps reference the Tel Aviv Inter-Bank Offered Rate (TELBOR) and have a maximum tenor of 11 and 3.25 years for IRS and FRA respectively.
- In September 2020, LCH Ltd increased the maximum tenors of KRW non-deliverable interest rate swaps (NDIRS) and HUF IRS to 21 years. LCH Ltd also extended its OIS product suite to include the clearing of variable notional OIS (VNOIS) for GBP SONIA, USD SOFR and USD Fed Funds swaps.

18 Completed competition reviews include: an informal merger review by the Australian Competition & Consumer Commission. Available at <https://www.accc.gov.au/media-release/london-stock-exchange-group%E2%80%99s-acquisition-of-refinitiv-not-opposed>; an antitrust investigation by the Department of Justice. Available at <https://www.justice.gov/opa/pr/statement-department-justice-antitrust-division-closing-its-investigation-london-stock>; and a merger review by Competition Bureau Canada.

19 SwapClear clears inflation products in four indices: UK RPI (50Y), European HICPxT (30Y), French CPIxT (30Y), and US CPI (30Y).

Appendix A: Activity in SwapClear

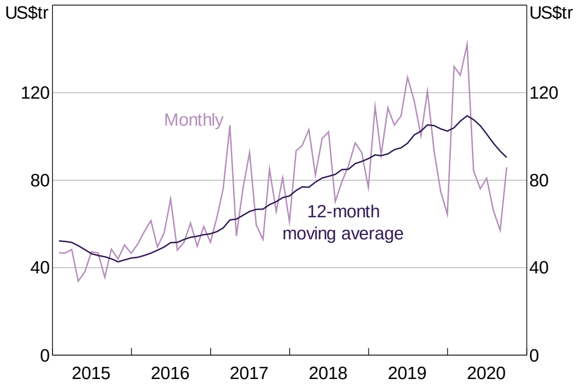
A.1 Global Activity

The notional value of trading activity cleared by SwapClear's 122 direct clearing participants contracted by around 14 per cent over the assessment period (Graph 1).[20] Much of the variation in activity through the year was driven by changing expectations regarding the likely future path of global monetary policy settings. In particular, the emergence of the COVID-19 pandemic, and the associated increase in market expectations for policy rate reductions, saw monthly activity in the SwapClear service peak at a record US$142 trillion in March, before reverting back towards historical levels of activity.

Graph 1

Trades Registered*

Notional value



* Data count two sides of each trade

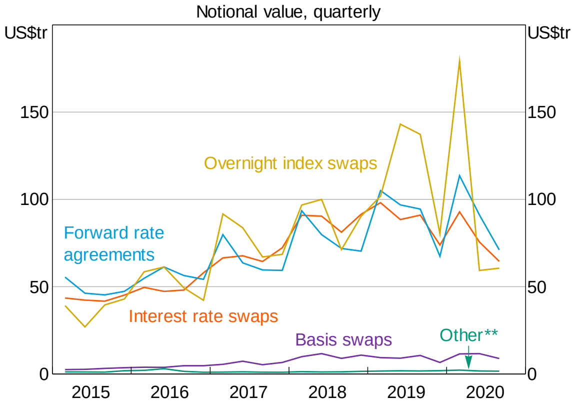
Source: LCH Ltd

By product, much of the pick-up and subsequent pullback in activity occurred in OIS, owing to their link to short-term policy rates (Graph 2). Changes in activity in FRA and IRS were less pronounced but followed a similar pattern.

Graph 2

Trades Registered by Product*

Notional value, quarterly



* Data count two sides of each trade

** Inflation swaps, non-deliverable interest rate swaps, variable notional swaps and zero-coupon swaps

Source: LCH Ltd

OIS, FRA and IRS accounted for 95 per cent of the notional value of trades registered. SwapClear also clears other products including basis swaps, zero-coupon swaps, variable notional swaps (VNS), NDIRS and inflation swaps. SwapClear clears OTC IRD in 27 currencies.

Around 44 per cent of trades registered were denominated in USD and 23 per cent in EUR (Graph 3). The AUD was SwapClear's fourth most registered currency and accounted for around 5 per cent of trade registrations.

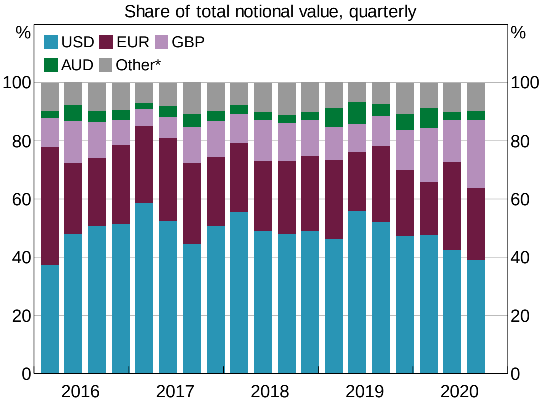
The relatively short duration of OIS positions (typically less than 6 months) and the decline in new OIS trades registered during the second half of the assessment period led to a fall in the stock of derivatives outstanding (Graph 4).

20 Unless otherwise stated, all positions data reported in this Appendix are as at the end of the assessment period (30 September 2020), while all activity data and growth rates are reported over the 12 months to the end of the assessment period.

Graph 3

Trades Registered by Currency

Share of total notional value, quarterly



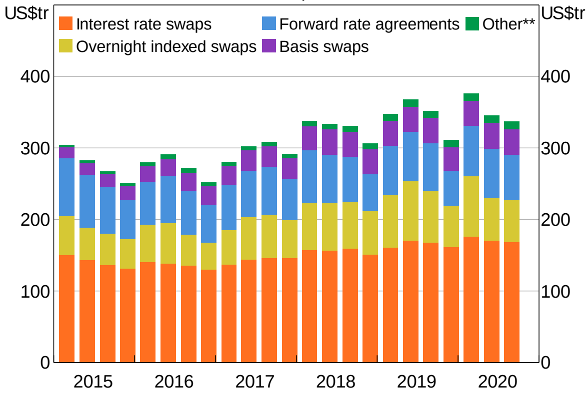
* Other is BRL, CAD, CHF, CLP, CNY, CZK, DKK, HKD, HUF, INR, JPY, KRW, MXN, NOK, NZD, PLN, SEK, SGD, THB, TWD and ZAR; excludes COP

Source: LCH Ltd

Graph 4

Notional Value Outstanding by Product*

End of quarter



* Data count two sides of each trade

** Other includes zero-coupon, variable-notional and inflation-indexed swaps

Source: LCH Ltd

Total initial margin requirements, which is a measure of the level of market risk a CCP manages, increased in early 2020 as the COVID-19 pandemic unfolded. This was in response to a combination of heightened market volatility and increased trading activity (Graph 5). However, the increase in initial margin requirements due to these factors was less severe than it otherwise would have been because of the anti-procyclical design of LCH Ltd's margin system. The margin system incorporates a floor, which requires participants to post additional margin when volatility falls to a low level. Prior to the increase in market volatility, around 80 per cent of house and client accounts were subject to this additional margin requirement (Appendix B).[21]

The proportion of initial margin requirements met by clients (as opposed to participants) increased over the assessment period, from 55 per cent in 2019 to over 60 per cent in June 2020 (Graph 6).[22] Much of this increase was driven by the continued growth in client clearing at SwapClear due to changing incentives for firms that are not subject to mandatory clearing requirements. These incentives include increased liquidity and netting benefits for centrally cleared derivatives, and changing regulations such as higher capital and margin requirements for OTC derivatives that are not centrally cleared.

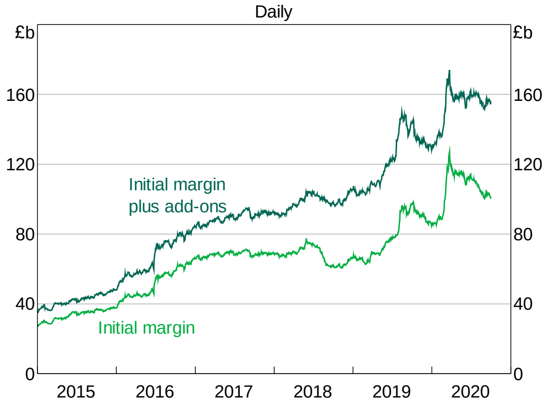
21 Initial margin add-ons are also called to cover risks not captured in the base initial margin model, including credit, liquidity, sovereign and concentration risks.

22 For further information on client clearing, see Box A in the 2017/18 *Assessment of LCH Limited's SwapClear Service*. Available at <https://www.rba.gov.au/payments-and-infrastructure/financial-market-infrastructure/clearing-and-settlement-facilities/assessments/lch/2018/>.

Graph 5

LCH: OTC Rates Initial Margin Requirements*

Daily



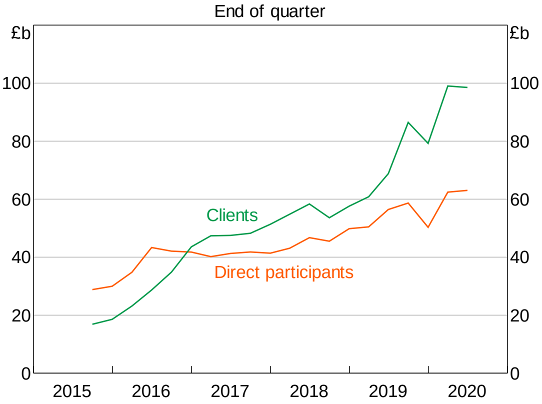
* The OTC Rates margin class includes all SwapClear products and those Listed Rates interest rate futures that have been moved for the purposes of portfolio margining

Source: LCH Ltd

Graph 6

LCH: OTC Rates House and Client Initial Margin Requirements*

End of quarter



* The OTC Rates margin class includes all SwapClear products and those Listed Rates interest rate futures that have been moved for the purposes of portfolio margining

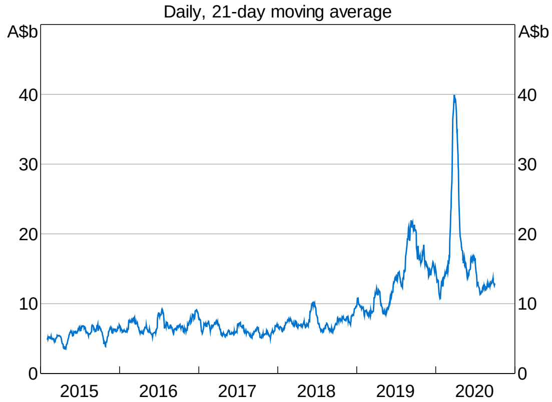
Source: LCH Ltd

Variation margin flows, which prevent the build-up of current exposures as prices move, peaked in early 2020 alongside the increase in volatility and positions, but have since reverted to pre-COVID-19 levels as market conditions and trading activity stabilised (Graph 7 and Graph 8). Average daily variation margin flows in the March quarter were $22.7 billion, 28 per cent higher than in the September 2019 quarter. The number and value of intraday margin calls, which are made when a participants' margin liabilities exceed a predetermined credit threshold, followed a similar pattern (Graph 9).

Graph 7

Variation Margin Flow*

Daily, 21-day moving average



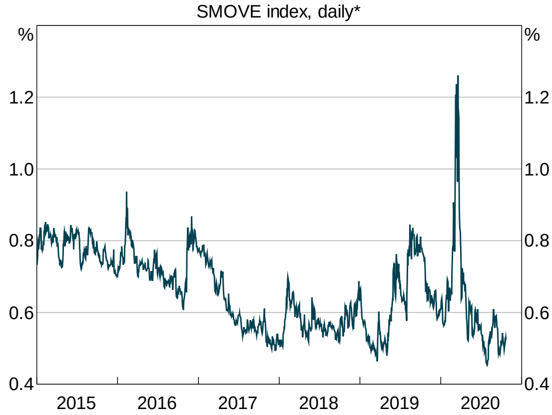
* Value of one side of variation margin flow

Source: LCH Ltd

Graph 8

Implied Volatility in US Markets

SMOVE index, daily*

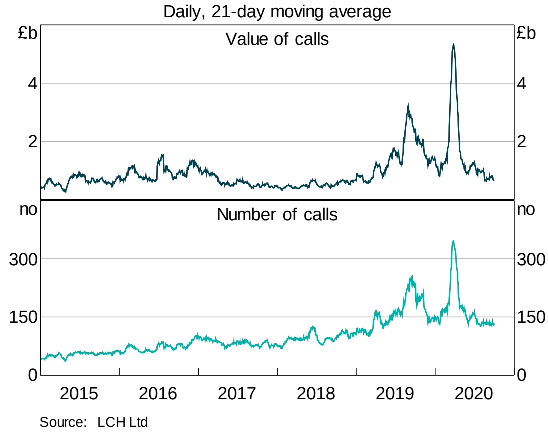


* The SMOVE index is a yield curve weighted index of the normalised implied volatility on 3-month swaptions; it is the weighted average of volatilities on 2-, 5-, 10- and 30-year maturity swaps

Source: Bloomberg

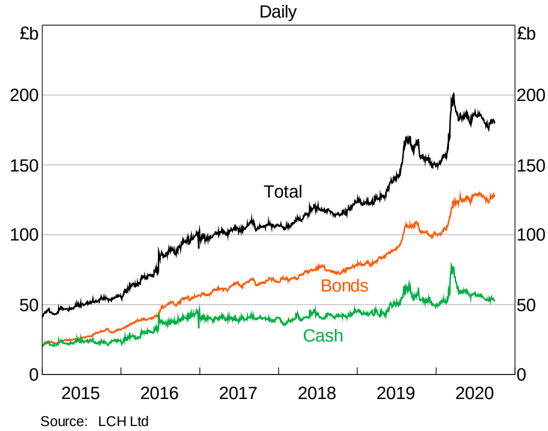
Graph 9

Intraday Margin Calls



Graph 10

Total Collateral Held



LCH Ltd accepts cash and non-cash collateral in a range of currencies, with collateral eligibility differing between types of margin calls and default fund contributions.[23] Total collateral held by the SwapClear service increased around 9 per cent over the assessment period (Graph 10). While LCH Ltd accepts Australian government securities and AUD cash as initial margin, AUD collateral accounts for less than 1 per cent of total collateral held; the majority of collateral held (86 per cent) is denominated in USD, GBP or EUR.

A.2 Australian Activity

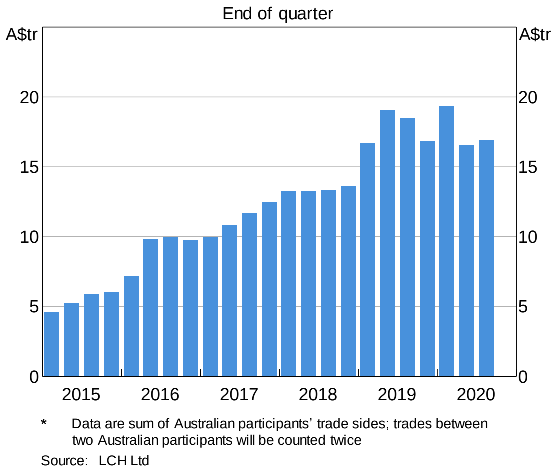
A.2.1 Australian-domiciled direct clearing participants

SwapClear has six Australian-domiciled direct clearing participants – Australia and New Zealand Banking Group Ltd, Commonwealth Bank of Australia, Goldman Sachs Financial Markets Pty Ltd, Macquarie Bank Limited, National Australia Bank Limited, and Westpac Banking Corporation.

The total notional value of Australian participants' IRD outstanding (in all currencies) cleared via SwapClear declined by 8.5 per cent in AUD terms over the assessment period (Graph 11).

Graph 11

Notional Value Outstanding – Australian Participants*

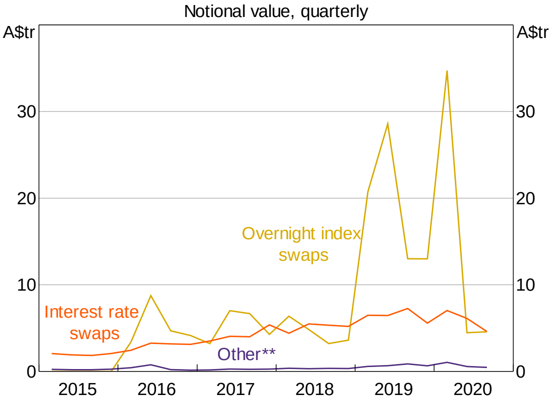


23 LCH Ltd accepts: GBP cash for default fund contributions, eligible cash and non-cash collateral for initial margin, and eligible cash for intraday margin calls. Variation margin must be met in the currency of the underlying exposure. For further information, see LCH Ltd's website on *LTD Acceptable Collateral*. Available at <https://www.lch.com/collateral-management/ltd-collateral-management/ltd-acceptable-collateral>.

A.2.2 AUD-denominated OTC IRD

Globally, an estimated 85 per cent of all centrally cleared AUD-denominated OTC IRD registered during the assessment period were cleared via SwapClear. The notional value of AUD trading activity mirrored the global pattern, with changing expectations around the likely path of Australian monetary policy settings driving intra-year variation in OIS trading activity (Graph 12).

Graph 12
AUD Interest Rate Derivatives Registered*
Notional value, quarterly

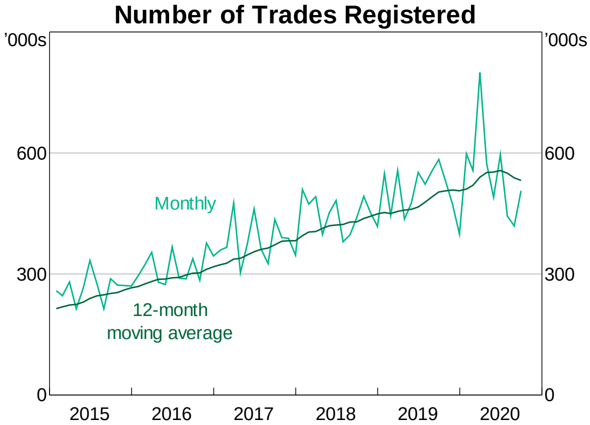


* Data count two sides of each trade
** Basis swaps, variable notional swaps and zero-coupon swaps
Source: LCH Ltd

A.3 Operational Performance

The number of trades registered at SwapClear in the assessment period increased by around 6 per cent relative to the previous year (Graph 13). LCH Ltd deems its capacity utilisation target to be met if the service has the capacity to handle the greater of either (i) two times the daily peak throughput of trades registered over the previous two years, or (ii) the projected daily average throughput in 12 months' time. LCH Ltd met its target in each month in the assessment period for the SwapClear service, including when record trade volumes were experienced in March.

Graph 13
Number of Trades Registered



Source: LCH Ltd

LCH Ltd targets IT system availability for the SwapClear service equivalent to at least 99.7 per cent. In effect this means that system outages should last no more than 2 hours in any one calendar month.[24] SwapClear met this target in 11 months of the assessment period; IT system availability averaged 99.9 per cent.

24 LCH Ltd weights outages to calculate service availability: a weight of one where there is full service outage; a weight of 0.5 or 0.25 for partial outages, depending on the incident; and a weight of zero for partial losses of resilience, such as when the service is still operating but an additional server used to share the load is unavailable.

Appendix B: Risk Management, Governance and the LCH Limited Regulatory Environment

B.1 Risk Management

A CCP acts as the buyer to every seller, and the seller to every buyer in a market. This is commonly achieved by the CCP interposing itself as the legal counterparty to all purchases and sales via a process known as novation. These arrangements provide substantial benefits to participants in terms of counterparty credit risk management as well as greater opportunities for netting of obligations. However, these arrangements result in a significant concentration of risk in the CCP. This risk can crystallise if a clearing participant defaults on its obligations to the CCP, since the CCP must continue to meet its obligations to all of the non-defaulting participants. LCH Ltd manages this risk in a number of ways, including through participation requirements, margin collection, the maintenance of pooled resources and loss allocation arrangements.

B.1.1 Clearing participation requirements

To limit its exposure to its participants, LCH Ltd only allows institutions to become SwapClear clearing participants if they meet certain financial and operational requirements at the time of admission and on an ongoing basis. Clearing participants of SwapClear are required to have net capital of at least US$50 million, as well as appropriate payment arrangements, staff with sufficient experience, and systems to manage their clearing activities. Participants must also demonstrate their operational capability to participate effectively in default management processes, including their ability to value and bid on the portfolio of a defaulting participant.

B.1.2 Margin collection

LCH Ltd covers its credit exposures to SwapClear participants by collecting several types of margin:

- *Initial margin.* LCH Ltd requires clearing participants to post initial margin on all positions. Initial margin requirements aim to cover the risk of a fall in the value of a participant's outstanding portfolio during the expected close-out period should that participant default. LCH Ltd collects various forms of additional initial margin to cover any risks – including credit, liquidity, concentration and sovereign risks – not captured by the base initial margin model.
- *Variation margin.* All SwapClear positions are marked-to-market on at least a daily basis. Variation margin is collected from clearing participants that have experienced a mark-to-market loss and paid to those with a mark-to-market gain.

LCH Ltd calls initial and variation margin at the end of each business day. Additionally, LCH Ltd monitors participants' portfolios intraday to take account of changes in both prices and positions. LCH Ltd makes margin calls intraday if a participant's combined margin liability exceeds a predetermined participant-specific credit threshold. Margin is not paid out intraday to participants whose margin requirements have fallen. Further, most trades will only be registered if, at the point of registration, there are sufficient pre-funded resources posted by the participant to cover the risk of default.[25]

LCH Ltd calculates initial margin requirements for SwapClear using its Portfolio Approach to Interest Rate Scenarios (PAIRS) model. The model sets initial margin requirements to cover potential losses over a five-day close-out period for participants' positions with 99.7 per cent confidence, based on volatility-scaled historical movements in yield curves and exchange rates over a 10-year lookback period. LCH Ltd also imposes a floor on initial margin requirements based on an unscaled historical 10-year lookback period plus an additional 2½-year window covering the global financial crisis. This is to prevent initial margin requirements falling during periods of low volatility. LCH Ltd assumes that an additional two-days (seven days in total) will be required to close out the positions of clients of participants; initial margin requirements and the floor for initial margin requirements on the positions of clients are therefore scaled up accordingly.[26] LCH Ltd assesses the performance of its margin model through daily and monthly backtesting. LCH Ltd also assesses the adequacy of the model assumptions through monthly sensitivity analysis and performs annual model validation reviews of the PAIRS model and individual margin add-ons.

B.1.3 Pooled financial resources

In the event of a clearing participant default, any losses would first be covered by the margin and other collateral posted by the defaulter across all LCH Ltd services in which it participated.[27] Should these resources prove insufficient to meet LCH Ltd's obligations, LCH Ltd may draw on other resources in the Rates service default waterfall. The Rates service default fund covers the SwapClear and Listed Rates services, as LCH Ltd allows for portfolio margining between these services.[28] The available resources are depicted in Figure 1, which shows the order in which financial resources would be used to cover default losses in excess of the defaulter's collateral.

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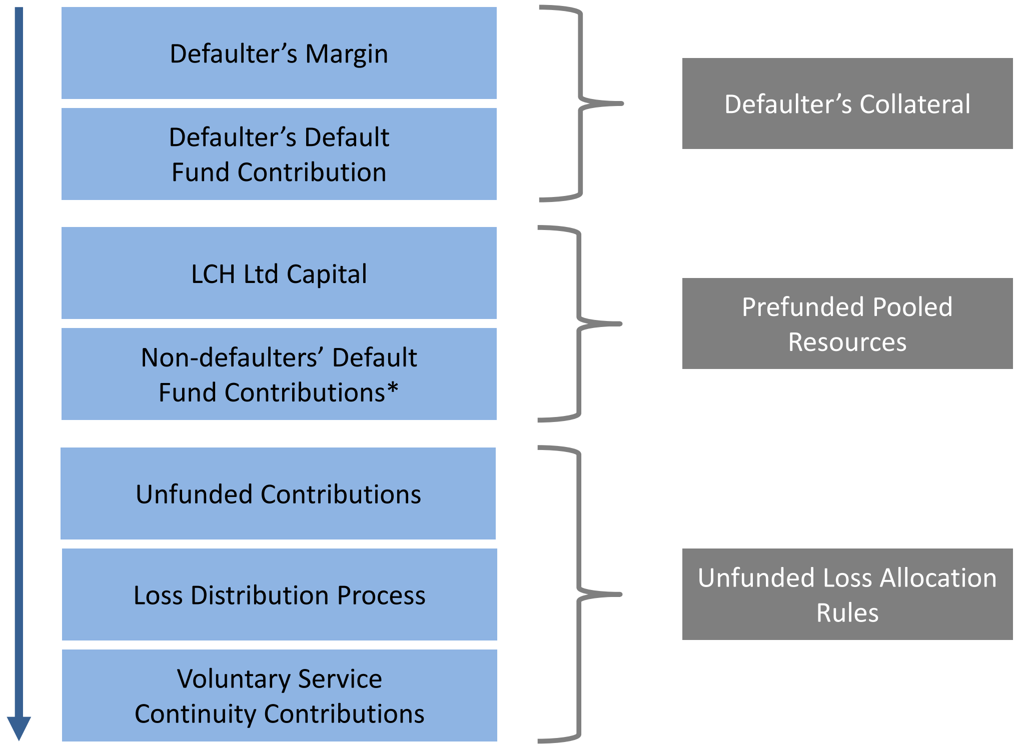
25 Pre-funded resources can be in the form of initial margin or the real time registration component (Appendix B.1.3).

26 The additional two-day holding period for client positions allows time for clients to decide whether to seek to port their portfolio to another clearing participant, as well as time to carry out any such transfer.

27 A clearing participant that defaulted would be deemed to have defaulted in all LCH Ltd services. If any of that clearing participant's margin and default fund contributions for a given service were not required to meet losses in that service, they would be applied to losses in any other service of which that clearing participant was a member.

28 Losses in one LCH Ltd service cannot be applied to the mutualised resources of the default waterfall of another LCH Ltd service (apart from within the Rates service). In an extreme situation, a given LCH Ltd service could be closed, while the other services remained open (apart from the services within the Rates service).

Figure 1: Rates Service Default Waterfall



* The Rates default fund comprises the core component and the real-time trade registration component
Source: LCH Ltd

Prefunded resources

The Rates service default fund is a pool of mutualised financial resources, prefunded by clearing participants. The Rates service default fund comprises two components: a core component and an additional component that supports the intraday provision of credit needed to facilitate real-time trade registration (RTTR) (see 'Default fund real-time trade registration component' below). Both components are available to cover losses from participant defaults. Both SwapClear and Listed Rates participants contribute to the core component, but only SwapClear participants contribute to the RTTR component.

In the event that all of the defaulting clearing participant's margin and other collateral, including its contribution to the Rates service default fund, were exhausted, LCH Ltd would allocate remaining losses arising from the default to its own capital contribution in the default fund waterfall (€67.6 million as at 30 September 2020). Should this also prove insufficient, losses would be allocated to the non-defaulters' contributions to the Rates service default fund.

Default fund core component and default fund additional margin

The core component of the default fund is calibrated to cover any losses LCH Ltd would incur if the two clearing participants (including their affiliates and clients) with the largest exposures defaulted under extreme but plausible conditions, after using the defaulters' total initial margin (including add-ons). This is intended to meet the 'cover two' requirement under CCP Standard 4.4 and its equivalent under EMIR.

The core component of the default fund is resized on the first business day of each month. LCH Ltd calculates this by summing the largest two participant stress test losses over initial margin (STLOIM) over a 60-day lookback period, adding a buffer, and then subtracting the amount of monthly default fund additional margin (DFAM) called.[29]

Each SwapClear participant's contribution to the core component is equal to its average share of total STLOIM for both house and client positions over the previous month. The share of each participant's stress test losses is adjusted according to the portability of each of its clients' portfolios.[30]

Contributions to the core component are subject to a minimum of £17.5 million for SwapClear participants who are also Listed Rates participants, £10 million for SwapClear-only clearing participants and £500,000 for Listed Rates-only clearing participants. Contributions are rebalanced each month when the core component is resized. Following a resize, participants are informed of their new contributions on the third business day of the month, and payments are due the following day if their contribution has changed.

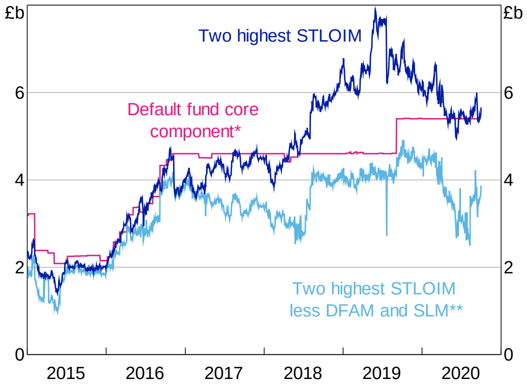
LCH Ltd uses *monthly* DFAM to achieve a balance between defaulter-pays and mutualised resources, ensuring that participants with large exposures relative to other Rates service members provide larger contributions to the resources required to cover those exposures. Monthly DFAM is called from the largest participant if its STLOIM exceeds a specified threshold of the value of the default fund, determined by its internal credit score (ICS). Monthly DFAM is not mutualised; it can only be used to cover losses from the participant that posted it.

LCH Ltd also calls *daily* DFAM from those participants with STLOIM that exceed a predefined proportion of the default fund. This predefined default fund proportion is based on the participant's ICS. The amount of daily DFAM called is the difference between the participant's STLOIM and the relevant proportion of the default fund on that day, less any monthly DFAM. Like monthly DFAM, daily DFAM is not mutualised; it can only be used to cover losses from the participant that posted it. Participants can ask clients to cover their own stress test losses (rather than the participant paying DFAM) through 'stress loss margin' (SLM).

Over the assessment period, LCH Ltd maintained sufficient financial resources to meet the cover two requirement (Graph 14). That is, STLOIM less daily and monthly DFAM of the two participants with the largest exposures were smaller than the default fund core component. The total Rates service default fund was operating at its cap of £6 billion (£5.4 billion core component and £600 million RTTR component) throughout the assessment period. Where the cap is binding, LCH Ltd maintains sufficient

Graph 14

Rates Service: Default Fund and Stress Test Losses



* Includes intra-month new-member contributions

** STLOIM is stress test losses over initial margin; DFAM is (monthly and daily) default fund additional margin; SLM is stress loss margin; only DFAM and SLM from the participants with the two highest STLOIM is subtracted

Source: LCH Ltd

29 The STLOIM of a participant and its affiliates is based on the stress test losses and initial margin of the participant, its affiliates, and all the clients of the participant and its affiliates.

30 Portability refers to the ease with which LCH Ltd is able to transfer a client's positions and associated collateral from one direct participant to another. Portability is assessed with reference to the number of live backup clearing arrangements of each client account.

prefunded financial resources to meet its cover two requirement by collecting DFAM, as described above.

Default fund real-time trade registration component

To meet European regulatory requirements, SwapClear must novate or reject new trades within 10 seconds. Trades are novated if the incremental margin requirement arising from the trade is covered by collateral lodged by that participant, or is below a tolerance limit set by LCH Ltd. LCH Ltd assigns these tolerance limits to participants based on their ICSs. By extending credit to participants through tolerance limits, the frequency with which LCH Ltd can register trades is not necessarily restricted by the frequency with which LCH Ltd can collect margin.

LCH Ltd mitigates the credit risk that arises from offering trade registration tolerance limits through an additional £600 million RTTR component in the default fund. The proportion of each SwapClear participant's contribution to the RTTR is based on their prior utilisation of their RTTR limit relative to that of other participants over the previous 20 business days, subject to a floor of £4 million and a cap of £30 million. Listed Rates-only participants do not contribute to the RTTR component of the default fund. Participant contributions to the RTTR are rebalanced on the same timeline as those of the core component of the default fund. Usage of the RTTR is limited on a cover two basis, which means that no clearing participant may use more than 50 per cent of this component at any time.

Participants can register sub-block trading venue trades without this credit check. Sub-block trading venue trades are trades below a certain size which are transacted on an electronic trading facility.[31] Participants can register these trades even if they do not have sufficient collateral held by LCH Ltd or RTTR component tolerance available. However, participants will need to meet any incremental initial margin requirement for sub-block trading venue trades at the next intraday margin call.

Unfunded loss allocation rules

In extreme cases it is possible that prefunded financial resources could be insufficient to fully absorb default-related losses, leaving the CCP with an uncovered credit loss shortfall. In such an event, LCH Ltd would allocate remaining losses to surviving clearing participants through 'loss allocation rules':

- *Unfunded contributions*. For each default, LCH Ltd is able to call unfunded contributions from non-defaulting participants up to the value of their last default fund contribution per default, subject to a maximum of three defaults in any six-month period.
- *Loss distribution process*. LCH Ltd may apply pro-rata haircuts, up to a cap, to the variation margin payments owed to non-defaulting SwapClear participants whose positions make gains. This process is known as variation margin gains haircutting (VMGH).
- *Voluntary service continuity contributions*. Should losses remain following the loss distribution process, LCH Ltd would invite non-defaulting participants to make voluntary contributions to avoid the service closing.
- *Service closure*. If insufficient voluntary payments were made to cover the remaining credit losses, the Rates service DMG would make an Insufficient Resources Determination and LCH Ltd would close the SwapClear and Listed Rates services. In the event the SwapClear and Listed Rates services were wound down, all outstanding SwapClear and Listed Rates contracts would be terminated and

31 For further information, see *Sub-Block Trading Venue Transaction – SwapClear and ForexClear*. Available at <https://www.lch.com/system/files/media_root/sub-block%20trading%20venue%20transaction.pdf>.

the DMG would calculate a sum owing between LCH Ltd and each non-defaulting clearing participant.

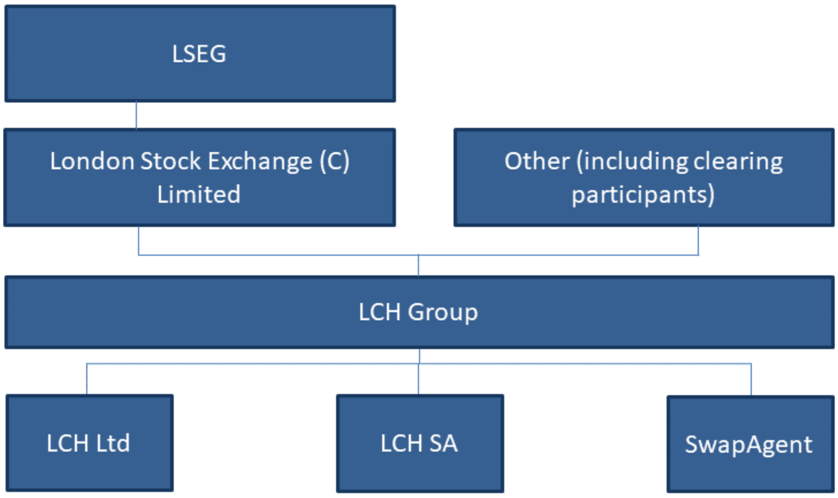
B.2 Governance

B.2.1 Structure of LCH Group

LCH Ltd is a wholly owned subsidiary of LCH Group (Figure 2). As at 30 September 2020, LCH Group is 82.6 per cent owned by the London Stock Exchange (C) Limited, a wholly owned subsidiary of LSEG, and 17.4 per cent owned by others, including clearing participants.

LCH Group is a holding company incorporated in the UK. In addition to LCH Ltd, LCH Group has another majority owned subsidiary that actively operates central clearing services, LCH SA. A third subsidiary, SwapAgent service, offers processing, margining and settlement services for non-cleared derivatives.

Figure 2: LCH Group Structure

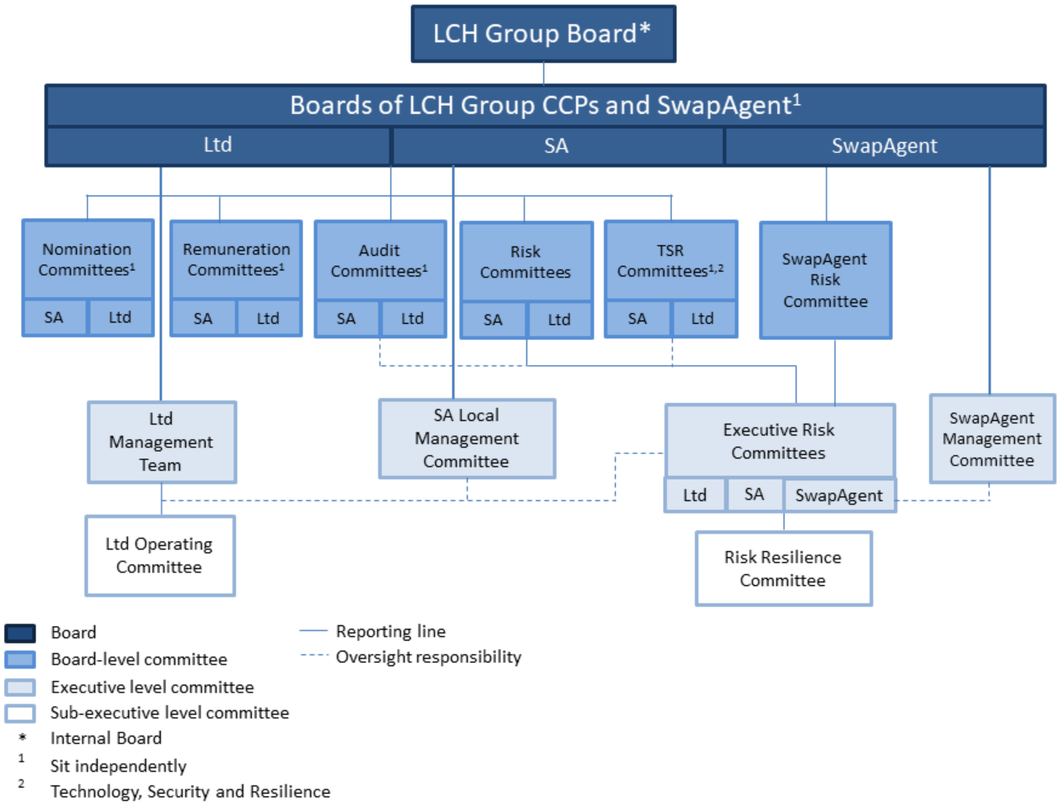


Source: LCH Ltd

B.2.2 LCH Group and LCH Ltd governance arrangements

LCH Group and LCH Ltd (as well as the other LCH Group CCPs) have independent governance structures, including their own boards, board-level committees and executive-level committees (Figure 3).

Figure 3: LCH Group Board and Committee Structure



Source: LCH Ltd

Although LCH Ltd, LCH Group and the other LCH Group entities each operate under separate governance arrangements, there is close coordination between each entity. To promote consistency and to avoid duplication, a number of the CCP and LCH Group board-level and executive-level committees have overlapping memberships, with some routinely sitting together. Many of the key policies that govern LCH Ltd's operations are Group policies, developed by LCH Group and the LCH Group CCPs in coordination, and apply across each of the CCPs. LCH Group Risk policies must be approved by the LCH Ltd Board to be applicable to LCH Ltd, after review by the board-level Risk Committee.[32]

LCH Ltd also coordinates closely with LCH Group and the other LCH Group CCPs in day-to-day processes; some processes, such as the assignment of ICSs and model validations, are performed at the LCH Group level, rather than the individual CCP level.

LCH Group and LCH Ltd Boards

The LCH Group Board is responsible for the overall management and strategic direction of the LCH Group. The Group board is an internal-only board with 5 members who are executives from LSEG and LCH Group. As at 30 September 2020, the LCH Group Board meets at least three times a year and on an ad hoc basis, as required.

32 The LCH Group Risk policies are: the Financial Resource Adequacy Policy; Liquidity Risk Policy; Operational Risk Policy; Investment Risk Policy; Collateral Risk Policy; Counterparty Credit Risk Policy; Contract and Market Acceptability Policy; Default Management Policy; Settlement, Payment and Custody Risk Policy; Model Governance, Validation and Review Policy; Procyclicality Policy; Information Security and Cyber Risk Policy; Technology Risk Policy and the Business Continuity Risk Policy.

The LCH Ltd Board has ultimate responsibility for LCH Ltd. This includes responsibility for: establishing clear objectives and strategies; establishing and overseeing the risk management function; ensuring compliance with legal, regulatory and contractual responsibilities; overseeing the compliance and internal control functions; and monitoring LCH Ltd senior management. Where there is overlap in the matters reserved for the LCH Group and LCH Ltd Boards, the relevant matter will require the approval of both boards. The LCH Ltd Board has 12 directors, including 5 independent directors (including the Chair), the CEOs of both LCH Group and LCH Ltd, the LCH Group Chief Risk Officer (CRO), 3 member representatives and 1 director nominated by LSEG.

Board-level and executive-level committees

LCH Ltd and LCH SA have similar board-level and executive-level committee structures. The committees have overlapping, but not identical memberships. The board-level Risk Committees routinely sit together facilitating cooperation and coordination, and reducing repetition. The CCP board-level Audit and Remuneration Committees may also sit together. Issues specific to a particular CCP can be considered at combined meetings.

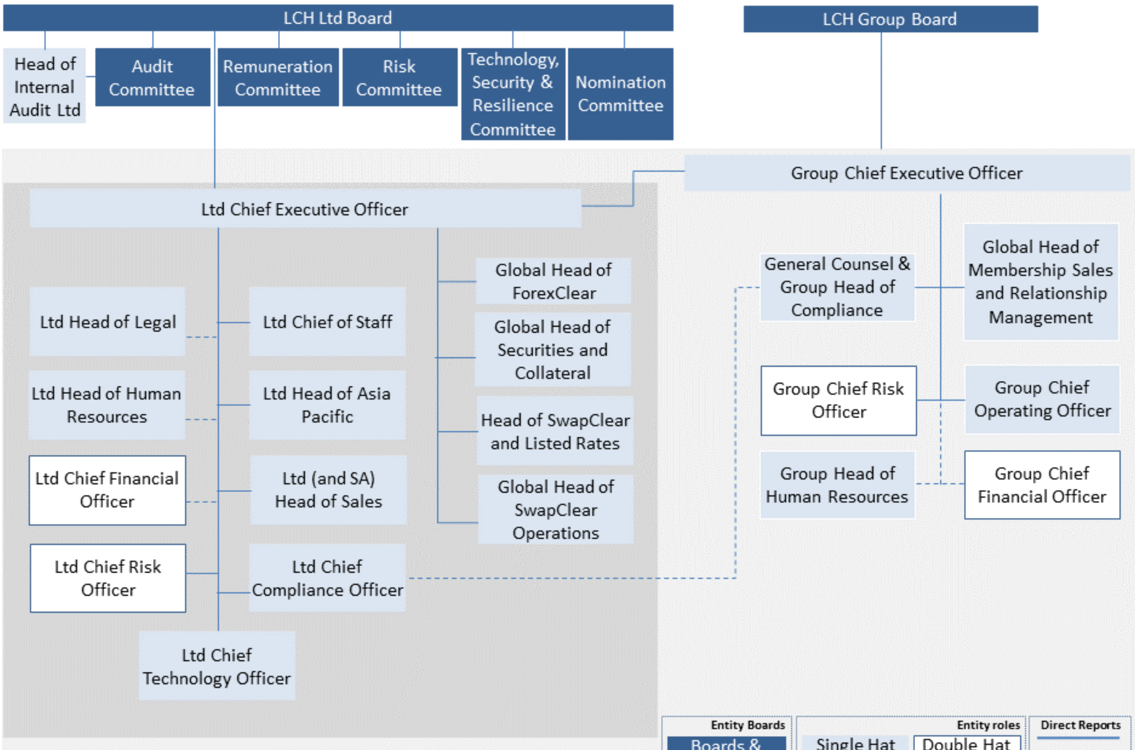
Key LCH Ltd board-level and executive-level committees include:

- *LCH Ltd Risk Committee*. The LCH Ltd Risk Committee is a board-level committee with key responsibilities including providing independent advice to the LCH Ltd Board on risk policy, new markets and products, and amendments to margin and stress testing methodologies. The Risk Committee considers and comments on all aspects of LCH Ltd's risk appetite, tolerance and strategy, and assists the LCH Ltd Board to fulfil its responsibility for the oversight of risk management of LCH Ltd.
- *LCH Ltd Technology, Security and Resilience Committee*. The board-level LCH Ltd Technology, Security and Resilience Committee assesses the adequacy of LCH Ltd's strategies and plans for the management of technology, security, operational and cyber risks. It also assists the LCH Ltd Board in reviewing the frameworks, policies and strategies that set the internal control environment in relation to LCH Ltd's technology, operational resilience, security and regulatory compliance
- *LCH Ltd Management Team and LCH Ltd Operating Committee.* LCH Ltd Management Team is responsible for strategic planning and objective setting for LCH Ltd. The Operating Committee is responsible for overseeing the day-to-day running of the CCP and acting as an advisory to the Management Team. Permanent members of the teams include senior management from both LCH Ltd and LCH Group. These teams replace LCH Ltd's former LMC. LCH SA and SwapAgent have retained their LMCs.
- *Executive Risk Committees (ERCos)*. LCH Ltd, LCH SA and SwapAgent each have an ERCo. The ERCos have overlapping membership, meet concurrently and are chaired by the Group CRO. Each ERCo is responsible for the management, monitoring and oversight of all material risks faced by the relevant entity. The LCH Ltd ERCo reports directly to the LCH Ltd Risk Committee and, via the LCH Ltd CRO, provides regular updates on its activities to the LCH Ltd Management Team.
- *Other key committees and working groups*. Various committees support decision-making within LCH Ltd. These include (among others): the Group-level Risk Resilience Committee and, at a CCP level, the Change Management Committee and Rule Change Committee. In addition, the LCH Group Financial Risk Working Group typically considers matters related to financial risk at LCH Ltd before they are submitted to the LCH Ltd ERCo for review or approval.

Senior management

LCH Group and LCH Ltd have similar senior management structures and reporting lines (Figure 4). Some positions across LCH Ltd and LCH Group are held by the same person ('double hat roles').

Figure 4: Senior Management Positions and Reporting Lines



A number of roles have direct reporting lines to LSEG departments, with indirect reporting lines to LCH Ltd and LCH Group management positions.

Source: LCH Ltd

B.2.3 Departments in LCH Ltd

LCH Ltd is organised into departments based on its core functions and the products it offers. The 'functional' departments include: Audit, Collateral and Liquidity Management (CaLM), Compliance, Finance, Human Resources, Information Technology, Legal, Operations and Risk. Departments are further divided into teams. For example the Risk department includes teams responsible for credit risk, default management, risk resilience, reporting, collateral and liquidity risk. It also includes several product-specific Risk teams which operate as a second line of defence to the first-line Risk functions operated by each business. The CaLM department is responsible for ensuring investment activities are conducted in accordance with the relevant Group Risk policies and regulations and is separate to the Collateral and Liquidity Risk Management (CaLRM) function, which is responsible for monitoring and assessing various risks against Group Risk policies. 'Product' departments are structured around LCH Ltd's various clearing services and include the SwapClear business unit.

B.2.4 Governance of SwapClear

The Head of SwapClear and Listed Rates is responsible for developing and managing the SwapClear and Listed Rates services, and has the authority to develop and implement business strategy, operational plans, policies and budgets for SwapClear and Listed Rates. The Head of SwapClear and Listed Rates reports directly to the CEO of LCH Ltd. LCH Ltd also maintains regional representation for SwapClear in

Australia. The Asia-Pacific Head for LCH Ltd, who reports directly to the LCH Ltd CEO, is responsible for overseeing the strategy and business operations of SwapClear and other services in Australia and the Asia-Pacific region.

SwapClear operates as a distinct business unit within LCH Ltd, although it is not a separate legal entity. SwapClear has its own executive management team overseeing its operations and has a dedicated team that performs risk management functions consistent with policies set at the LCH Ltd and LCH Group levels. The Rates service (encompassing SwapClear and Listed Rates) risk management team's responsibilities include determining stress test scenarios and sizing the Rates default fund, pricing positions and calling variation margin, calling additional margin, determining and performing backtesting for initial margin, and determining SwapClear default management protocols. The second line of defence comprises both LCH Group and LCH Ltd level functions. Responsibilities at the Group level included the maintenance of risk policies aligned to the LCH Ltd Board's risk appetite, determination and monitoring of ICSs and credit risk related limits, new product approvals and the risk governance process. Teams in LCH Ltd are responsible for analysis of margin and default fund adequacy and methodologies, risk aggregation and reporting, new product reviews and default management coordination for each clearing service.

B.3 Regulatory Environment

As described in section 2.2, LCH Ltd is incorporated in England and licensed in Australia under section 824B(2) of the *Corporations Act 2001*. LCH Ltd is primarily regulated by the BoE under UK and EU legislation.

The Bank has a memorandum of understanding in place with the BoE regarding supervision of CS facilities.[33] The memorandum provides a framework for bilateral cooperation, including information sharing and investigative assistance. The Bank also engages with the BoE on LCH Ltd supervision matters through the LCH Ltd Global College, which was established in 2012 (see below).

B.3.1 The regulatory regime

LCH Ltd's operations are subject to a number of regulatory regimes:

- *UK regulation.* Within the UK, LCH Ltd is regulated by the BoE as a 'recognised central counterparty' under the UK Financial Services and Markets Act 2000. This sets recognition requirements for UK CCPs including EU EMIR compliance, maintaining a recovery plan and loss allocation rules, and instituting measures to monitor and reduce potential market abuse. The PPS operated by LCH Ltd is regulated and overseen by the BoE as a 'recognised payment system' under the UK Banking Act 2009.
- *EU regulation.* In the EU, LCH Ltd is authorised under EMIR, a harmonised framework for the regulation of FMIs, including CCPs, incorporated in the region. During the Brexit transition period, this law will continue to apply to LCH Ltd. After this time, LCH Ltd will become a foreign or 'third country' CCP under EMIR.
- *Regulation in other jurisdictions.* LCH Ltd's operations span several jurisdictions. Outside the European Economic Area and Australia, LCH Ltd has been formally licensed or granted an

33 The memorandum is available at <http://www.rba.gov.au/payments-and-infrastructure/payments-system-regulation/pdf/memorandum-2015-05-25.pdf>.

exemption in the US, Switzerland, Japan, the Canadian provinces of Ontario and Québec, Mexico, Hong Kong and Singapore, allowing it to offer a range of clearing services in those jurisdictions.

B.3.2 The EMIR College and the Global College

EMIR provides a framework for cooperative oversight of CCPs among EU authorities, requiring that a supervisory college be established for each EU-based CCP.

The EMIR supervisory college for LCH Ltd (EMIR College) is chaired by the BoE and plays a role in the ongoing supervision of LCH Ltd, including when LCH Ltd applies to the BoE to expand its services or make significant changes to its risk models. The EMIR College also facilitates the exchange of information among its members.

The BoE has also established a Global College for LCH Ltd, membership of which extends beyond the EMIR College. The Bank is represented on the Global College.

B.3.3 The Bank of England's oversight approach and supervisory priorities

The BoE has a mandate to protect and enhance the stability of the UK financial system. In its role as supervisor, the BoE aims to ensure FMIs are 'managed in a manner that is consistent with the public interest including reducing systemic risk'.[34] The BoE takes a risk-based approach to oversight, prioritising its supervisory efforts in areas where it considers risks to financial stability are greatest.

The BoE conducts at least annual assessments of the risks each UK FMI presents to financial stability. Based on its assessment, the BoE sets expectations of risk-mitigating actions the FMI should take, in the form of supervisory priorities. The BoE provides LCH Ltd with a single set of supervisory priorities, covering its operations as a CCP and as a payments system. The BoE also conducts thematic reviews across all CCPs for which it has oversight responsibility.

In light of the ongoing COVID-19 pandemic, the BoE has scaled back its supervisory activities, where appropriate, to focus on the operational and financial resilience of CCPs, including their ability to operate under business continuity arrangements for an extended period. A number of non-critical reviews and business-as-usual supervisory activities have been postponed.

B.3.4 Resolution

As a UK-based CCP, any resolution of LCH Ltd would be governed by UK law. Under the UK's legal framework, resolution of CCPs is governed by the UK *Banking Act 2009* (which was extended to include CCPs by the UK *Financial Services Act 2012*). In August 2014, secondary legislation was introduced to enter the resolution regime into force for CCPs.[35] The BoE is the resolution authority for UK CCPs.

The BoE leads the LCH Ltd Crisis Management Group (CMG), of which the Bank is a member. The role of the CMG is to discuss and facilitate development of a resolution plan for LCH Ltd.

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34 BoE (2013), *The Bank of England's approach to the supervision of financial market infrastructures*. Available at <https://www.bankofengland.co.uk/-/media/boe/files/financial-stability/financial-market-infrastructure-supervision/the-boe-approach-to-the-supervision-of-fmi.pdf?la=en&hash=CD95F6E8C2093172F4EA183E0A552D815FAAB5C5>.

35 For more information on the circumstances under which resolution tools would be used, see <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/411563/banking_act_2009_code_of_practice_web.pdf>.

B.4 Operational Risk Management

Operational risk is the risk that deficiencies in information systems, internal processes and personnel, or disruptions from external events, will result in the reduction, deterioration or breakdown of services provided by a CCP. Operational failures can damage a CCP's reputation or perceived reliability, have legal consequences, and result in financial losses incurred by the central counterparty, participants and other parties. In certain cases, operational failures can also be a source of systemic risk.

LCH Ltd uses a 'three lines of defence' approach to assign responsibilities for identifying, monitoring and managing operational risks:

- The first line of defence is embedded within business lines and support functions, including the Business, First Line Risk, Operations and IT departments. These areas are responsible for the day-to-day management of operational risks within risk appetite, including maintaining effective internal controls and ensuring that all material risks are identified.
- The second line of defence is provided by LCH Ltd Risk Resilience department and the LCH Group Risk Resilience Committee and is responsible for maintaining and supporting the development of policies consistent with the Operational Risk Management Framework. It provides oversight, support and challenge to the first line of defence in relation to risk management activity and adherence to the Framework. The second line also produces aggregated risk reporting to senior executive committees and the LCH Ltd Board.
- The third line of defence is internal audit, encompassing the LCH Ltd Internal Audit department and the LCH Ltd Audit Committee, who are responsible for reviewing the effectiveness of the management and governance of operational risk, including the system of internal controls and the operational risk framework, and providing assurance to the Board.

LCH Ltd classifies different aspects of operational risk into distinct 'resilience' risks and maintains policies, procedures and controls to address each of these risks:

Technology risk is the risk technological failures disrupt critical services provided by LCH Ltd. As the primary objective of IT systems is to support LCH Ltd's services, IT systems are managed to minimise the potential for the disruption of service. This includes maintaining sufficient capacity for service growth, service availability targets and technology change management processes to ensure critical systems maintain a high level of performance.

Business continuity risk refers to potential losses arising from a failure to recover from the disruption of critical business or IT processes due to adverse circumstances or events. The LCH Ltd Board expects that adequate processes are in place to minimise disruption. These processes include service availability targets, the regular testing of back-up and recovery plans to recover critical systems within two hours of a disruptive event, and the operation of geographically distinct secondary processing sites capable of running all critical functions.

Information and cyber security risk refers to the risk to LCH Ltd's operations, assets, staff and partners arising from unauthorised access, use, disclosure, disruption, modification, or destruction of information and/or information systems. To manage these risks, LCH Ltd expects that appropriate checks are performed prior to information leaving LCH Ltd in the normal course of business and cyber security threats are appropriately evaluated and key controls remain adequate. This is complemented by employing the National Institute of Standards and Technology (NIST) cyber security framework and the CPMI-IOSCO Guidance on Cyber Resilience.

Default management risk covers the risk that adequate processes are not in place prior to a default event, which leads to a material deterioration in the market value of assets held by LCH Ltd. To minimise this risk, LCH Ltd has policies and procedures in place that set out the key roles and responsibilities in managing a participant default. LCH Ltd conducts Group-wide and partial fire drills at least annually to test both participants' and the CCP's awareness of and ability to implement the default management process.

Operational risk, as defined within the LCH Group Risk Governance Framework, refers to all other risks where loss may arise from inadequate or failed internal processes, people and systems, or from external events. The LCH Ltd Board has a low appetite for operational risks and requires these risks to be managed in a proactive manner to minimise the impact to LCH Ltd.

When any resilience risk is assessed to be outside or near LCH Ltd's risk appetite, a mitigation plan must be developed and implemented to bring the risk within the specified risk appetite. Any outside appetite risks that will take longer than six months to return within LCH Ltd's risk appetite must be notified to the LCH Ltd Board. The LCH Ltd Board is responsible for determining the LCH Ltd appetite for operational risk.

Abbreviations

€STR	Euro short-term rate
AEDT	Australian Eastern Daylight Time
AONIA	Australian Overnight Index Average
ASIC	Australian Securities and Investments Commission
BBSW	Bank Bill Swap Rate
The Bank	Reserve Bank of Australia
BoE	Bank of England
BSL	Business Services Limited
CaLM	Collateral and Liquidity Management
CaLRM	Collateral and Liquidity Risk Management
CCP	Central counterparty
CCP Resilience Guidance	Resilience of Central Counterparties: Further guidance on the PFMI
CCP Standards	Financial Stability Standards for Central Counterparties
CEO	Chief Executive Officer
CMG	Crisis Management Group
CPMI	Committee on Payments and Market Infrastructures
CRO	Chief Risk Officer
CS	Clearing and settlement
CTO	Chief Technology Officer
DFAM	Default fund additional margin
DMG	Default Management Group
EMIR	European Market Infrastructure Regulation (Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories)
EMIR College	EMIR supervisory college for LCH Ltd
ERCo	Executive Risk Committee
ESMA	European Securities and Markets Authority
FMI	Financial market infrastructure
FRA	Forward rate agreements
FSB	Financial Stability Board
Global College	Multilateral Arrangement for Regulatory, Supervisory and Oversight Cooperation on LCH Ltd
IBOR	Interbank offered rate
ICS	Internal credit score
IRD	Interest rate derivatives

IRS	Interest rate swaps
IOSCO	International Organization of Securities Commissions
LCH Group	LCH Group Holdings Limited
LCH Ltd	LCH Limited
LIBOR	London Interbank Offered Rate
LMC	Local Management Committee
LSEG	London Stock Exchange Group plc
NDIRS	Non-deliverable interest rate swaps
NIST	National Institute of Standards and Technology
NZIONA	New Zealand short-term rate
OIS	Overnight index swaps
OTC	Over-the-counter
PAIRS	Portfolio Approach to Interest Rate Scenarios
PFMI	Principles for Financial Market Infrastructures
PPS	Protected Payments System
RFR	Risk-free rate
RTTR	Real-time trade registration
SLM	Stress loss margin
SOFR	Secured overnight financing rate
SONIA	Sterling Overnight Index Average
SORA	Singapore Overnight Rate Average
STLOIM	Stress test losses over initial margin
TELBOR	Tel Aviv Inter-Bank Offered Rate
VMGH	Variation margin gains haircutting
VNS	Variable notional swaps
VNOIS	Variable notional overnight index swaps