

Assessment of LCH Limited's SwapClear Service

December 2018

Contents

Executive Summary	1
1. Regulatory Priorities	2
2. Material Developments	8
Box A: Client Clearing in the SwapClear Service	13
Appendix A: Activity in SwapClear	16
Appendix B: Risk Management, Governance and the LCH Limited Regulatory Environment	19
Appendix C: Detailed Assessment of LCH Limited's SwapClear Service against the Financial Stability Standards	32
Abbreviations	139

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ISSN 2204-3152 (Online)

Executive Summary

Purpose This report presents the annual Assessment by the Reserve Bank of Australia (the Bank) 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 2018.

Conclusion In the assessment period, LCH Ltd has met the CCP Standards and 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 2017/18 Priorities As at the end of the assessment period, all current participants the Bank expects to use LCH Ltd's Australian Protected Payments System (PPS) to settle their AUD obligations now do so. LCH Ltd also began to analyse the challenges and implications of extending the operating hours of the SwapClear service.

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

- changes to LCH Ltd's governance and organisational structure to improve the effectiveness of its governance arrangements
- developments related to operational and cyber risk, including LCH Ltd's management of risks associated with outsourcing
- LCH Ltd's alignment with the Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO) *Resilience of central counterparties (CCPs): Further guidance on the PFMI* (CCP Resilience Guidance), which the Bank considers in how it applies the CCP Standards related to financial risk management.
- Macquarie Bank Limited joined the SwapClear service as a direct member.

Priorities for 2018/19 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 one priority from 2017/18, regarding the extension of SwapClear's operating hours. The Bank has set a new regulatory priority regarding LCH Ltd's PPS contingency arrangements.

In its supervision of LCH Ltd in the next 12 months, the Bank will also monitor: the effectiveness of LCH Ltd's governance arrangements; how it manages operational and cyber risks; its financial risk management related to liquidity risk and margin; and how it manages the tiering risks arising from its client clearing offerings.

1. Regulatory Priorities

This section summarises actions taken by LCH Ltd over the 2017/18 assessment period to meet the Bank's regulatory priorities, and developments related to the Bank's areas of supervisory focus. It also summarises the priorities and areas of supervisory focus identified by the Bank for the next assessment period. This section describes the Bank's approach to assessing the sufficient equivalence of LCH Ltd's home regulatory regime.

1.1 Progress against Regulatory Priorities

The Bank's previous Assessment set out two priorities for LCH Ltd, reflecting SwapClear's systemic importance in Australia.

Extension of operating hours. LCH Ltd should continue its work to extend the operating hours of the SwapClear service, while ensuring the safety and resilience of its operations. Following the scheduled implementation of an upgrade to the SwapClear trade registration and margining platform around the end of 2017, LCH Ltd should conduct any necessary analysis and present to the Bank a plan regarding how it expects to work towards this priority.

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

LCH Ltd has partly addressed this regulatory priority. LCH Ltd has continued to analyse the technical and operational challenges to extending the operating hours of the SwapClear service (section 2.1.1). SwapClear's official opening hours remain from 6am UK time to 7pm New York time, but SwapClear can open from an hour earlier, at LCH Ltd's discretion. This regulatory priority has been carried forward to the 2018/19 assessment period (section 1.3).

Australian Protected Payments System. LCH Ltd should continue to facilitate technical testing and the resolution of any technical issues such that, as soon as is practicable, the final major Australian bank can begin using the Australian PPS to settle its AUD obligations with LCH Ltd.

CCP Standard 9 (Money settlement)

LCH Ltd has fully addressed this regulatory priority. The final major Australian bank began using the Australian PPS in early 2018 (section 2.1.2). Going forward, the Bank expects that any direct participant of SwapClear with an active exchange settlement account (ESA) (and which joined since LCH Ltd was licensed to offer the SwapClear service in Australia) will settle its AUD obligations using the Australian PPS.

1.2 Progress in Areas of Supervisory Focus

The Bank's previous Assessment set out three areas of supervisory focus for LCH Ltd. These are areas in which LCH Ltd has made significant changes, or where the Bank considers further analysis was required. For much of this, the Bank was able to source appropriate information through its active participation in the Multilateral Arrangement for Regulatory, Supervisory and Oversight Cooperation

on LCH Ltd (Global College) and via bilateral discussions with the Bank of England (BoE). The Bank also sourced information by engaging directly with LCH Ltd.

Developments in LCH Ltd's governance arrangements. The impact of recent and any further changes to LCH Ltd's governance and organisational structure on the effectiveness of LCH Ltd's governance arrangements.

CCP Standard 2 (Governance)

LCH Ltd has made changes to the structure of the LCH Ltd Board to enhance its independence, and worked to improve the effectiveness of its governance arrangements (section 2.2.1). For example, the roles of Chair of the LCH Group Holdings Limited (LCH Group) and of LCH Ltd were separated. The Bank will continue to monitor the effectiveness of LCH Ltd's new governance arrangements in the next assessment period (section 1.4).

Operational resilience and cyber risk management. LCH Ltd's implementation of measures to enhance its operational resilience (including its service availability) and management of cyber risk (including measures to align its practices with the CPMI-IOSCO *Guidance on cyber resilience for financial market infrastructures* (Cyber Guidance)).

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

In the assessment period, LCH Ltd has taken actions to improve how it manages operational and cyber risks (section 2.2.2). In particular, it is enhancing its management of risks from its outsourcing arrangements to both related entities and third-party critical service providers. LCH Ltd has also taken actions set out in its cyber roadmap, which details the steps LCH Ltd intends to take to enhance its cyber risk management. The Bank will continue to monitor LCH Ltd's management of operational and cyber risk in the next assessment period (section 1.4).

Developments in international standards. The alignment of LCH Ltd's risk management arrangements for the SwapClear service with the new CPMI-IOSCO *Resilience of Central Counterparties: Further guidance on the Principles for financial market infrastructures* (CCP Resilience Guidance). The alignment of LCH Ltd's recovery planning arrangements with the revised CPMI-IOSCO *guidance on Recovery of financial market infrastructures* (Recovery Guidance).

CCP Standards 2 (Governance), 3 (Framework for the comprehensive management of risks), 4 (Credit risk), 5 (Collateral), 6 (Margin), 7 (Liquidity risk), and 14 (General business risk)

In almost all cases, LCH Ltd's risk management practices align with the CCP Resilience Guidance. There are two areas, related to CCP Standards 6 (Margin) and 7 (Liquidity risk), where the Bank considers further analysis is required (section 2.2.3):

- how LCH Ltd accesses foreign exchange markets for minor currencies, including in times of market stress
- LCH Ltd's validation of margin add-ons, and how it assesses the SwapClear margin system holistically.

Based on these findings, the Bank has set financial risk management as an area of supervisory focus for the next Assessment (section 1.4).

In the assessment period, the Bank reviewed LCH Ltd's recovery planning arrangements against the revisions to the Recovery Guidance, and is comfortable LCH Ltd's arrangements align with the revisions. This follows a review, by the Global College of LCH Ltd's Recovery and Wind-down Plans against the original Recovery Guidance in 2015/16.

1.3 2018/19 Regulatory Priorities

Based on this year's assessment, the Bank has set two regulatory priorities for LCH Ltd for the next assessment period. The Bank will engage directly with LCH Ltd regarding its progress towards these priorities.

Extension of operating hours. LCH Ltd should continue to work to extend the operating hours of the SwapClear service while ensuring the safety and resilience of its operations. LCH Ltd should finish its analysis of the technical and operational challenges to extend its operating hours, and provide it to the Bank along with a plan of how it expects to address this regulatory priority.

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

The regulatory priority on extension of SwapClear's operating hours has been carried over from the last assessment because it has been only partly addressed (sections 1.1 and 2.1.1). SwapClear continues to be closed for much of the Australian trading day. When SwapClear is open, trades are cleared within 10 seconds of being submitted (depending on the execution venue). However, trades cannot be cleared while SwapClear is closed. Therefore Australian participants must manage bilateral credit risk exposures during much of the Australian business day.

In the next assessment period, the Bank expects more progress on this priority. LCH Ltd should finish its analysis of the technical and operational challenges to extend its operating hours, and the costs and benefits of doing so, and provide this analysis to the Bank along with a plan of how it expects to address this regulatory priority.

Protected Payment System contingencies. LCH Ltd should improve its PPS contingencies to ensure payments to and from LCH Ltd can continue to occur in a timely manner, in the event of a PPS bank outage or failure. LCH Ltd should provide its plan to the Bank for how it will improve its PPS contingencies, and begin implementing it.

CCP Standard 9 (Money settlements)

The PPS is used by LCH Ltd to settle cash payments to and from participants (CCP Standard 9.1). 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. They may use a correspondent bank if they do not have a local presence.

LCH Ltd has previously identified that its PPS contingency arrangements need to be improved to effectively manage payments to and from LCH Ltd (such as variation margin) in the event of a PPS bank outage or failure. The Bank has set this regulatory priority for LCH Ltd for 2018/19. The Bank expects LCH Ltd, in coordination with its members and PPS banks, to continue to work to ensure its current and future PPS contingency arrangements are timely, robust and effective. Over the next assessment period, the Bank expects LCH Ltd to demonstrate how it will make progress towards meeting this regulatory priority, and begin implementing the necessary changes.

1.4 2018/19 Areas of Supervisory Focus

This year, the Bank has identified four areas of supervisory focus for its supervision of LCH Ltd. These describe matters that the Bank considers will be an important part of its supervision of LCH Ltd's SwapClear service in the next assessment period. In each of these areas there is significant change underway at LCH Ltd that the Bank will monitor, or the Bank considers further analysis is warranted. As appropriate, the Bank will seek information regarding these matters through its participation in the Global College and bilaterally with the BoE. The Bank will also engage directly with LCH Ltd on these matters as needed.

Governance. The effectiveness of LCH Ltd's governance arrangements.

CCP Standard 2 (Governance)

LCH Ltd has made changes to its Board to improve its independence and effectiveness over the previous year. This area of supervisory focus has been carried forward from the last Assessment; the Bank will monitor the effects of these changes over the next assessment period (sections 1.2 and 2.2.1).

Operational and cyber risk management. LCH Ltd's ongoing work to enhance its operational risk management (including its outsourcing and critical service provider arrangements), and cyber risk management.

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

This area of supervisory focus has been carried forward from the last Assessment because LCH Ltd is continuing to undertake work to implement improvements in these areas (sections 1.2 and 2.2.2).

Financial risk management. LCH Ltd's analysis of, and improvements to, its financial risk management in areas including: access to foreign exchange markets, including in periods of market stress; and validation of margin add-ons as well as the margin system as a whole.

CCP Standards 6 (Margin) and 7 (Liquidity risk)

This area of supervisory focus has arisen from the 2017/18 area of supervisory focus on international guidance (sections 1.2 and 2.2.3). The Bank will monitor analysis related to these areas in the next assessment period.

Tiering. Developments in how LCH Ltd monitors and mitigates tiering risk with respect to client clearing.

CCP Standards 13 (Segregation and portability) and 18 (Tiered participation arrangements)

Tiering is a new area of supervisory focus for 2018/19. Tiering is an arrangement where clients access CCPs indirectly, via a direct participant of the CCP. Client clearing has increased substantially at LCH Ltd in recent years; clients now contribute more than half of the total risk cleared through SwapClear (measured by initial margin).

Given LCH Ltd's growing client clearing business, the Bank will monitor developments in how LCH Ltd manages and mitigates potential risks associated with tiering over the next assessment period. See Box A for more information on the growth in client clearing at LCH Ltd and globally.

1.5 Bank of England Supervisory Focus

The BoE is the primary supervisor of LCH Ltd. The BoE outlines its supervisory focus, across all financial market infrastructures (FMIs) for which it has supervisory responsibilities, in its document *Supervision of Financial Market Infrastructure – Annual Report*.¹ For the period from February 2018, the BoE will:

- continue to focus on embedding the approach to supervision of operational resilience and cyber security. The BoE will review FMI's self-assessments against the Cyber Guidance, and will also conduct work on its impact tolerance for operational disruptions at FMIs. The impact tolerance is a defined level of operational disruption the BoE is willing to tolerate in line with its objectives, which will produce expectations for FMIs.
- conduct a thematic core assurance review across payment system operators on their approach to IT resilience, as many FMIs are planning significant changes to their IT platforms. The PPS operated by LCH Ltd is regulated and overseen by the BoE as a 'recognised payment system' under the UK Banking Act 2009.
- review CCPs' risk models across selected service lines, incorporating initial margin methodologies, stress testing and default fund sizing, and collateral haircut models. This will enable the BoE to form a comprehensive view of the counterparty credit risk management framework.
- continue its review of certain FMIs' recovery plans.

The Bank will engage with the BoE on these priorities (and to monitor progress toward them), as far as they relate to LCH Ltd, through its participation in the Global College and via bilateral discussions as appropriate. The Global College is designed to facilitate information sharing and supervisory coordination among regulators, recognising the complex cross-border nature of LCH Ltd's business.

1.6 Sufficient Equivalence of LCH Ltd's Home Regulatory Regime

LCH Ltd 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 to be sufficiently equivalent to those in Australia. LCH Ltd is incorporated in England, and is primarily regulated by the BoE under UK and EU legislation.

The UK is preparing to leave the EU on 29 March 2019 (for more information, see Appendix B3). The Australian Securities and Investments Commission (ASIC) and the Bank will consider how this may affect the continued sufficient equivalence of LCH Ltd's home regime. If LCH Ltd's home regime changes, the Bank and ASIC will advise the Minister (or their delegate) on whether the regime continues to be sufficiently equivalent to the Australian regime.²

Any actions by ASIC and the Bank depend on the outcome of UK-EU negotiations:

- In the event the implementation period (which has been provisionally agreed between the UK and the EU) comes into effect, EU law – including the European Market Infrastructure

1 Available at <https://www.bankofengland.co.uk/-/media/boe/files/annual-report/2018/supervision-of-financial-market-infrastructures-annual-report-2018.pdf?la=en&hash=58A07611A193B1C549E4A443DF3D0E7D19B23A95>.

2 When advising the Minister, the Bank takes into account a number of factors. See <https://www.rba.gov.au/payments-and-infrastructure/financial-market-infrastructure/clearing-and-settlement-facilities/standards/overseas-equivalence.html>.

Regulation (EMIR) – will continue to have effect in the UK until the end of 2020.^{3,4} There will be no need for the Bank and ASIC to reassess the sufficient equivalence of the regime until the end of the transition period, because LCH Ltd’s home regime will not change during the transition period.

- In the event the implementation period does not eventuate, there are contingency arrangements in place that will allow applicable EU law, such as EMIR, to be converted into UK law.⁵ As LCH Ltd’s home regime will have changed, the Bank and ASIC will reassess the sufficient equivalence of LCH Ltd’s home regime. The UK’s HM Treasury have stated that the statutory instruments to convert EU law (including EU Regulations) into UK domestic law ‘are not intended to make policy changes, other than to reflect the UK’s new position outside the EU, and to smooth the transition’. The UK has released draft statutory instruments to this effect.⁶ The BoE has also released a consultation paper outlining its proposed changes to FMI-related Binding Technical Standards and the BoE’s domestic rules for FMIs so that these work effectively in the UK after it leaves the EU.⁷ In the event the implementation period does not eventuate, ASIC and the Bank will advise the Minister of the sufficient equivalence of the new home regime for LCH Ltd. Subject to there being no significant changes to the approach the UK authorities are consulting on, the Bank expects the regime to continue to be sufficiently equivalent.

3 EMIR is the European regulatory regime for CCPs (Appendix B3). 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*.

4 See paragraph 1.2 in *HM Treasury’s approach to financial services legislation under the European Union (Withdrawal) Act*. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/720298/HM_Treasury_s_approach_to_financial_services_legislation_under_the_European_Union_Withdrawal_Act.pdf.

5 See paragraphs 1.8 and 1.9 in *HM Treasury’s approach to financial services legislation under the European Union (Withdrawal) Act*. Available at footnote 4.

6 Instruments relevant to EMIR include: draft *The Central Counterparties (Amendment, etc., and Transitional Provision) (EU Exit) Regulations*, available at <http://www.legislation.gov.uk/ukdsi/2018/9780111171882/part/3>; and draft *Over the Counter Derivatives, Central Counterparties and Trade Repositories (Amendment, etc., and Transitional Provision) (EU Exit) Regulations 2018*, available at <https://www.gov.uk/government/publications/draft-over-the-counter-derivatives-central-counterparties-and-trade-repositories-amendment-etc-and-transitional-provision-eu-exit-regulations>.

7 *UK Withdrawal from the EU: Changes to FMI rules and onshored Binding Technical Standards*, BoE consultation paper, October 2018. Available at <https://www.bankofengland.co.uk/-/media/boe/files/paper/2018/uk-withdrawal-from-eu-changes-to-fmi-rules-and-onshored-bts-complete.pdf?la=en&hash=DA90F953E776AA06A9C76C620325284050630BCD>.

2. Material Developments

LCH Ltd has implemented a number of changes over the assessment period to support its provision of the SwapClear service to the Australian market. Some of these changes have been in response to the regulatory priorities and areas of supervisory focus set out by the Bank in the previous Assessment; others have been driven by changes to SwapClear's global product offering, risk management arrangements and governance.

2.1 2017/18 Regulatory Priorities

2.1.1 Operating hours extension

The SwapClear service is officially open from 6am UK time to 7pm New York time, but can open from an hour earlier, at LCH Ltd's discretion. In practice, LCH Ltd opened the service at 5am UK time on almost all business days in the assessment period. The official operating hours correspond to 3pm-9am AEST in the Australian winter, and 5pm-11am AEDT in the Australian summer.⁸ While the SwapClear service is closed, trades cannot be cleared. Therefore Australian participants must manage bilateral credit risk exposures during much of the Australian business day, which also introduces operational complexity and uncertainty.

Over the assessment period, LCH Ltd continued to analyse the technical and risk management changes required to extend the SwapClear service's operating hours. In line with the Bank's expectations, LCH Ltd has indicated to the Bank that it will only extend its operating hours further if it would not adversely affect the operational resilience of SwapClear. LCH Ltd updated its trade registration and margining platform during the assessment period, but did not extend its operating hours. LCH Ltd will consider further extending operating hours in the next assessment period.

LCH Ltd has partly addressed the Bank's regulatory priority regarding extending its operating hours. In the next assessment period, LCH Ltd should complete its analysis and present this and a plan to the Bank of how it will implement any changes.

2.1.2 Australian Protected Payments System

LCH Ltd operates an Australian PPS, which facilitates AUD payments to and from the SwapClear service's Australian participants. Currently, five Australian participants use the Australian PPS to settle their AUD obligations with LCH Ltd directly using their ESAs at the Bank, up from three last year. This is in line with the Bank's expectation that any direct participant of SwapClear with an active ESA (and which joined since LCH Ltd was licensed to offer the SwapClear service in Australia) settle AUD obligations using the Australian PPS (CCP Standard 9).

⁸ Differences in when the Australian states, New York and the UK begin and end daylight savings affect these times.

Of the two Australian participants that began using the Australian PPS in the last assessment period, one existing participant completed its technical testing in early 2018. Macquarie Bank Limited became a direct participant of SwapClear in April 2018 (section 2.3.1), and also joined the Australian PPS.

LCH Ltd has fully addressed the Bank's regulatory priority regarding the Australian PPS.

2.2 2017/18 Areas of Supervisory Focus

2.2.1 Developments in LCH Ltd's governance arrangements

In the assessment period, the size of the LCH Ltd Board was set to eleven directors. LCH Ltd currently has five independent non-executive directors, two of whom do not sit on any other boards within LCH Group. LCH Ltd has also implemented changes designed to improve the effectiveness of board challenge and oversight. The Bank will continue to monitor developments in LCH Ltd's governance arrangements.

There were a number of key personnel changes at LCH Ltd and LCH Group during the assessment period:

- Marshall Bailey OBE was appointed the Chair of the LCH Group Board, replacing Professor Lex Hoogduin. Professor Hoogduin continues as the Chair of LCH Ltd, and remains a director of LCH Group.
- Kate Birchall was appointed Head of Asia-Pacific, LCH Ltd in October 2018. This role is based in Sydney. She replaces Marcus Robinson, who moved to a different role internally.
- Dennis McLaughlin was appointed the LCH Ltd Chief Risk Officer (CRO), in addition to his role as the LCH Group CRO.
- Mamun Ahmed, formerly the LCH Ltd CRO, became the Head of Risk Resilience at LCH Group and LCH Ltd; this is a newly created role.
- Boaz Schechter was appointed Head of Shared Operations (a new role), taking responsibility for Member Onboarding, Collateral Operations and Collateral and Liquidity Management (CaLM) Middle Office Regulatory Reporting and Fees.
- David Schwimmer was appointed as a director of LCH Group. Mr Schwimmer was also appointed the Chief Executive Officer (CEO) of the London Stock Exchange Group plc (LSEG), following the resignation of Xavier Rolet in November 2017.

There were also a number of other changes in the directors of LCH Ltd and LCH Group.

In October 2018, LSEG announced it has entered into agreements with minority shareholders to acquire up to a further 15.1 per cent of LCH Group's share capital. This would take its majority ownership to over 80 per cent. As at the end of the assessment period, LCH Group was 68 per cent owned by LSEG.

2.2.2 Operational resilience and cyber risk management

Over the assessment period, LCH Ltd has continued to make enhancements to how it manages operational and cyber risk. As noted in the previous assessment, LCH Ltd has reviewed its cyber risk management against the National Institute of Standards and Technology (NIST) *Framework for Improving Critical Infrastructure Cybersecurity* (Cybersecurity Framework) and the Cyber Guidance. LCH Ltd has implemented a number of actions set out in its cyber roadmap.

LCH Ltd has reviewed and is enhancing how it manages the risks of its outsourcing arrangements with LSEG's Business Services Ltd (BSL). LCH Ltd also aligned its assessment survey for all critical service providers with the CPMI-IOSCO *Assessment methodology for the oversight expectations applicable to critical service providers*. LCH Ltd has begun to implement this survey into its management of operational risk related to critical service providers. Over the next assessment period, LCH Ltd will make further changes to its risk management and governance of critical service providers, including BSL, and continue to embed the assessment survey into its approach.

The Bank will continue to monitor LCH Ltd's operational risk management framework, including in the areas of cyber risk, outsourcing and critical service providers, and operational resilience. The BoE has also continued to focus on operational resilience in its supervision of FMIs (section 1.5). The Bank engages regularly with the BoE on its work in this area.

2.2.3 Developments in international standards

The CCP Resilience Guidance, published in July 2017, clarifies and elaborates on the standards set out in the CPMI-IOSCO *Principles for Financial Market Infrastructures* (PFMI) relating to CCPs' financial risk management.⁹ It focuses on five areas: governance; credit and liquidity stress testing; coverage of financial resources; margin; and a CCP's contribution to the default waterfall. The CCP Resilience Guidance does not create additional standards beyond those already set out in the PFMI. Instead, it aims to improve the financial resilience of CCPs by providing clarity on an acceptable way of observing the PFMI. The Bank applies this guidance in interpreting the CCP Standards, and expects CCPs active in Australia to align their practice with this guidance.

In the assessment period, LCH Ltd completed a self-assessment against the CCP Resilience Guidance. In almost all cases, LCH Ltd's risk management practices align with the CCP Resilience Guidance. There are two areas where the Bank considers further analysis is required:

- Liquidity risk, with respect to how LCH Ltd accesses foreign exchange markets for minor currencies, including in times of market stress (CCP Standards 7.4 and 7.5). LCH Ltd maintains sufficient liquid resources in GBP, EUR and USD to meet its default liquidity requirements without access to foreign exchange markets, and also has access to central bank liquidity in certain currencies (including AUD). Although LCH Ltd does not rely on foreign exchange markets for the majority of its default liquidity requirements by value, LCH Ltd may need access to foreign exchange markets to meet its liquidity outflows in other currencies. The Bank considers further analysis is required on LCH Ltd's access to these markets, including in stressed conditions.
- Margin, with respect to LCH Ltd's validation of its margin add-ons, and how it assesses the SwapClear margin system as a whole. The CCP Resilience Guidance clarifies that CCP Standard 6 applies to all aspects of a CCP's margin system, including any add-ons. LCH Ltd's margin system comprises its base initial margin model, and a number of add-ons to mitigate specific risks not captured by the base model (for more information on LCH Ltd's margin system, see Appendix B1). LCH Ltd independently validates the SwapClear base initial margin model and the largest add-on, liquidity margin, annually. The Bank will monitor LCH Ltd's validation of its margin system in the next assessment period, specifically to see that LCH Ltd can demonstrate that it reviews all add-ons periodically and the margin system as a whole against alternatives.

9 The CCP Resilience Guidance is available at: <http://www.bis.org/cpmi/publ/d163.htm>.

The Bank has set an area of supervisory focus on financial risk management with respect to these two points, and will monitor them over the next assessment period. The CCP Resilience Guidance clarifies that CCPs' credit and liquidity stress tests should be consistent. In line with this, in September 2018 LCH Ltd changed its proxy for variation margin outflows in its liquidity stress tests to bring them in line with its credit stress tests. In its liquidity stress testing, LCH Ltd now uses credit stress test losses of the defaulting participants as its proxy for variation margin outflows. LCH Ltd previously used the defaulting participants' initial margin as the proxy in its liquidity stress tests.

The Bank also reviewed LCH Ltd in light of the updates to the Recovery Guidance, and is comfortable LCH Ltd's arrangements align with the updates.¹⁰ The Global College previously reviewed LCH Ltd's Recovery and Wind-down Plans against the original Recovery Guidance in 2015/16.

2.3 Other Material Developments

2.3.1 New Australian SwapClear member

In April 2018, Macquarie Bank Limited joined as a direct member of SwapClear. Macquarie Bank Limited uses the Australian PPS to settle its AUD obligations with LCH Ltd. There are now six Australian-domiciled direct members.

2.3.2 AUD cash as initial margin

In the 2016/17 Assessment period, LCH Ltd fully addressed the Bank's regulatory priority to proceed with its plans to accept AUD cash as initial margin. LCH Ltd announced that it would accept AUD cash as initial margin from December 2017. To date, no participants or clients have posted AUD cash as initial margin.

2.3.3 Minimum default fund contributions

LCH Ltd increased the minimum contribution to the Rates default fund for participants who clear both SwapClear and Listed Rates products in May 2018. These participants must contribute at least £10m for the SwapClear service and £7.5m for the Listed Rates service (Appendix B2). Previously participants of both services had to contribute at least £10m for the SwapClear service and £0.5m for the Listed Rates service to the default fund. The minimum contribution for participants that clear only SwapClear products remains at £10m, and at £0.5m for participants that clear only Listed Rates products.

2.3.4 New products

Over the assessment period, LCH Ltd added the following products to the SwapClear service:

- AUD BBSW-AONIA basis swaps were added in December 2017. AONIA is the interbank overnight cash rate, which is the operational target of the Bank's monetary policy. These basis swaps comprise a small share of AUD-denominated swaps cleared by LCH Ltd (Appendix A).
- Non-deliverable interest rate swaps denominated in CNY, INR and KRW were added in April 2018. Counterparties settle the net cash flows on these swaps in USD. At the end of September 2018, these non-deliverable interest rate swaps were 0.5 per cent of notional value outstanding in SwapClear.

¹⁰ The revised Recovery Guidance is available at: <http://www.bis.org/cpmi/publ/d162.htm>; a tracked changes version showing the revisions is also available.

- USD overnight index swaps (OIS) and basis swaps referencing SOFR were introduced following the publication of SOFR from April 2018 in line with global benchmark reform (section 2.3.6). SOFR is the US secured overnight financing rate. A small share of USD OIS outstanding referenced SOFR at the end of the Assessment period.

Several new products from the Listed Rates service are now eligible for portfolio margining with SwapClear products. In addition to short-term interest rate futures, from late 2018, LCH Ltd allows portfolio margining with long-term interest rate futures that reference UK long gilts as well as German 2-year Schatz, 5-year Bobl and 10-year Bunds. 3-month CurveGlobal SONIA Futures have also been included. Portfolio margining is allowed between these products and SwapClear derivatives denominated in 14 of 21 currencies (CCP Standard 6.5).

2.3.5 Default management fire drills

LCH Ltd took part in the annual LCH Group default management fire drill in parallel with its participation in a multi-CCP fire drill coordinated and observed by a number of regulators, including the BoE. The multi-CCP drill allows regulators, CCPs and participants to assess the possible impact of the default of a large member across several CCPs.

The LCH Group fire drill tested LCH Ltd's response to the default of two participants under one group (including a Futures Commission Merchant (FCM) participant), active across all clearing services in LCH Group, under stressed market conditions.¹¹ As a result of the drill, LCH Ltd identified some areas where its processes could be improved, and is currently working to implement the necessary changes.

2.3.6 Benchmark reform – transition away from LIBOR

LCH Ltd is counterparty to a large number of trades that reference interbank offer rates such as LIBOR. The international regulatory community is reforming these benchmarks, and establishing suitable alternative risk-free rates. For example in Australia, the BBSW methodology has been enhanced, and the Australian Government has introduced a new regulatory framework for financial benchmarks which gives ASIC the power to set rules for (and license administrators of) significant benchmarks.¹²

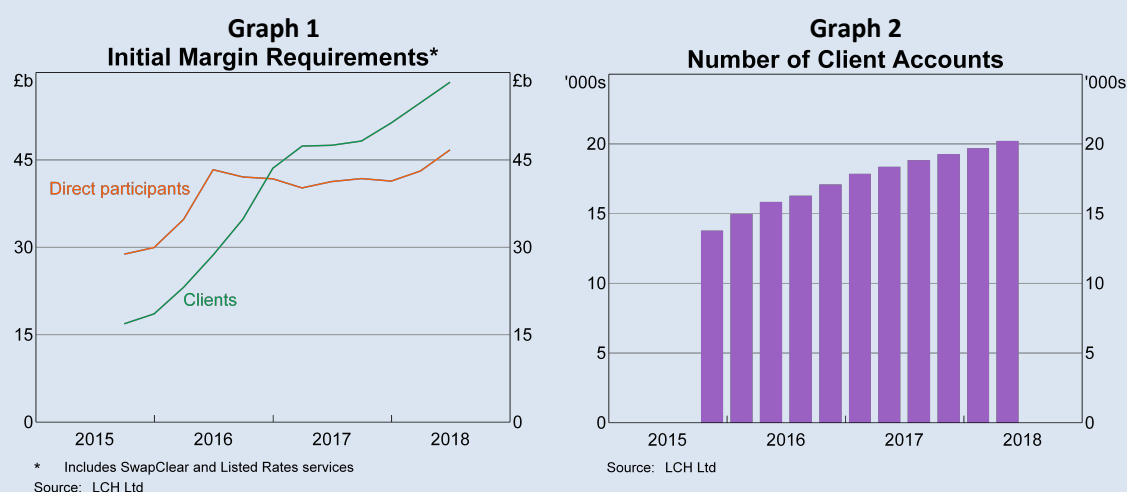
Market participants are beginning to use alternative rates, such as SOFR (for USD swaps) and SONIA (for GBP swaps). LCH Ltd now accepts USD SOFR basis swaps and OIS for clearing (see 2.3.4). In the assessment period, LCH Ltd adjusted the risk-free reference rate on GBP OIS and basis swaps to the new calculation of SONIA by the BoE. LCH Ltd has also made changes to its Rulebook so that it may determine alternative interest rates for products to be used in the event that the original reference rate is unavailable or ceases to be published. The Bank will continue to monitor global work on benchmark reform, including at LCH Ltd.

¹¹ See CCP Standards 13 and 17 for more detail on FCMs and their clients.

¹² For more information, see G Debelle, 2018, *Interest Rate Benchmark Reform*, Keynote at ISDA Forum, 15 May. Available at: <https://www.rba.gov.au/speeches/2018/sp-dg-2018-05-15-2.html>. For an example of international work, see BoE, *Transition to sterling risk-free rates from LIBOR*. Available at: <https://www.bankofengland.co.uk/markets/transition-to-sterling-risk-free-rates-from-libor>.

Box A: Client Clearing in the SwapClear Service¹³

The share of risk managed in SwapClear from client exposures has grown substantially in recent years (Graph 1). Clients are now responsible for more than half of the initial margin requirements in the SwapClear service. The number of client accounts has also grown (Graph 2). The risks posed by client clearing to CCPs differ in a number of respects from that of direct participants; CCP Standards 13 and 18 (Appendix C) describe how LCH Ltd mitigates these risks. This Box discusses recent international work relating to client clearing, the growth in client clearing at SwapClear, and the composition of global and Australian clients.



Firms can access a CCP either as a direct participant or as a client of a direct participant.¹⁴ Firms may elect to clear as a client for several reasons. For example, they may be unable or unwilling to meet a CCP's participation requirements, it may be too onerous operationally, or it may be cheaper than clearing directly. In most client clearing arrangements (including in SwapClear), the CCP is only exposed to the direct participant, which must continue to meet its clients' obligations in the event a client defaults.¹⁵ Providers of client clearing are typically large international banks. Clients are mostly smaller banks, pension and superannuation funds, asset managers and non-financial corporations.

The number of clients clearing over-the-counter (OTC) derivatives has increased globally. The Derivatives Assessment Team (DAT), comprised of international standard-setting bodies, has examined the incentives to centrally clear OTC derivatives.¹⁶ With respect to client clearing, the DAT found that the reforms to OTC derivatives following the global financial crisis have created an incentive for direct participants as well as larger and more active clients to clear. These reforms include mandatory clearing of certain products, and margin requirements and higher capital requirements for derivatives that are not centrally cleared. The reforms have also interacted with non-regulatory pressures – such as liquidity shifting to cleared markets, netting efficiencies and benefits for counterparty credit risk management – to further encourage clearing.

¹³ Most data referred to in this Box are drawn from LCH Ltd's quantitative disclosures, which are available up to the end of the June quarter 2018. These data are published under the CPMI-IOSCO *Public quantitative disclosure standards for central counterparties*, and are available at: <https://www.lch.com/resources/rules-and-regulations/ccp-disclosures>.

¹⁴ LCH Ltd also offers indirect client clearing at SwapClear, where a firm clears as the client of a client. However, there are currently no indirect clients in the SwapClear service.

¹⁵ For more detail on client clearing arrangements, see A Clarke and Ryan P (2014), 'Non-dealer Clearing of Over-the-counter Derivatives', *RBA Bulletin*, March. Available at: <https://www.rba.gov.au/publications/bulletin/2014/mar/pdf/bu-0314-9.pdf>.

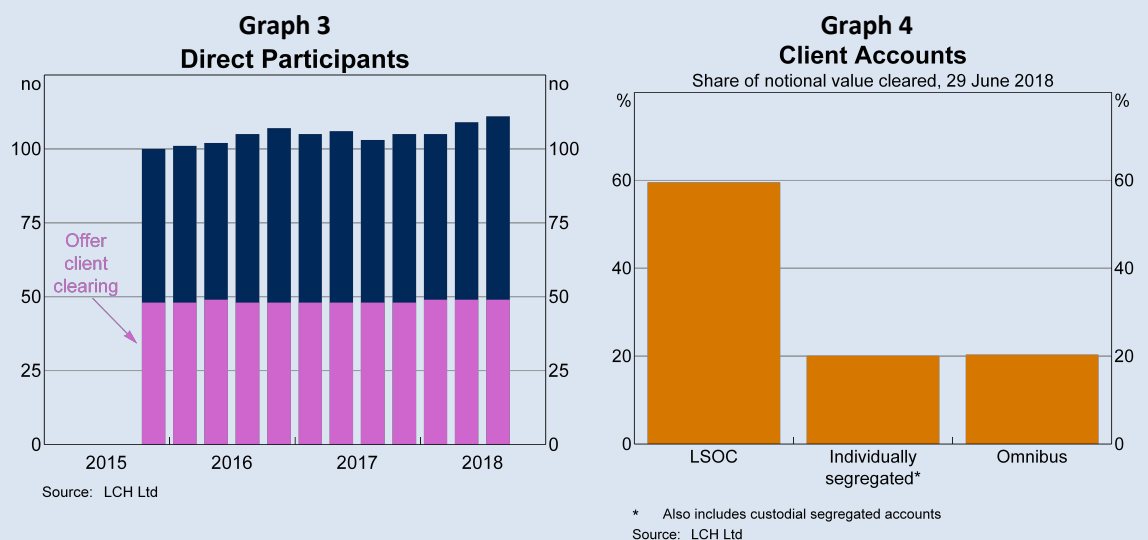
¹⁶ Basel Committee on Banking Supervision (BCBS), CPMI, Financial Stability Board (FSB) and IOSCO, 2018, *Incentives to Centrally Clear Over-the-counter Derivatives*, 19 November. Available at <https://www.bis.org/publ/othp29.pdf>.

However, the incentives for smaller firms to clear their derivatives portfolios may be somewhat lower. This is because the benefits for these firms (such as netting and more liquid markets) may be smaller relative to the fees and fixed costs of accessing a CCP as a client. The DAT also found evidence of concentration in offering client clearing; more than four-fifths of client margin at large OTC-derivatives CCPs was cleared through the largest five direct participants.

Characteristics of SwapClear clients

As noted above, the risk and activity brought to LCH Ltd by clients has increased substantially. This growth has been driven both by an increase in the number of clients in the SwapClear service, and the average risk brought by each client. There were about 6,300 distinct, active clients in the SwapClear service at the end of September 2018; SwapClear has around 21,000 open accounts in total.

In addition to the rapid growth in firms accessing clearing as clients, another reason for the relatively high share of client margin is that clients tend to hold more directional exposures than clearing participants, which are typically dealers that prefer to hold balanced books. Therefore the risk associated with client positions is likely larger than measures of activity (such as notional value) imply.



Of the 111 direct participants in the SwapClear service, 50 are client clearers (as at end-September 2018). 37 offer client clearing through the SwapClear Clearing Member model, and 13 offer the FCM model. US-domiciled clients must clear through FCMs, though non-US clients may also clear through FCMs. The number of direct participants offering client clearing has been fairly stable in recent years (Graph 3). At LCH Ltd, the largest 10 client clearers in the SwapClear service clear about 92 per cent of client activity (by notional value).

Client account types

LCH Ltd offers four broad types of accounts for clients in SwapClear: Legally Segregated Operationally Commingled (LSOC) accounts; Individual Segregated Accounts (ISAs); gross Omnibus Segregated Accounts (OSAs); and net OSAs (see CCP Standard 13.2 for more detail). Different account types provide varying levels of protection from fellow client risk, and differ in collateral and netting efficiencies. Fellow client risk is the risk that a client is exposed to losses due to the simultaneous default of their direct participant and a fellow client. Around 60 per cent of client activity in SwapClear (by notional value, as at June 2018) is in LSOC accounts, which must be used by all clients of FCMs that clear swaps (Graph 4). In an LSOC account, clients are protected from fellow client risk in almost all circumstances, as positions are recorded (and margined) separately, and the value of

collateral is legally segregated. However, all the collateral for all clients of FCMs is physically held together.

Clients of SwapClear Clearing Members have a broader choice of accounts. The most common accounts for clients of SwapClear Clearing Members are individually segregated. ISAs offer protection against fellow customer risk, as each client's positions and collateral are held separately from other clients, and margin requirements are calculated separately for each client. LCH Ltd also offers an account that provides custodial segregation; the Custodial Segregated Account (CSA) differs from the ISA in that clients can lodge non-cash assets directly with LCH Ltd using a central securities depository (CSD) rather than via the direct participant. By contrast, in omnibus account structures clients may be exposed to fellow client risk depending on how their positions and collateral are held. LCH Ltd offers gross and net OSAs. A net OSA may be cheaper for clients as multiple clients' positions can be margined together, which may reduce their margin requirements.

The type of account also affects the likelihood a client could be ported. Porting refers to the shifting of a client's positions and collateral, in the event of the default of their direct participant, to a surviving clearing member. If porting is not possible, then the client's positions would be liquidated. For clients of SwapClear Clearing Members, porting requires the assent of the client, as well as the surviving participant to which their account is ported. Positions and collateral held in accounts with other clients (net OSAs and certain groups of clients in gross OSAs) can only be ported if all positions of all clients were ported to the same surviving clearing participant. Therefore porting may be more straightforward for positions and accounts of a single client (in ISAs, CSAs and certain gross OSAs).

Different provisions apply to clients of FCMs. In the event of default, porting is coordinated by all FCMs and LCH Ltd with the oversight of the Commodity Futures Trading Commission (CFTC). Porting these accounts may be more straightforward than other omnibus accounts because, as noted above, client positions are maintained in legally segregated accounts, and are margined separately. CCP Standard 13 describes LCH Ltd's client account structures and porting arrangements in detail.

Client clearing in Australia

The Australian banks that are now members of SwapClear previously cleared all their trades as clients of other direct participants. Although they are now direct members of the SwapClear service, the Australian participants still clear OTC interest rate derivatives in certain currencies as clients in part due to cost and convenience.

Client clearing by Australian firms has broadly mirrored international trends. There are currently 17 active Australian-domiciled clients in SwapClear, including banks, asset managers and superannuation funds. The notional value outstanding of Australian clients was A\$676 billion in September 2018; by contrast the Australian direct participants have about A\$13 trillion outstanding (Graph 10 in Appendix A). Around two-thirds of Australian client activity is cleared through LSOC accounts. Australian clients currently contribute around A\$650 million in initial margin to the SwapClear service. For comparison, the Australian direct participants post about A\$3.7 billion. The Bank has set tiering as an area of supervisory focus for 2018/19. The Bank will continue to monitor activity and risks of clients in SwapClear over the next assessment.

Appendix A: Activity in SwapClear

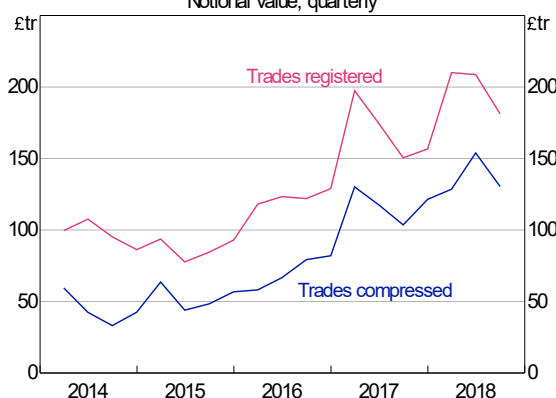
A.1 Global Activity

There were 111 direct clearing participants in the SwapClear service as at 28 September 2018, with direct participants domiciled in Australia, Canada, Europe, Hong Kong, Japan, New Zealand and the US. The number of direct participants has increased by around six per cent over the assessment period.

The notional value of trading activity grew over the past year, though more slowly than in previous years (Graph 5). The growth in activity over the past year was similar for interest rate swaps, forward rate agreements and OIS; together these products accounted for 96 per cent of trades registered in the 12 months to September 2018 (Graph 6). Growth was stronger in basis swaps, albeit from a low base. SwapClear also clears other products including zero-coupon swaps, variable notional swaps, non-deliverable interest rate swaps and inflation swaps.

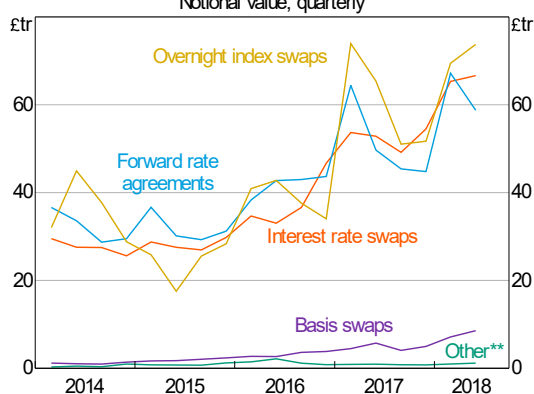
SwapClear clears OTC interest rate derivatives in 21 currencies. About 51 per cent of trades registered are denominated in USD, 24 per cent in EUR and 12 per cent in GBP (Graph 7). Around 3 per cent were denominated in AUD, which was SwapClear's fourth most registered currency.

Graph 5
Trades Registered and Compressed*
Notional value, quarterly



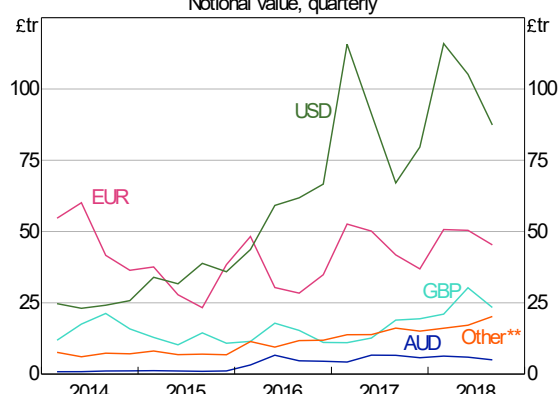
* Data count two sides of each trade
Source: LCH Ltd

Graph 6
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

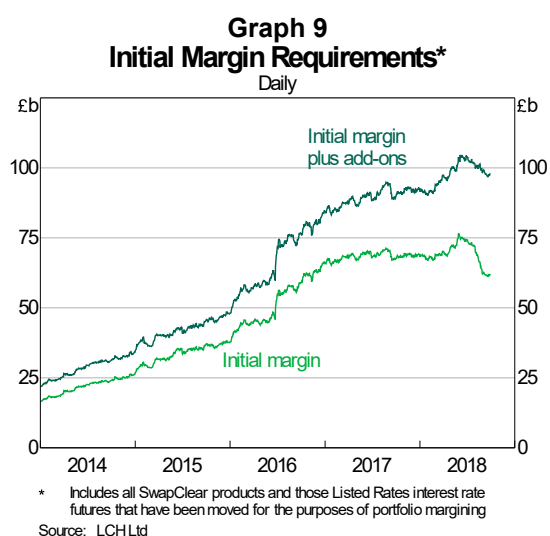
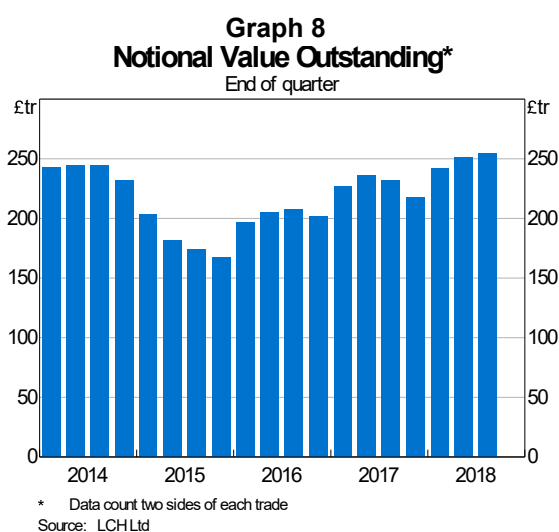
Graph 7
Trades Registered by Currency*
Notional value, quarterly



* Data count two sides of each trade
** CAD, CHF, CNY, INR, JPY, KRW, SEK, NZD, MXN, CZK, DKK, HKD, HUF, NOK, PLN, SGD and ZAR
Source: LCH Ltd

The stock of derivatives outstanding, as measured by notional value, rose moderately over the assessment period (Graph 8). The growth was due to the faster growth in the registration of new trades than that of the compression of existing trades and trades maturing.¹⁷

Initial margin, which is an indicator of the level of risk the CCP manages, grew moderately over the assessment period (Graph 9). Changes in initial margin requirements reflect changes in participants' portfolios, as well as changes to the parameters of the initial margin model. Initial margin add-ons, which are called to cover risks not captured in the base initial margin model, grew substantially over the year and now comprise around 37 per cent of total initial margin posted by participants. The proportion of initial margin called from clients continued to increase over the assessment period (see Box A for a discussion of trends in client clearing in SwapClear).



A.2 Australian Activity

A.2.1 Australian domiciled direct clearing participants

Macquarie Bank Limited joined the SwapClear service in April 2018 (section 2.3.1). As at the end of September 2018, SwapClear had 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 outstanding of interest rate derivatives (in all currencies) cleared by Australian banks via SwapClear grew by 16 per cent in Australian dollar terms over the assessment period (Graph 10).

A.2.2 AUD-denominated OTC interest rate derivatives

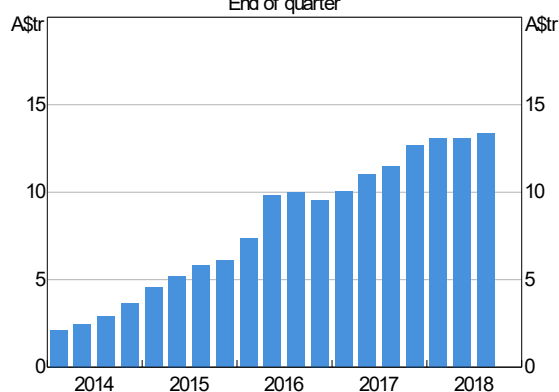
Globally, an estimated 87 per cent of all centrally cleared AUD-denominated OTC interest rate derivatives registered during the assessment period were cleared via SwapClear. In the assessment

¹⁷ Compression involves identifying offsetting trades in participants' portfolios and terminating them, while leaving those participants' market-facing exposures unchanged or within a predefined tolerance. Reducing the volume of trades outstanding reduces operational overhead and simplifies the default management process. For more information about the compression process, see *Box A: Compression* in the 2014/15 Assessment, which is available at <http://www.rba.gov.au/payments-and-infrastructure/financial-market-infrastructure/clearing-and-settlement-facilities/assessments/lch/2015/pdf/lch-assess-2015-12.pdf>.

period, total AUD activity continued to increase, due in part to a shift towards clearing, as margining requirements for non-centrally cleared derivatives have come into force for some counterparties.

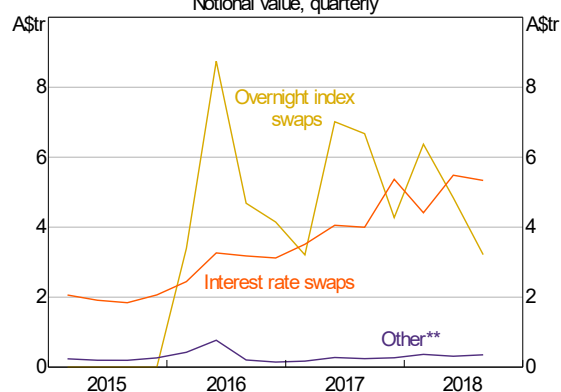
Activity in AUD interest rate swaps and OIS increased by 10 per cent in the assessment period (Graph 11). The notional value of AUD OIS registered fluctuates substantially; quarterly volumes of AUD interest rate swaps registered have also become more volatile over the assessment period. These fluctuations reflect in part trading activity based on market expectations of interest rates. As AUD interest rate swaps have longer maturities, they contribute more to the risk cleared by participants than AUD OIS. Basis, zero-coupon and variable notional swaps remain a small share of AUD activity.

Graph 10
Notional Value Outstanding – Australian Banks*
End of quarter



* Data are sum of Australian banks' trade sides; trades between two Australian banks will be counted twice
Source: LCH Ltd

Graph 11
AUD Interest Rate Derivatives Registered*
Notional value, quarterly



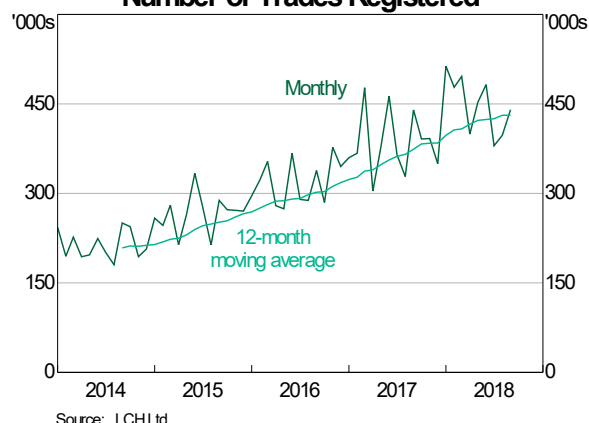
* Data count two sides of each trade
** Basis swaps, variable notional swaps and zero-coupon swaps
Source: LCH Ltd

A.3 Operational Performance

LCH Ltd targets IT system availability for the SwapClear service equivalent to at least 99.7 per cent which, in effect, means that system outages should last no more than 60 minutes in any one calendar month.¹⁸ SwapClear met this target in 10 months of the assessment period; IT system availability over the assessment period averaged 99.9 per cent.

The number of trades registered in SwapClear each month has increased by 15 per cent in the assessment period (Graph 12). LCH Ltd has met its target for maximum capacity utilisation of 50 per cent in each month in the assessment period for the SwapClear service. 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 current daily peak throughput of trades registered over the previous two years, or (ii) the projected daily average throughput in 12 months' time.

Graph 12
Number of Trades Registered



Source: LCH Ltd

¹⁸ 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 losses of resilience (that is, when the service is still operating but, for example, an additional server used to share the load becomes 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. Prospective clearing participants of SwapClear are required to have net capital of at least US\$50 million, appropriate payment arrangements, staff with sufficient experience, and appropriate systems to manage their clearing activities. Prospective 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 its SwapClear participants by collecting several types of margin:

- *Variation margin.* All SwapClear positions are marked-to-market at the end of the day and three times intraday. At the end of each day, variation margin is collected from participants with loss-making positions and paid to those with profit-making positions. This practice ensures that uncovered losses on SwapClear participants' positions do not accrue over time.
- *Initial margin.* In the event of a clearing participant default, LCH Ltd would be exposed to risk arising from potential changes in the market value of the defaulting participant's open positions between the last settlement of variation margin and the close-out of these positions. LCH Ltd collects initial margin to mitigate this risk. Most trades will only be registered if, at the point of registration, there are sufficient resources at the clearing participant level, either in the form of initial margin or the real-time trade registration (RTTR) component of the default fund

(Appendix B.1.3) to cover the potential future exposure of the trade (up to a given confidence level).¹⁹

- *Intraday margin.* LCH Ltd monitors participants' portfolios intraday to take account of changes in both prices and positions; LCH Ltd makes intraday margin calls where margin liabilities exceed predetermined participant-specific credit thresholds.
- *Additional margin.* LCH Ltd collects various forms of additional margin to cover any risks – including credit, liquidity, concentration and sovereign risks – not captured by the base initial margin model.

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 with 99.7 per cent confidence, based on historical movements in yield curves and exchange rates over a 10-year lookback period. LCH Ltd assumes that an additional two-day period will be required to close out client positions; initial margin requirements on the positions of clients of participants are scaled up accordingly.²⁰ 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 (CCP Standard 6.6).

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.²¹ 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 (CCP Standard 6.5).²² 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, as at September 2018.

Prefunded resources

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 capital contribution to the default fund waterfall (€44.1 million for the Rates service, as at the end of September 2018). Should this also prove insufficient, losses would be allocated to the Rates service default fund.

The Rates service default fund is a pool of mutualised resources, prefunded by clearing participants. The Rates service default fund comprises two components: a core component (£4.6 billion at the end of September 2018) and an additional component that supports the intraday provision of credit needed to facilitate real-time trade registration (£400 million as at September 2018) (see 'Default fund real-time trade registration component' below). Both components are available to cover losses from

19 Participants can register sub-block trading venue trades without this credit check.

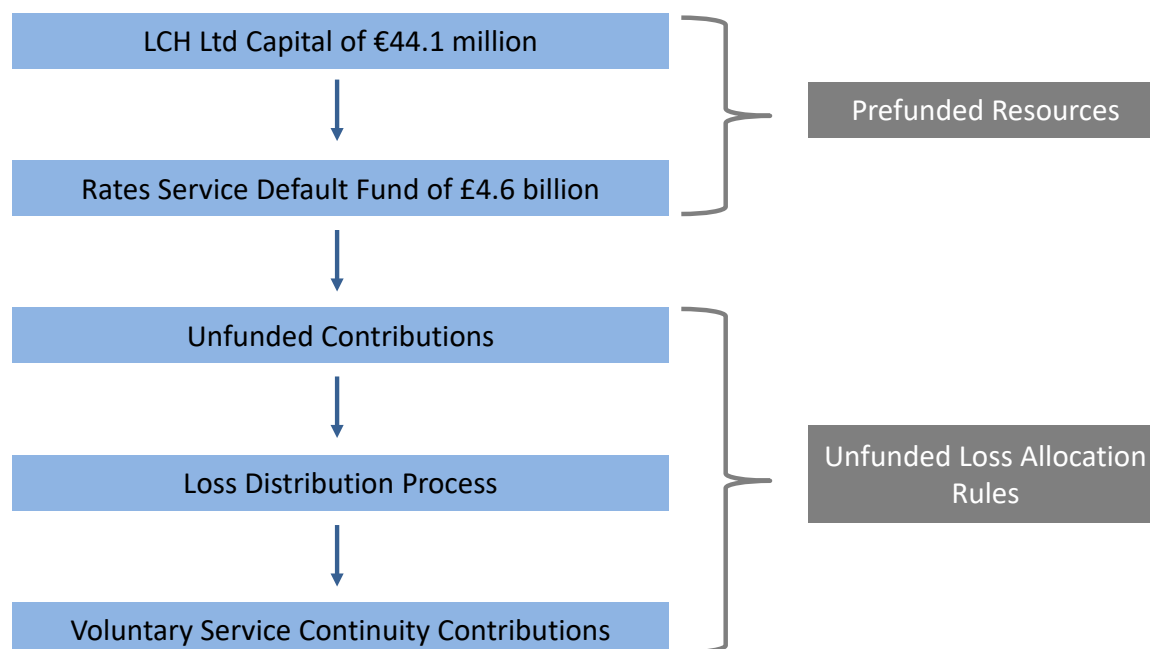
20 The additional two-day holding period for client positions allows time for clients to decide whether to seek to port their portfolio to another clearing participant, as well as time to carry out any such transfer.

21 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.

22 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).

participant defaults. Both SwapClear and Listed Rates participants contribute to the core component, but only SwapClear participants contribute to the RTTR component.

Figure 1: Rates Service Default Waterfall after the Defaulter’s Collateral*
as at 28 September 2018



* Real-time trade registration component of the default fund not shown
Source: LCH Ltd

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’ initial margin and monthly default fund additional margin (DFAM). This is intended to meet the ‘cover two’ requirement under CCP Standard 4.4 and its equivalent under EMIR.

The core component 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 DFAM called.²³

Each SwapClear participants’ contribution to the core component is equal to their average share of total initial margin requirements over the previous month based on its house positions only.

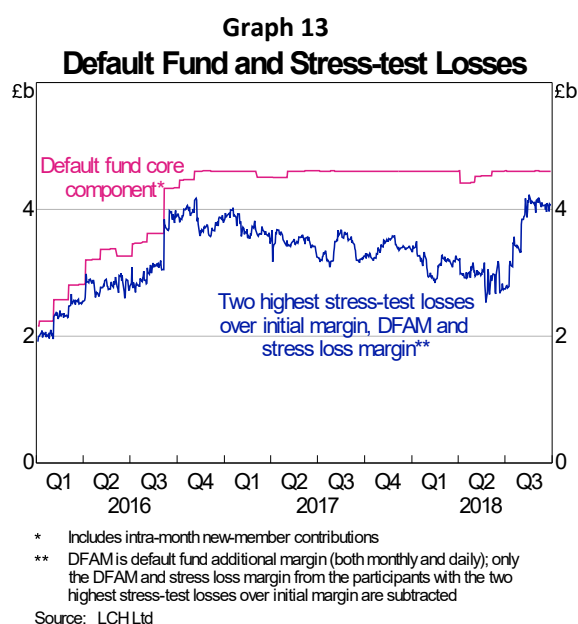
Contributions are subject to a minimum of £17.5 million for SwapClear participants who are also Listed Rates participants, £10 million for SwapClear-only clearing participants and £500,000 for Listed-Rates-only clearing participants. Contributions are rebalanced each month when the core component is resized. 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.

²³ 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.

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 a participant if its STLOIM exceeds a specified threshold of the sum of the combined stressed exposure value and buffer, 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 and affiliates with STLOIM that exceed a predefined proportion of the default fund.²⁴ The relevant default fund proportion is based on those participants' ICSs. The amount 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.

Over the assessment period, LCH Ltd maintained sufficient financial resources to meet the cover two requirement (Graph 13). That is, stress test losses in excess of initial margin and daily and monthly DFAM of the two participants with the largest exposures were smaller than the default fund core component (see CCP Standard 4.7 for further detail). For most of the assessment period, the Rates service default fund was at the cap of £5 billion (£4.6 billion core component and £400 million RTTR component) prescribed in the LCH Ltd Rulebook. Where the cap is binding, LCH Ltd maintains sufficient prefunded financial resources to meet its cover two requirement by collecting monthly DFAM.



Default fund real-time trade registration component

To meet European regulatory requirements, SwapClear must novate or reject new trades within 10 seconds. Most trades are novated provided that 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 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 RTTR component in the default fund. This additional component is currently sized at £400 million. The proportion that each SwapClear participant is obliged to contribute is based on its tolerance limit utilisation relative to that of other participants over the previous 20 business days, subject to a floor of £3 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 additional component are

24 Participants can ask clients to cover their own stress test losses (rather than the member paying DFAM) through stress loss margin. Members and clients jointly agree to provide additional collateral to LCH in order to reduce the exposure generated by that client.

rebalanced on the same timeline as those to the core component. Usage of this additional component is limited on a cover two basis, which means that no clearing participant may use more than half 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. 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 at the next intraday margin call (CCP Standard 6.4).

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', which are described in detail in CCP Standard 4.8.

- *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, subject to a maximum of three defaults in any six-month period.
- *Loss distribution process.* LCH Ltd may apply haircuts to the variation margin payments owed to non-defaulting SwapClear participants whose positions make gains. Participants in the Listed Rates service would be allocated losses in proportion to their default fund contributions. These haircuts are capped at the higher of £200 million or twice a participant's default fund contribution, and the Loss Distribution Process is limited to 10 days. In the event a participant reaches the cap, or variation margin gains haircuts (VMGH) was likely to extend beyond 10 days, participants will vote on whether the Loss Distribution Process should continue (CCP Standard 4.8).
- *Voluntary service continuity contributions.* Should losses remain, LCH Ltd would ask non-defaulting participants to make voluntary contributions. Participants can make these payments at any time during the default management process, but are not obliged to make any voluntary payments.
- *Service closure.* If insufficient voluntary payments were made to cover the remaining credit losses, the Rates service Default Management Group (DMG) would make an Insufficient Resources Determination and LCH Ltd would close the SwapClear and Listed Rates services (CCP Standard 3.5). In the event the SwapClear and Listed Rates services were wound down, all outstanding SwapClear and Listed Rates contracts would be terminated and the Rates service DMG would calculate a sum owing between LCH Ltd and each non-defaulting clearing participant (CCP Standard 4.8).

B.2 Governance

B.2.1 Structure of LCH Group

LCH Ltd is a wholly owned subsidiary of LCH Group (Figure 2). As at the end of September 2018, LCH Group is 68 per cent owned by the London Stock Exchange (C) Limited, a wholly owned subsidiary of LSEG, and 32 per cent owned by others, including clearing participants and other exchanges.

LCH Group is a holding company incorporated in the UK. In addition to LCH Ltd, LCH Group has another wholly owned subsidiary that actively operates central clearing services, LCH SA. It also has a US CCP

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 (see below). Many of the key policies that govern LCH Ltd's operations – such as the Financial Resources Adequacy Policy, the Collateral Risk Policy and the Operational Risk Policy – are Group policies. Group policies are 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; all LCH Group Risk policies are approved by the LCH Ltd Board after review by the board-level Risk Committee.²⁵

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 (CCP Standards 2.6 and 4.2).

LCH Group and LCH Ltd Boards

The LCH Group Board is responsible for the overall management and strategic direction of the LCH Group. As at 30 September 2018, the LCH Group Board has 15 members, including 6 independent directors (including the Chair). The LCH Group Board meets at least five times a year and on an ad hoc basis, as required. Four members of the LCH Group Board – three of the independent directors and the CEO of LCH Group – also sit on the LCH Ltd Board.

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 (CCP Standard 2.3). 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. As at 30 September 2018, the LCH Ltd Board has 11 directors, including 5 independent directors (including the Chair), the CEOs of LCH Group and LCH Ltd, the LCH Group CRO, 2 member representatives and 1 director nominated by LSEG.

Group-level, 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 with the equivalent Group-level committees. Issues specific to a particular CCP can be considered at combined meetings.

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

- *LCH Ltd Risk Committee*. The LCH Ltd Risk Committee is a board-level committee responsible for reviewing all risk policies prior to recommending approval by the Board, considering and commenting on all aspects of LCH Ltd's risk appetite, tolerance and strategy, and assisting the LCH Ltd Board to fulfil its responsibility for the oversight of risk management of LCH Ltd (CCP Standard 2.6). The terms of reference for the Risk Committee of each of LCH Ltd and LCH SA require that the Committee consider proposals for harmonisation of policies or procedures between the LCH Group CCPs.

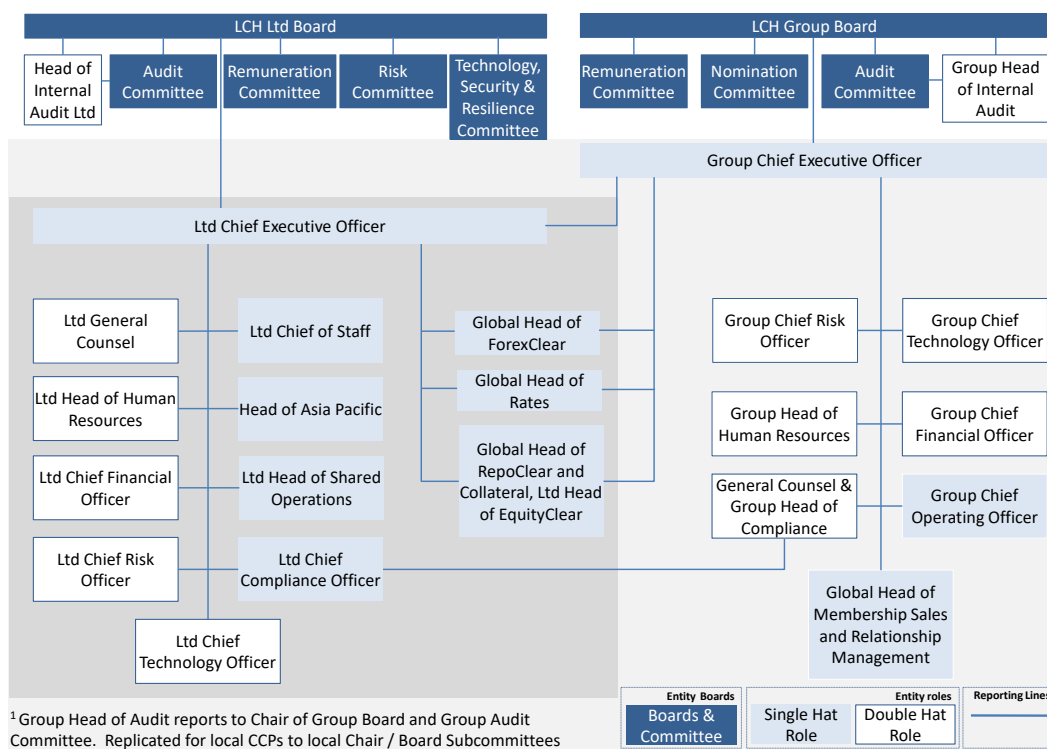
²⁵ The LCH Group Risk policies are: the Financial Resource Adequacy Policy; Liquidity Risk Policy; Operational Risk Policy; Investment Risk Policy; Collateral Risk Policy; Counterparty Credit Risk Policy; Contract and Market Acceptability Policy; Default Management Policy; Settlement, Payment and Custody Risk Policy; Model Governance, Validation and Review Policy; and the Procyclicality Policy.

- *LCH Ltd Technology, Security and Resilience Committee.* The board-level LCH Ltd Technology, Security and Resilience Committee assesses LCH Ltd’s management of technology, security, operational and cyber risks, and 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 and security.
- *LCH Group Executive Committee.* The LCH Group Executive Committee is the most senior LCH Group management committee. It is an advisory body, which provides advice and recommendations to the Group CEO and the CEOs of the Group’s CCPs. The Executive Committee is made up of: the Group CEO, who acts as the Chair; the CEOs of each of the Group CCPs; the business line heads; and the Group functional heads.
- *Local Management Committees.* Each of LCH Ltd, LCH SA and SwapAgent has a Local Management Committee (LMC). Unlike some of the board-level committees and other executive-level committees, the LMCs do not sit jointly. This allows the LCH Ltd LMC to consider issues from the perspective of LCH Ltd in isolation. The LCH Ltd LMC provides support and advice to the LCH Ltd CEO on risk management, strategy, financial management and reporting, operational management, audit and governance. The LCH Ltd LMC reports directly to the LCH Ltd Board and provides direction and oversight to the LCH Ltd Executive Risk Committee (ERCo). Permanent members of the LCH Ltd LMC include senior management from both LCH Ltd and LCH Group. LMC members are allowed to nominate delegates to attend in their place.
- *Executive Risk Committees.* 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 Ltd CRO, provides regular updates on its activities to the LCH Ltd LMC.
- *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



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, CaLM, Compliance, Finance, Human Resources, Information Technology, Legal, Operations and Risk. The various departments are further divided by function. For example the Risk department includes teams responsible for credit risk, default management, 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 separation of duties between first- and second-line risk management is discussed in CCP Standard 16.1. The CaLM function 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 Global Head of Rates, a Group-level position, 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 Global Head of Rates also has responsibility for launching and extending the SwapAgent service. The Global Head of Rates reports directly to the CEO of LCH Ltd and to the CEO of LCH Group. 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 the 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 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 Head of the Rates service Risk team reports directly to the Head of the Rates Service. The Group-level Risk department performs the second line of defence including the maintenance of risk policies aligned to the LCH Ltd Board's risk appetite, analysis of margin and default fund adequacy and methodologies, risk aggregation and reporting, default management coordination, determination and monitoring of internal credit scores and monitoring of credit risk related limits, new product approvals and the risk governance process.

B.3 Regulatory Environment

LCH Ltd 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 to be sufficiently equivalent to those in Australia. LCH Ltd is incorporated in England, and 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.²⁶ 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:

- *EU regulation.* In July 2012, the EU introduced EMIR, a harmonised framework for the regulation of FMIs, including CCPs, incorporated in the region. In May 2018, EMIR was incorporated into the European Economic Area Agreement.²⁷ EMIR is therefore in force in the European Economic Area, which covers the EU and Iceland, Liechtenstein and Norway. EMIR and its associated technical standards largely implement the PFMI in the EU. Under EMIR, primary regulatory authority over a CCP is given to the national competent authority in the country in which that CCP is established; since LCH Ltd is established in the UK, this is the BoE.
- *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 EMIR compliance, maintaining a recovery plan and loss allocation rules, and instituting measures to monitor and reduce potential market abuse. The PPS

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

27 For more information, see <http://www.efta.int/EEA/news/EEA-Joint-Committee-incorporates-22-EMIR-acts-508781>.

operated by LCH Ltd is regulated and overseen by the BoE as a ‘recognised payment system’ under the UK Banking Act 2009.

- *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 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.

The UK is preparing to leave the EU on 29 March 2019. The UK and the EU have provisionally agreed the terms of an implementation period, during which EU law (including EMIR) would continue to have effect in the UK until the end of 2020.²⁸ This implementation period is part of the wider Withdrawal Agreement between the UK and EU and needs to be approved by both the UK and EU before it can come into effect.²⁹

In the event the implementation period does not come into effect there are contingency arrangements in place that will allow applicable EU law, such as EMIR, to be converted into UK law, with minimal changes made to ensure that these laws would work effectively in the UK.³⁰ The UK has released draft regulations in line with this approach.³¹ The BoE has also released a consultation paper setting out its proposed changes to FMI-related Binding Technical Standards and the BoE’s domestic rules for FMIs so that these work effectively in the UK after it leaves the EU.³²

The Bank is monitoring developments related to LCH Ltd’s future regulatory regime, and will continue to engage with the BoE and other relevant authorities as appropriate. The Bank will consider the continued sufficient equivalence of LCH Ltd’s home regulatory regime to the Australian regulatory framework in the event of changes to the home regulatory regime (section 1.6).

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

28 See paragraph 1.2 in *HM Treasury’s approach to financial services legislation under the European Union (Withdrawal) Act*. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/720298/HM_Treasury_s_approach_to_financial_services_legislation_under_the_European_Union_Withdrawal_Act.pdf.

29 See *Procedures for the Approval and Implementation of EU Exit Agreements: Written statement – HCWS342*, available at: <https://www.parliament.uk/written-questions-answers-statements/written-statement/Commons/2017-12-13/HCWS342>

30 See paragraphs 1.8 and 1.9 in *HM Treasury’s approach to financial services legislation under the European Union (Withdrawal) Act*. Available at footnote 28.

31 Instruments relevant to EMIR include: draft *The Central Counterparties (Amendment, etc., and Transitional Provision) (EU Exit) Regulations*, available at <http://www.legislation.gov.uk/ukdsi/2018/9780111171882/part/3>; and draft *Over the Counter Derivatives, Central Counterparties and Trade Repositories (Amendment, etc., and Transitional Provision) (EU Exit) Regulations 2018*, available at <https://www.gov.uk/government/publications/draft-over-the-counter-derivatives-central-counterparties-and-trade-repositories-amendment-etc-and-transitional-provision-eu-exit-regulations>.

32 UK Withdrawal from the EU: Changes to FMI rules and onshored Binding Technical Standards, BoE consultation paper, October 2018. Available at <https://www.bankofengland.co.uk/-/media/boe/files/paper/2018/uk-withdrawal-from-eu-changes-to-fmi-rules-and-onshored-bts-complete.pdf?la=en&hash=DA90F953E776AA06A9C76C620325284050630BCD>.

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'.³³ 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 an annual assessment 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.

The BoE publishes an annual report on its oversight of UK CCPs and other FMIs. The latest report, published in February 2018, summarised the BoE's supervisory priorities and thematic reviews during the period from February 2017 to February 2018, as they applied across all FMIs, and the FMIs' progress against them.³⁴ The relevant priorities and reviews, focusing on their applicability to the UK CCPs, were:

- *Operational resilience.* The BoE began a cross-FMI review of business continuity and IT recovery capabilities, focussing on governance, strategy and risk management. The BoE is continuing to seek assurance that each FMI's business continuity arrangements are operating as intended and in line with the FMI's risk appetite. In addition, the BoE carried out a cross-FMI review of FMI's use of critical service providers, including outsourcing arrangements. The review found that FMIs' outsourcing arrangements were generally appropriate but identified areas in which FMIs could improve the way they risk manage and govern these relationships.
- *Recovery and resolution.* The BoE continued a review of certain CCPs' recovery plans. The review concluded that arrangements were compliant with regulatory requirements, although some recommendations were made on how these plans could be enhanced. As noted in the Bank's 2016/17 assessment, the BoE (in coordination with Federal Financial Supervisory Authority (BaFin), Bundesbank and CFTC), requested that CME, Eurex Clearing and LCH Ltd conduct their 2017 fire drills in parallel. The BoE observed the fire drills, met with the CCPs and eight of the largest clearing participants after the drill, and reviewed procedures and documentation. The authorities concluded that the CCPs had the required measures in place to complete fire drills successfully, although they made a number of recommendations to enhance both CCPs' and participants' default management processes.
- *Financial resilience.* The BoE started a number of assessments into financial resilience, which included looking at risk models used to calculate margin, default fund contributions and collateral

33 BoE (2013), *The Bank of England's approach to the supervision of financial market infrastructures*. Available at <http://www.bankofengland.co.uk/financialstability/Documents/fmi/fmisupervision.pdf>.

34 BoE (2018), *The Bank of England's supervision of financial market infrastructures – Annual Report*. Available at <https://www.bankofengland.co.uk/news/2018/february/supervision-of-financial-market-infrastructures-annual-report-2018>.

haircuts. The BoE also began its cross-FMI review to assess how UK CCPs meet the CCP Resilience Guidance.

- *EU withdrawal.* The BoE continued to ensure through its supervision that FMIs were able to identify, manage and mitigate risks arising from the UK's withdrawal from the EU. These include risks from potential changes in the arrangements for providing cross-border services and the potential for significant market moves.

The BoE's supervisory priorities for the period from February 2018 are discussed in section 1.5.

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 incorporate CCPs into the resolution regime.³⁵ The BoE is the resolution authority for UK CCPs. Clarification as to how a resolution scenario would work in practice is expected to develop in light of the UK's HM Treasury's negotiations with the European Commission about the pending EU regime for CCP recovery and resolution.

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.

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.

Appendix C: Detailed Assessment of LCH Limited's SwapClear Service against the Financial Stability Standards

The CCP Standards are made up of 21 headline standards, each of which is accompanied by a number of more detailed sub-standards. In assessing a facility against each of the CCP Standards, the Bank takes into account associated guidance.³⁶

This is the Bank's assessment of LCH Ltd's SwapClear service. Where relevant to certain CCP Standards, the Bank also considers interdependencies with other services provided by LCH Ltd as well as with other related entities in LCH Group and LSEG, if these services/entities affect how the SwapClear service complies with these standards.

Standard 1: Legal basis

A central counterparty should have a well-founded, clear, transparent and enforceable legal basis for each material aspect of its activities in all relevant jurisdictions.

1.1 A central counterparty should be a legal entity which is separate from other entities that may expose it to risks unrelated to those arising from its function as a central counterparty.

LCH Ltd is a wholly owned subsidiary of LCH Group, a private company that is limited by shares and incorporated in the UK. As at the end of September 2018, LCH Group is 68 per cent owned by London Stock Exchange (C) Limited, a wholly owned subsidiary of LSEG, and 32 per cent owned by others, including clearing participants and other exchanges.

LCH Group has one other wholly owned subsidiary that actively operates central clearing services: LCH SA. It also has a US CCP subsidiary, LCH LLC, which holds a CFTC DCO licence. The CCPs are legally separate entities, each with separate financial resources. LCH Group's SwapAgent Limited, which offers processing, margining and settlement services for non-cleared derivatives, is provided by a separate subsidiary. LCH Ltd's activities are also separate to those of LSEG. Nonetheless, LSEG's BSL provides shared technology and support services across all LSEG entities, including LCH Ltd.

LCH Ltd's services are limited to CCP clearing of exchange-traded products and OTC derivatives, in accordance with the LCH Ltd Rulebook. Accordingly, LCH Ltd does not provide any services that have a distinct risk profile from, or pose additional risks to, its activity of operating a CCP.

³⁶ The guidance is available at <http://www.rba.gov.au/payments-and-infrastructure/financial-market-infrastructure/clearing-and-settlement-facilities/standards/central-counterparties/2012/>.

1.2 The legal basis should provide a high degree of certainty for each material aspect of a central counterparty's activities in all relevant jurisdictions.

Legal basis

LCH Ltd novates contracts accepted for clearing and nets obligations across each clearing participant's open contracts.³⁷ These activities require a high degree of legal certainty to ensure they will be effective, even in a default scenario. Key components of the legal basis under which LCH Ltd operates are set out below.

LCH Ltd is primarily regulated by the BoE as a 'recognised central counterparty'. This designation arises from the UK *Financial Services and Markets Act 2000*, and EMIR, the harmonised European regulatory framework for CCPs. EMIR and its associated technical standards largely implement the Principles within the PFMI in the EU. LCH Ltd's operations span several jurisdictions. LCH Ltd is also registered as a DCO under the US *Commodity Exchange Act of 1936*, and therefore it and its provision of the SwapClear service (as well as the ForexClear and Listed Rates services) are directly regulated by the CFTC. Outside the EU and US, LCH Ltd has been formally licensed to offer clearing services (or granted an exemption from regulation) in the Canadian provinces of Ontario and Québec, Japan, Mexico, Norway, Singapore, Hong Kong and Switzerland, as well as Australia.

In Australia, LCH Ltd holds a CS facility licence under part 7.3 of the *Corporations Act 2001*. This licence is administered by ASIC in consultation with the Bank. The Minister acts as the ultimate decision-maker on licensing matters, although this responsibility has been delegated to ASIC since April 2016. LCH Ltd's licence permits it to clear OTC interest rate derivatives and inflation rate derivatives through the SwapClear service.

The PPS operated by LCH Ltd (the system that provides for cash settlement of margins and other payments between LCH Ltd and its clearing participants; CCP Standards 8 and 9) is regulated and overseen by the BoE as a 'recognised payment system' under the UK *Banking Act 2009*. The BoE requires LCH Ltd to operate this system having regard to the PFMI.

The LCH Ltd Rulebook, which consists of general regulations, default rules, settlement finality regulations, sponsored clearing regulations and various procedures, is governed by English law.³⁸ LCH Ltd maintains a separate FCM Rulebook for its US-domiciled FCM clearing participants, which includes a set of regulations, procedures and default rules (CCP Standard 17.2). The rest of this standard relates to the LCH Ltd Rulebook, which governs the rights and responsibilities of LCH Ltd's Australian clearing participants. LCH Ltd has advised the Bank that the LCH Ltd Rulebook and FCM Rulebook are broadly the same in respect of the SwapClear rules and procedures that require a high degree of legal certainty, for example, with respect to settlement finality, default rules and procedures, netting arrangements and the porting of client positions in the event of a clearing participant default. One exception is the enforcement of collateral, which LCH Ltd has indicated that it would pursue under New York law, instead of English law, in the event of a SwapClear FCM default.

All clearing participants must enter into a Clearing Membership Agreement with LCH Ltd. The Clearing Membership Agreement is a contract between LCH Ltd and the participant, governed by English law, that requires a participant to comply with the terms of the relevant LCH Ltd Rulebook. There is a

37 The SwapClear service operates on a novated basis. Certain other LCH Ltd services operate on an 'open offer' model, under which contracts are created directly with LCH Ltd upon trade execution.

38 The sponsored clearing regulations set out the rules for RepoClear's sponsored membership model, and are not applicable to the SwapClear service.

separate Clearing Membership Agreement for FCM participants, which is governed by US law. Accordingly, relevant contractual rights and obligations between LCH Ltd and its participants are contained in the LCH Ltd Rulebook. LCH Ltd has stated that its Rulebook covers all material aspects of SwapClear's activities, and aims to provide a clear and certain legal basis for its operations.

Rights and interests

The rules governing the rights and actions of LCH Ltd and its clearing participants in the event of a clearing participant default are set out in the LCH Ltd Rulebook (CCP Standard 12). The LCH Ltd Rulebook, together with separate security agreements entered into by clearing participants (see below), defines the rights and interests of LCH Ltd, its direct clearing participants and its direct participants' clients in respect of clearing positions and associated collateral. The relationships between direct participants and their clients are governed by bilateral client clearing documentation.

At the time of licensing, LCH Ltd provided an English legal opinion to the Bank to the effect that where cash margin is paid to LCH Ltd, title in such cash passes to LCH Ltd upon receipt by LCH Ltd in accordance with the terms of the LCH Ltd Rulebook. At the time of licensing, LCH Ltd provided the Bank with an Australian legal analysis stating that an Australian court would give effect to the provisions relating to this transfer provided that the relevant provisions are legal, valid and enforceable under English law.

For non-cash collateral, LCH Ltd's clearing participants are required to grant security to LCH Ltd pursuant to a deed of charge between LCH Ltd and the clearing participant (known as a Charge Agreement) (CCP Standard 15.2). LCH Ltd's Charge Agreements are governed by English law. LCH Ltd seeks a legal opinion, from a lawyer based in each relevant jurisdiction, on the capacity of participants in that jurisdiction to grant security pursuant to the Charge Agreement; this includes seeking opinions under English law.³⁹ LCH Ltd has provided the Bank with the relevant legal opinion obtained in Australia, which specifies that an Australian court would recognise LCH Ltd's security interest in collateral provided by Australian clearing participants, provided LCH Ltd's security interest was also valid under English law.⁴⁰

LCH Ltd relies upon contractual arrangements with custodians and CSDs. LCH Ltd has advised the Bank that prior to entering into an arrangement with a custodian or CSD, it conducts due diligence to ensure that the assets belonging to LCH Ltd or its clearing participants are fully segregated, identifiable and accessible promptly in the event of a clearing participant default (CCP Standard 15.2). As part of the due diligence process, LCH Ltd must also be satisfied that assets belonging to LCH Ltd are fully segregated, identifiable and accessible promptly in the event that the custodian or CSD defaults (CCP Standard 15.2). Due diligence reviews are conducted at least every two years, and LCH Ltd has the ability to initiate ad hoc reviews when necessary. When conducting due diligence on a non-UK domiciled custodian or CSD, LCH Ltd will also seek legal advice for that jurisdiction.

³⁹ These opinions, which also cover a range of other issues (CCP Standard 1.5), are made available on the LCH Group website at <https://www.lch.com/resources/rules-and-regulations/ltd-rulebooks/jurisdictional-legal-opinions>.

⁴⁰ The relevant legal opinion also recommended that LCH Ltd register its security interests under the Charge Agreement entered into with each Australian clearing participant in accordance with the *Personal Property Securities Act 2009*, in order to protect the enforceability and priority of LCH Ltd's security interests. LCH Ltd has advised the Bank that registrations have been effected for those five Australian clearing participants of SwapClear that have executed Charge Agreements.

1.3 A central counterparty should have rules, procedures and contracts that are clear, understandable and consistent with relevant laws and regulations.

To facilitate an understanding of the risks that current and prospective clearing participants may face by participating in the SwapClear service, the LCH Ltd Rulebook is available on the LCH Group website (CCP Standard 20.1). The LCH Ltd Rulebook sets out the procedures, timings, contract terms and other details of the SwapClear service.

The LCH Ltd Rulebook is supplemented with explanatory material, published on the LCH Group and SwapClear websites and the LCH Ltd restricted clearing participant website, to support participants' (and prospective participants') understanding of the risks they face through participation in the SwapClear service. Publicly available material includes high-level descriptions of LCH Ltd's risk management framework, margining methodology, business continuity arrangements and default management process (CCP Standard 20.1).

The LCH Ltd Rules Change Committee oversees all amendments to the LCH Ltd Rulebook. Changes to the LCH Ltd Rulebook must be unanimously approved by the Rules Change Committee before being effected. The Committee comprises the LCH Ltd Head of Legal, LCH Ltd Chief Compliance Officer (CCO), another representative of each of the Compliance and Legal departments, and another LCH Ltd representative (as nominated by the LCH Ltd CEO). If the Rules Change Committee deems a change to be material, clearing participants are consulted on the change, for a period determined by the Rules Change Committee. The Rules Change Committee also has the ability to make non-material amendments to the LCH Ltd Rulebook by providing notice to affected clearing participants, unless explicit provisions stating otherwise are included in the LCH Ltd Rulebook or Clearing Membership Agreement.⁴¹

Proposed changes to the LCH Ltd Rulebook are submitted to the BoE for approval or non-objection. Amendments to the LCH Ltd Rulebook that affect its DCO services must also be submitted to the CFTC, and are made publicly available on the LCH Group website prior to implementation.

1.4 A central counterparty should be able to articulate the legal basis for its activities to the Reserve Bank and other relevant authorities, participants and, where relevant, participants' customers, in a clear and understandable way.

LCH Ltd has obtained certain legal opinions regarding its legal basis. These opinions address, among other things, the efficacy of the choice of English law as the governing law of LCH Ltd's Rulebook, Clearing Membership Agreement and Charge Agreement, and the enforceability of those agreements, subject to certain assumptions (CCP Standard 1.2). These opinions are made publicly available on the LCH Ltd website. Before offering the SwapClear service in any new jurisdiction, LCH Ltd obtains a legal opinion from a lawyer based in that jurisdiction regarding, among other things, the enforceability of the LCH Ltd Rulebook (CCP Standard 1.6).

LCH Ltd publishes key information about its regulatory status on its website and in its annual report. The details of the relevant regulatory frameworks under which LCH Ltd operates, including statutory instruments and stated policies, are publicly available on the BoE and CFTC websites. The LCH Ltd Rulebook refers to supporting legislative instruments where appropriate. LCH Ltd's articles of association are available through Companies House, the UK company registrar.

⁴¹ See Regulation 44 (Alteration of Regulations and the Procedures), LCH Ltd General Regulations, p 154. Available at <https://www.lch.com/resources/rules-and-regulations/ltd-rulebooks>.

LCH Group also publishes key information about the regulatory status and legal basis of LCH Ltd as part of its response to the CPMI–IOSCO *Disclosure Framework for Financial Market Infrastructures*, which describes LCH Ltd’s approach to meeting the legal basis requirements of the PFMI (CCP Standard 20.5).⁴²

LCH Ltd has provided legal analysis to the Bank and ASIC in support of it permitting Australian clearing participants to offer client clearing services. Among other things, this analysis covered LCH Ltd’s ability under Australian laws to apply its default rules, as they relate to client clearing, in the event of a default of an Australian clearing participant that is a SwapClear Clearing Member. In particular, these default rules provide for LCH Ltd to transfer a defaulting clearing participant’s client’s positions and collateral to a non-defaulting clearing participant or to terminate and close out those positions and return any remaining collateral to the client.

1.5 A central counterparty should have rules, procedures and contracts that are enforceable in all relevant jurisdictions. There should be a high degree of certainty that actions taken by the central counterparty under such rules and procedures will not be voided, reversed or subject to stays, including in the event that the central counterparty enters into external administration or that one or more of its participants defaults or is suspended.

The LCH Ltd Rulebook is governed by English law. As discussed above, LCH Ltd requires each clearing participant to enter into a Clearing Membership Agreement, which is also governed by English law and stipulates that English courts have exclusive jurisdiction to determine any action or dispute arising in relation to the Clearing Membership Agreement (CCP Standard 1.2). LCH Ltd obtains legal opinions for all jurisdictions in which participants are incorporated, to assess the legal risk presented by these participants and whether the laws of those jurisdictions would present conflict-of-laws issues (CCP Standards 1.4 and 1.6). Measures that contribute to ensuring a high degree of certainty in respect of specific aspects of LCH Ltd’s activities are detailed below.

Settlement finality

The Settlement Finality Regulations contained within the LCH Ltd Rulebook set out the conditions under which settlement obligations arising from registered exchange-traded and OTC contracts are final and irrevocable (CCP Standard 8.1). These regulations are supported by LCH Ltd’s designation under the UK *Financial Markets and Insolvency (Settlement Finality) Regulations 1999*, which implement *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*. This directive seeks to reduce the risks associated with participation in payment and securities settlement systems, by minimising the disruption caused by insolvency proceedings brought against a clearing participant in such a system.

Netting arrangements

LCH Ltd has obtained a legal opinion to the effect that English law recognises the effectiveness of LCH Ltd’s netting arrangements.⁴³ LCH Ltd has obtained an updated legal opinion stating that an Australian court should uphold the choice of English law governing LCH Ltd’s netting arrangements.⁴⁴

42 The *LCH Ltd CPMI–IOSCO Self Assessment 2017* is available at https://www.lch.com/sites/default/files/media/files/CPMI%20IOSCO%20Qualitative%20Assessment%20of%20LCH%20Limited%202017_0.pdf.

43 This legal opinion is available at [https://www.lch.com/system/files/media_root/LCH%20Opinion%20\(UK\)_0.pdf](https://www.lch.com/system/files/media_root/LCH%20Opinion%20(UK)_0.pdf).

44 This legal opinion is available at https://www.lch.com/system/files/media_root/Australia.pdf.

LCH Ltd has provided the Bank with a legal opinion to the effect that the *Payment Systems and Netting Act 1998* (PSNA) would apply in the event of the insolvency of an Australian clearing participant. LCH Ltd's SwapClear CS facility is approved as a 'netting market' in Australia under the PSNA. LCH Ltd has provided the Bank with a copy of a legal opinion to the effect that the Clearing Membership Agreement should constitute a 'market netting contract' for the purposes of the PSNA and that certain rights of LCH Ltd under the Rulebook and the Charge Agreement, including those relating to termination, novation and netting, are protected under part 5 of the PSNA in the event of the insolvency of an Australian clearing participant of SwapClear. Part 5 of the PSNA covers several areas relevant to CCPs, including a CCP's rights to access a defaulting clearing participant's collateral, termination of open contracts and netting of a CCP's obligations with respect to an insolvent Australian clearing participant, in accordance with the CCP's rights under the relevant market netting contract.

The *Financial Legislation Amendment (Resilience and Collateral Protection) Act 2016* amended the PSNA to enhance the protections afforded to netting markets, including LCH Ltd SwapClear, to protect the exercise of recovery powers and protect default fund contributions by participants should participants subsequently enter administration.

Assumption of risk

LCH Ltd assumes the counterparty credit risk of SwapClear contracts through novation. Under the LCH Ltd Rulebook, novation occurs at the time the contract is registered with the CCP. LCH Ltd has advised the Bank that the concept and specific meaning of novation is established in English common law, and it relies on this to provide the legal basis for novation of contracts under the Rulebook.

Enforceability of rules in default

Default of participants

LCH Ltd has obtained an English legal opinion confirming that its default rules are enforceable as a matter of English law. The application of LCH Ltd's default rules and procedures to the exclusion of the UK insolvency regime is protected by a number of statutory instruments. LCH Ltd has shared its assessment with the Bank that it is protected by part VII of the UK *Companies Act 1989* from general application of the UK insolvency regime. LCH Ltd has obtained a legal opinion that states that, as provided for under part VII of this Act, it is permitted to exercise its rights in respect of contracts registered with SwapClear consistent with its default management process, and is protected from interference, or subsequent claim, by the insolvency office holder of the defaulted party.

The UK *Financial Collateral Arrangements (No 2) Regulations 2003* seek to prevent the placing of moratoriums under UK insolvency law on the enforcement of securities which are 'financial collateral arrangements'. LCH Ltd has stated that it seeks to ensure that its security arrangements meet the relevant criteria for protection under these regulations.

Insolvency of LCH Ltd

The LCH Ltd Rulebook sets out contract termination and netting arrangements that apply in the event of LCH Ltd's insolvency; LCH Ltd has stated that it believes the netting provisions contained in the Rulebook would be enforceable in the event of LCH Ltd's insolvency. As noted above, the Rulebook is governed by English law. In addition, at the time of licensing, LCH Ltd provided the Bank with legal analysis stating that insolvency of LCH Ltd would be governed under English law. This legal analysis indicated that English law would not prohibit or render ineffective the netting arrangements provided

in the Rulebook. The Rulebook also provides for clearing participants to set off debts against LCH Ltd in respect of their mutual dealings with each other. LCH Ltd has provided legal analysis to the Bank which notes, separately, that UK insolvency law provides for mandatory set-off provisions.

The BoE, in its role as the UK resolution authority, has various powers that it could use to maintain the continuity of LCH Ltd's services if LCH Ltd was failing, or was likely to fail, and it was not reasonably likely that LCH Ltd's own actions would be sufficient to maintain continuity of its services. These powers are set out in the UK *Banking Act 2009* (as amended by the UK *Financial Services Act 2012*), which provides for a special resolution regime for CCPs. The UK Treasury's Special Resolution Regime Code of Practice supports the legal framework of the special resolution regime. Under the special resolution regime, the BoE would have the power to transfer some or all of the business of a CCP or its group undertaking to a commercial purchaser or to a bridge CCP owned and controlled by the BoE, and the power to transfer the ownership of the CCP to any person. The BoE would also have the power of direction over an insolvency practitioner appointed in relation to the CCP.

1.6 A central counterparty conducting business in multiple jurisdictions should identify and mitigate the risks arising from any potential conflicts of law across jurisdictions. A central counterparty should provide the Reserve Bank with a legal opinion that demonstrates the enforceability of its rules and addresses relevant conflicts of law across the jurisdictions in which it operates. This should be reviewed on a periodic basis or when material changes occur that may have an impact on the opinion, and updated where appropriate.

To minimise the legal risk that could arise from accepting non-UK domiciled clearing participants, agreements between LCH Ltd and its participants are governed by English law, and participants are required to submit to the jurisdiction of English courts.

LCH Ltd has adopted the LCH Group Legal Opinion Policy. In accordance with this policy, LCH Ltd seeks legal opinions prior to accepting clearing participants from other jurisdictions. Among other things, these legal opinions cover the extent to which those aspects of the LCH Ltd Rulebook that require a high degree of legal certainty are enforceable in a clearing participant's home jurisdiction (CCP Standard 1.5), and the enforceability of LCH Ltd's contracts and the jurisdiction of English courts over its clearing participants.

The LCH Group Legal Opinion Policy also requires that LCH Ltd refresh its legal opinions, including those relating to cross-border clearing participants, every three years. In accordance with this policy, the LCH Ltd Head of Legal may determine that a legal opinion should be refreshed earlier or later than required by the three-year cycle. This may occur if there is an issuance of regulatory rules or legislation that could have a substantial impact on the form of any legal opinion held by LCH Ltd.

To date, LCH Ltd has obtained legal advice for Australia, Austria, Belgium, Canada (Ontario and Québec), Denmark, England and Wales, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Poland, Portugal, Scotland, Singapore, Spain, Sweden, Switzerland and the US.

LCH Ltd has provided the Bank with a legal opinion addressing enforceability of LCH Ltd's Rulebook and conflicts of law issues for Australia. The advice is to the effect that, subject to certain qualifications and assumptions, no matters have been identified which would indicate that an Australian court would not uphold the provisions in the LCH Ltd Rulebook and any Clearing Membership Agreement that specify the governing law to be English law, and that provide for a clearing participant to submit to the jurisdiction of English courts.

As noted in CCP Standard 1.4, LCH Ltd has provided legal analysis to the Bank and ASIC that covers its ability under Australian laws to enact its default rules as they relate to client clearing in the event of a default of an Australian clearing participant that is a SwapClear Clearing Member.

Standard 2: Governance

A central counterparty should have governance arrangements that are clear and transparent, promote the safety of the central counterparty, and support the stability of the broader financial system, other relevant public interest considerations and the objectives of relevant stakeholders.

2.1 A central counterparty should have objectives that place a high priority on the safety of the central counterparty and explicitly support the stability of the financial system and other relevant public interest considerations.

The objectives of LCH Group are publicly available on the LCH Group website.⁴⁵ LCH Group's objectives include, among other things, the management of risk and promoting a safe and stable financial market. LCH Ltd assesses its performance against its objectives at both board level and executive level through regular business, risk management and performance reviews. The LCH Ltd Board has adopted a Risk Governance Framework, setting out the risks LCH Ltd faces, its tolerances for these risks, the personnel responsible for each risk and the associated reporting requirements (CCP Standard 2.6).

LCH Ltd's governance arrangements provide for input by participants, participants' clients, and other stakeholders, in various governance bodies and consultative forums (CCP Standard 2.8). These arrangements provide for consideration by LCH Ltd of the interests of participants and other stakeholders.

2.2 A central counterparty should have documented governance arrangements that provide clear and direct lines of responsibility and accountability. These arrangements should be disclosed to owners, the Reserve Bank and other relevant authorities, participants and, at a more general level, the public.

LCH Ltd is a wholly owned subsidiary of LCH Group (CCP Standard 1.1 and Appendix B.2). There is significant coordination in the governance of LCH Group and the two active Group CCPs, LCH Ltd and LCH SA; however, the LCH Ltd Board has ultimate responsibility for LCH Ltd. The SwapClear service operates as a business unit within LCH Ltd (Appendix B.2).

The governance arrangements of LCH Ltd are documented on the LCH Group website.⁴⁶ This documentation includes the composition of the Board and board-level committees, the Schedule of Matters Reserved for the Board and the terms of reference for board-level committees. Profiles of all directors are publicly available on the LCH Group website. LCH Ltd also maintains a conflict of interest policy to identify and manage potential and actual conflicts of interest, including those between LCH Ltd and LCH Group (CCP Standard 2.9).

As set out in the Schedule of Matters Reserved for the Board, the LCH Ltd Board is responsible for the overall management of LCH Ltd and for establishing clear objectives and strategies (CCP Standard 2.3). The Board has established an Audit Committee, a Remuneration Committee and, as advisory bodies, a Risk Committee and a Technology, Security and Resilience Committee. The composition and terms of

45 See <https://www.lch.com/about-us>.

46 See <https://www.lch.com/about-us/structure-and-governance>.

reference of the committees are made available on the LCH Group website. The board-level committees represent the Board's interest in a number of areas:

- The Audit Committee is responsible for monitoring LCH Ltd's financial management, internal controls, and audit function.
- The Remuneration Committee is responsible for determining and reviewing the remuneration policy and principles.
- The Risk Committee considers and comments on LCH Ltd's risk appetite, tolerance and strategy and assists the LCH Ltd Board to fulfil its responsibility for the oversight of the risk management of LCH Ltd.
- The Technology, Security and Resilience Committee assesses LCH Ltd's management of technology, security, operational and cyber risks, and assists the LCH Ltd Board in reviewing LCH Ltd's technology, operational risk and security policies.

2.3 The roles and responsibilities of a central counterparty's board of directors (or equivalent) should be clearly specified, and there should be documented procedures for its functioning, including procedures to identify, address and manage member conflicts of interest. The board should regularly review both its overall performance and the performance of its individual board members.

The roles and responsibilities of the LCH Ltd Board are set out in the Schedule of Matters Reserved for the Board and the Articles of Association. More general procedures relating to the functioning of the LCH Ltd Board are also set out in these documents, as relevant. The LCH Ltd Board meets at least five times a year, and on an ad hoc basis as required.

Broadly, the LCH Ltd Board is responsible for:

- establishing clear objectives and strategies
- monitoring LCH Ltd's senior management
- establishing appropriate remuneration policies
- establishing and overseeing the risk management function
- overseeing the compliance and internal control functions
- ensuring compliance with legal, regulatory and contractual responsibilities
- overseeing outsourcing arrangements
- providing accountability to shareholders, employees, clearing participants, clients and other stakeholders.

Consistent with the Articles of Association and Group Conflicts of Interest Policy, Board members must disclose any actual or potential conflicts of interest. A conflicted member will be excluded from relevant parts of a Board meeting and any vote or resolution relating to a matter in which that member has a conflict of interest, and will not be entitled to receive any information relating to the matter. A majority of the independent directors, in consultation with the Ltd CCO and/or General Counsel and Head of Compliance (GCHOC), can give consent for a conflicted member to participate. Where there is a question as to whether an actual or potential conflict of interest exists, the matter will be determined by the independent directors, in consultation with the Ltd CCO and/or GCHOC.

The LCH Ltd Board undertakes an annual review of its own performance and that of its committees. The review takes the form of an annual survey of the non-executive directors and considers the effectiveness of the Board and its members, the Chair, and the Board's processes, behaviour and culture. Results of the survey are formally fed back to the Board in a minuted session. The LCH Ltd Board is not subject to mandatory independent review.

2.4 The board should comprise suitable members with the appropriate skills and incentives to fulfil its multiple roles. This typically requires the inclusion of non-executive board member(s).

As at 30 September 2018, the LCH Ltd Board has 11 directors, including: 5 independent non-executive directors (including the Chair); 1 director nominated by LSEG; 2 representatives of members; the CEOs of LCH Group and LCH Ltd; and the LCH Group CRO. The Board's Chair, who is considered to be independent, is also currently a non-executive director of the LCH Group Board. There is some overlap between the independent members of the LCH Ltd Board and the boards of LCH Group and the other LCH Group CCPs.

Appointments to the LCH Ltd Board are made by the Board, on advice from the board-level LCH Group Nomination Committee. When nominating a candidate, the Nomination Committee must be satisfied that the candidate understands the responsibilities of Board membership and will devote the necessary time to the position. The Committee must also ensure that any candidate is respected for their competence and is of good standing in their field of business.

The Nomination Committee's terms of reference set out how independent directors are appointed, including the definition of 'independence'. In particular, the Nomination Committee considers a director to be independent if the individual is independent in character and judgement, and has no relationships or circumstances (including with LSEG or any of its subsidiary undertakings and/or with any significant user or venue shareholder) that are likely to affect, or could appear to affect, the prospective director's judgement. Independent directors are interviewed by the BoE prior to appointment, and their independence and 'fitness' are reviewed by the Nomination Committee at least annually. LCH Ltd publicly discloses which of its directors it regards as independent. When making decisions on recommendations in relation to the appointment of an independent director, the Nomination Committee will take into account that ideally among the independent directors there should be:

- a breadth of industry expertise and experience and product knowledge
- particular expertise and experience in risk management, audit, clearing services and financial services
- representation of the geographical spread of the Group's business
- diversity, including gender, age, geographical provenance, and educational and professional background.

Independent directors receive a fixed fee that is determined by the Board (excluding the independent directors) and is not linked to the business performance of LCH Ltd. Fees are reviewed annually. Other directors do not receive a fee.

The Nomination Committee's terms of reference provide that independent directors should have a maximum tenure of three three-year terms. However, the term of an independent director may be extended to ensure that not all independent directors' appointments terminate at the same time.

Directors who are representatives of members (known as User Directors; CCP Standard 2.8) are appointed for one three-year term, which may be renewed. All other directors are subject to re-election every three years.

The structure, size and composition of the LCH Ltd Board are reviewed periodically by the Nomination Committee. Recommendations are made to the Board if any changes are considered necessary or desirable. It is the responsibility of the LCH Ltd Board, in consultation with Nomination Committee, to perform adequate succession planning for Board positions.

2.5 The roles and responsibilities of management should be clearly specified. A central counterparty's management should have the appropriate experience, mix of skills and integrity necessary to effectively discharge its responsibilities for the operation and risk management of the central counterparty. Compensation arrangements should be structured in such a way as to promote the soundness and effectiveness of risk management.

The LCH Ltd CEO is responsible for managing LCH Ltd and may make decisions on all matters affecting the operation, performance and strategy of LCH Ltd, with the exception of matters reserved specifically for the LCH Ltd Board. The CEO of LCH Ltd reports directly to the LCH Ltd Board.

Other key LCH Ltd senior managers with responsibility for control or finance functions – the CRO, Chief of Staff, Chief Technology Officer (CTO), Chief Financial Officer (CFO), CCO and Head of Internal Audit – can make reports directly to the board-level Audit Committee. The CRO can also make reports directly to the board-level Risk Committee. Further details on the reporting lines between senior management and the LCH Ltd Board are available in Appendix B.2.

All senior management are responsible for: ensuring consistency of LCH Ltd's activities with the objectives and strategy of LCH Ltd, as determined by the Board; designing and establishing compliance and internal control procedures that promote LCH Ltd's objectives; subjecting the internal control procedures to regular review and testing; ensuring sufficient resources are devoted to risk management and compliance; being actively involved in the risk control process; and ensuring that risks posed to LCH Ltd by its clearing activities and activities linked to clearing are addressed.

LCH Ltd has formal procedures for filling senior management positions to ensure management has the appropriate experience and mix of skills. LCH Ltd has a talent management process in place, covering talent acquisition, succession planning and key person risk assessments. Senior management are also interviewed by the BoE prior to appointment. Senior management are subject to annual performance reviews, including assessment against their objectives and core competencies.

Remuneration policies are determined by the LCH Ltd Board on recommendation from the LCH Ltd Remuneration Committee, having regard to the LCH Group Remuneration Policy. When determining remuneration policies, the Remuneration Committee terms of reference require that:

- policies are aligned with the LCH Ltd risk tolerance and corporate strategy
- members of executive management and employees of LCH Ltd are provided with the appropriate incentives to encourage enhanced performance, with a particular focus on risk management as the core purpose of LCH Ltd
- employees and members of the executive management are, in a fair and responsible manner, rewarded for their individual contributions to the success of LCH Ltd.

Under the LCH Group Remuneration Policy, remuneration for employees in control functions (Internal Audit, Risk and Compliance) is determined by the relevant division head and the LCH Ltd CEO.

Remuneration for members of the LCH Group Executive Committee in control functions who have responsibilities within LCH Ltd is subject to separate review by the LCH Ltd and LCH Group Remuneration Committees. To avoid the creation of adverse incentives, bonuses for employees in control functions are set independently of the business performance of LCH Ltd. Although the overall performance of the LCH Group may be a contributing factor in determining the total bonus pools, the primary factor in determining individual rewards for employees in these functions is the degree to which corporate competencies and specific functional objectives have been achieved.

2.6 The board should establish a clear, documented risk management framework that includes the central counterparty's risk tolerance policy, assigns responsibilities and accountability for risk decisions, and addresses decision-making in crises and emergencies. Governance arrangements should ensure that the risk management and internal control functions have sufficient authority, independence, resources and access to the board, including through the maintenance of a separate and independent internal audit function.

LCH Ltd has established a Risk Governance Framework that: identifies the universe of risks to which LCH Ltd may be exposed; provides a framework for assessing the Board's tolerance to identified risks; designates responsibility for measuring, monitoring and managing each risk type; and provides guidelines for risk reporting (CCP Standard 3). The LCH Ltd Risk Governance Framework is owned by the LCH Ltd CRO, is reviewed at least annually and is approved by the LCH Ltd Board. The LCH Ltd Risk Governance Framework is consistent with the LCH Group Risk Governance Framework, which is determined by LCH Group in coordination with the LCH Group CCPs.

The LCH Ltd Board retains overall responsibility for the establishment and oversight of risk management and crisis management at LCH Ltd. LCH Ltd Board approval is required for:

- changes to the criteria for admission to clearing membership
- risk controls designed or adapted for the clearing of any new market
- changes to the default fund sizing methodology
- changes to the default fund rules
- adoption by LCH Ltd of the LCH Group Risk Governance Framework
- adoption by LCH Ltd of the LCH Group Risk policies (Appendix B.2.2); and any significant changes to these policies, following review by and recommendation from the LCH Ltd Risk Committee
- adoption by LCH Ltd of the LCH Group Business Continuity Management Policy and the LCH Ltd IT Disaster Recovery Plan.

LCH Ltd contributes to the development and revision of all LCH Group policies. The LCH Ltd Board can reject or amend a policy change proposed by LCH Group.

The LCH Ltd Board has established a board-level Risk Committee, responsible for considering and commenting on all aspects of LCH Ltd's risk appetite, tolerance and strategy. The LCH Ltd Risk Committee receives advice, recommendations and updates from LCH Ltd's ERCo relating to risk policies and methodologies subject to the LCH Ltd ERCo's oversight and review. The LCH Ltd Risk Committee also reviews, on an annual basis (or more frequently if deemed necessary), LCH Ltd policies and considers changes to existing and new arrangements. Recommendations made by the LCH Ltd Risk Committee are taken to the LCH Ltd Board for approval and any major decisions are disclosed to relevant stakeholders and, where there is a broad market impact, the public. Any decision in which the

Board has rejected a recommendation of, or superseded an action by, the Risk Committee, must be notified to relevant regulatory authorities within five days of the Board meeting.

The LCH Ltd Risk Committee currently has seven voting members. The Committee's terms of reference require the Chair to be an independent director. There is an additional independent director, and the remaining five voting members are representatives of clearing participants and clients of clearing participants. Other individuals, such as senior LCH Ltd, LCH Group and LSEG risk personnel, and risk experts representing participants may also be invited to attend meetings of the LCH Ltd Risk Committee in a non-voting capacity. LCH Ltd's Risk Committee currently has six non-voting risk expert members from clearing participants. Voting rights are rotated periodically (at least once a year) among the clearing participant representatives. It is the responsibility of the Chair, Vice Chair and Secretary of the LCH Ltd Risk Committee to ensure that the Committee has a suitable range of expertise to consider and evaluate the risk matters placed before it. The LCH Ltd Risk Committee meets at least six times a year, and typically does so more frequently.

The LCH Ltd CRO is responsible for the management and control of risks within LCH Ltd, and has the authority to develop and implement LCH Ltd's risk framework in accordance with Board-approved risk policies and the Board's risk appetite. The LCH Ltd CRO reports directly to the LCH Ltd CEO and makes reports to the LCH Ltd Risk Committee and Board as necessary. The LCH Ltd CRO works in conjunction with the Group Head of Credit Risk, the Group Head of Market and Liquidity Risk and the Group Head of Risk Resilience to manage the risk appetite of LCH Ltd and ensure appropriate risk policies are defined, established and developed. The risk management teams located within each service typically have responsibility for the implementation of these policies (Appendix B.2).

LCH Ltd has governance arrangements in place that address decision-making in crises and emergencies, including through the establishment of a Crisis Management Team (CMT) and a Default Crisis Management Team (DCMT). Each works according to established plans and procedures, which seek to ensure that the response to and management of a crisis or default is effective and to minimise the impact on employees and participants (CCP Standard 12.1 and CCP Standard 16.7).

The Head of Internal Audit is responsible for providing objective and independent assurances to the LCH Ltd Board on the effectiveness of risk management arrangements and activities across LCH Ltd (CCP Standard 2.7). The Head of Internal Audit reports directly to the Chair of the LCH Ltd Audit Committee on functional matters and to the Chair of the Ltd Board for administrative matters. To ensure that risk management personnel have sufficient independence, remuneration of key control functions, such as internal audit, risk and compliance, is not linked to the business performance of LCH Ltd (CCP Standard 2.5).

The LCH Ltd Board is responsible for setting the standards for LCH Ltd's management of procyclicality. The LCH Group Procyclicality Policy outlines how LCH Ltd assesses and limits destabilising, procyclical changes in the quantity of financial resources collected from participants. The policy describes the potential sources of procyclicality at LCH Ltd: initial margin and margin add-ons; default fund contributions; collateral haircuts; ICS multipliers; and unfunded financial resources in the event of a default (CCP Standards 4, 5, and 6).

Model validation

The LCH Group Model Governance, Validation and Review Policy defines the governance arrangements around the adoption, use, change and validation of models by LCH Ltd. It applies to margin models, models used for pricing financial products guaranteed by LCH Ltd or received as collateral, and models

used for assigning ICSs (CCP Standards 4, 5 and 6). The policy is reviewed by the LCH Ltd ERCo, and approved by the LCH Ltd Risk Committee and Board annually.

The model validation governance process varies depending on the importance of the model and type of change. The exact process applied to a particular model or change in model will include some combination of: peer review by quantitative experts through the Model Working Group; clearing participation consultation; review by the Financial Risk Working Group; independent validation of the model; approval by the LCH Ltd ERCo; review by the LCH Ltd Risk Committee; approval by the Board; and review and/or approval by the regulators, if necessary. When adopting a new model or making a material change to an existing model, the model must be reviewed by the Independent Model Validation team, which is a team within LCH Group that is not involved in building or testing the model. This team reports directly to the Group CRO and is independent of the first-line Risk teams responsible for developing and maintaining the margin, stress testing and collateral haircut models. The policy also allows for model validation by an external party. LCH Ltd engages external parties to validate the models for which the second-line Risk teams are responsible, such as the credit scoring and liquidity risk models.

Model validations cover at least the following aspects: the information provided by the model developer; the procedures for the monitoring of model performance, parameters and assumptions; and an analysis of the risks that are not covered by the model but are included in stress testing. The LCH Group Financial Resource Adequacy Policy specifies additional requirements for the validation of margin models. All models covered by the policy must be validated at least annually.

2.7 A central counterparty's operations, risk management processes, internal control mechanisms and accounts should be subject to internal audit and, where appropriate, periodic external independent expert review. Internal audits should be performed, at a minimum, on an annual basis. The outcome of internal audits and external reviews should be notified to the Reserve Bank and other relevant authorities.

Internal audits are performed by the LCH Ltd Internal Audit department. The core objective of the Internal Audit function is to assist management and the LCH Ltd Audit Committee to evaluate policies, control standards and associated procedures designed to manage business risk. Guidelines and principles that apply to internal audit are set out in the LCH Ltd Internal Audit Charter.

The Internal Audit department prepares an annual audit plan, which sets out the timing and frequency of audits each year. The audit plan is confirmed by the LCH Ltd Audit Committee. The frequency of internal audits is determined through risk assessments, with higher risk areas subject to more frequent audits. The Internal Audit department aims to meet professional standards and benchmarks against the Institute of Internal Auditors' *International Standards for the Professional Practice of Internal Auditing*.

To preserve its independence and objectivity, Internal Audit is independent from LCH Ltd's business processes and it does not assume direct operating responsibilities within LCH Ltd, including the design or implementation of controls. Internally recruited auditors do not audit activities or functions they have performed in the recent past. The Internal Audit function has direct access to the LCH Ltd Board and Audit Committee. The Head of Internal Audit reports directly to the Chair of the Audit Committee on functional matters and to the Chair of the Ltd Board for administrative matters. The Chair of the Ltd Board has delegated the regular administrative responsibility for Internal Audit to the LCH Ltd CEO. The adequacy of the resourcing of the Internal Audit function is reviewed and monitored by the Audit Committee each year, following the finalisation of the internal audit plan.

As discussed in CCP Standard 2.2, the LCH Ltd Board has established a board-level Audit Committee. The LCH Ltd Audit Committee is responsible for determining whether management has put in place adequate internal control systems that provide reasonable assurance that corporate objectives will be achieved and that LCH Ltd complies with applicable regulatory requirements. The discussions, decisions and recommendations of the Committee are reported to the LCH Ltd Board, which is responsible for deciding on an appropriate policy response.

The Audit Committee is also responsible for monitoring the quality and effectiveness of the Internal Audit department. In addition to ongoing review by the Audit Committee, an external review of LCH Ltd's Internal Audit function is conducted at least every five years. The most recent external review was presented to the Audit Committee in July 2015. LCH Ltd's Internal Audit function received the highest available rating, indicating that it generally conformed to the *International Standards for the Professional Practice of Internal Auditing*.

LCH Ltd commissions an external audit for its annual financial statements. External reviews may be initiated where internal audit processes or internal controls identify potential areas of weakness that require additional external scrutiny and analysis.

2.8 Governance arrangements should ensure that the central counterparty's design, rules, overall strategy and major decisions reflect appropriately the legitimate interests of its direct and indirect participants and other relevant stakeholders. Governance arrangements should provide for consultation and stakeholder engagement through appropriate forums on operational arrangements, risk controls and default management rules and procedures. Major decisions should be clearly disclosed to relevant stakeholders and, where there is a broad market impact, the public.

The LCH Ltd Board includes representatives of participants, exchanges, trading venues and other stakeholders (CCP Standard 2.4). The terms of reference of the LCH Group Nomination Committee require that the LCH Ltd Board has two directors who are associated with or connected to shareholders other than venue shareholders (User Directors), and up to two directors associated with or connected to shareholders that are exchanges, trading venues, multilateral trading facilities, alternative trading systems or similar (Venue Directors). LSEG recommends or approves the nominations of Venue Directors for so long as it holds a significant interest in LCH Group. If LSEG considers that there are insufficient venue shareholders to appoint a Venue Director, it can recommend or approve a Venue Replacement Independent Director instead. LSEG currently has representation on the Board.

Direct and indirect participants are represented on most of LCH Ltd's board-level committees, and on the LCH Ltd Risk Committee in both a voting and non-voting capacity (CCP Standard 2.6). LCH Ltd also has a number of product advisory groups that represent users of particular clearing services. These groups are consulted on potential changes to the relevant services.

LCH Ltd has an agreement in place with a group of 14 of the largest global banks for these banks to provide expertise, financial resources and strategic direction to LCH Ltd's SwapClear service (the SwapClear banks).⁴⁷

47 The SwapClear banks are as follows: Bank of America Merrill Lynch International Limited, Barclays Bank plc, BNP Paribas, Citigroup Global Markets Limited, Credit Suisse AG (acting through its Guernsey Branch), DB UK Holdings Limited, The Goldman Sachs Group Inc., HSBC Bank plc, J.P. Morgan Financial Investments Limited, Merrill Lynch International, Morgan Stanley Fixed Income Ventures Inc., Nomura European Investment Limited, The Royal Bank of Scotland plc, Société Générale and UBS AG (acting through its London Branch).

LCH Ltd must also consult with the SwapClear banks prior to LCH Ltd implementing material changes in certain pre-agreed areas. The agreement also provides for revenue sharing with the SwapClear banks. The terms of the agreement between LCH Ltd and the SwapClear banks are summarised on LCH Group's website.⁴⁸

LCH Ltd has established an Australian Member User Group for Australian direct clearing participants. The group provides a formal structure for LCH Ltd to seek input from Australian clearing participants of the SwapClear service on proposed changes to policy and risk management procedures and to provide timely updates on material changes. It also provides an opportunity for Australian participants to propose to LCH Ltd policy changes that they believe should be developed or prioritised. The Australian Member User Group holds face-to-face meetings on a roughly quarterly basis.

LCH Ltd consults with its participants about material changes to the SwapClear rules, such as rules around default management, and discloses major decisions, such as senior management appointments and changes to operating rules, to participants, regulators and other stakeholders through member circulars and pre-press release notifications. Announcements are disclosed to the public through press releases and published on the LCH Group website and social media.

LCH Ltd has also established arrangements to facilitate engagement with the banks that participate in its PPS. LCH Ltd holds separate Australian, UK and US PPS Working Group meetings on a periodic basis with its PPS banks to consult on topics including new initiatives and any potential associated issues.

2.9 A central counterparty that is part of a group of companies should ensure that measures are in place such that decisions taken in accordance with its obligations as a central counterparty cannot be compromised by the group structure or by board members also being members of the board of other entities in the same group. In particular, such a central counterparty should consider specific procedures for preventing and managing conflicts of interest, including with respect to intragroup outsourcing arrangements.

LCH Ltd is a wholly owned subsidiary of LCH Group, and as at the end of September 2018, LCH Group is 68 per cent owned by LSEG (CCP Standard 1.1 and Appendix B.2). LSEG directors sit on the LCH Group and LCH Ltd Boards. LSEG also owns trading platforms for which LCH Ltd provides a clearing service. LSEG's BSL provides shared technology and support services across all LSEG entities, including LCH Ltd.

To manage potential conflicts of interest, LCH Group and LSEG have agreed that any dealings between any LCH Group company and LSEG company will be conducted at arm's length on commercial terms and will be subject to prior approval of the LCH Group Board's independent directors. In addition, LSEG-appointed directors are unable to vote on any such dealings. With the exception of these matters, LSEG-appointed members of the LCH Ltd Board may attend and vote at all Board meetings. Special conflict rules apply to LSEG-appointed directors that permit them to be members of the LCH Ltd Board, notwithstanding their association with LSEG. Where there is a question as to whether an actual or potential conflict of interest exists, the matter would be determined by the independent directors, in consultation with the CCO and/or GCHOC (CCP Standard 2.3).

LCH Ltd seeks to comply with the LCH Group Conflicts of Interest Policy, which sets out the methods for identifying and managing potential and actual conflicts of interest, including those between LCH Ltd and its stakeholders. The policy requires all its employees to declare, upon joining and then annually, any potential or actual conflicts of interest. The Compliance department maintains a conflict of interest register that is updated when a potential or actual material conflict is reported, and is reviewed every

48 See <https://www.lch.com/sites/default/files/media/files/Governance%20Arrangements.pdf>.

quarter. LCH Ltd may take actions including avoidance measures or information barriers to avoid or mitigate potential or actual conflicts of interest. Conflicts that LCH Ltd cannot sufficiently avoid or mitigate are disclosed to the affected parties.

LCH Group has one other wholly owned subsidiary that actively operates central clearing services: LCH SA. It also has a US CCP subsidiary, LCH LLC, which holds a CFTC DCO licence. The CCPs are legally separate entities, each with separate financial resources (CCP Standard 1.1 and Appendix B.2). Although separate legal entities, LCH Ltd and LCH SA share some operational resources, including staff (CCP Standard 16.4). LCH Ltd and LCH SA have governance committees that routinely sit together, to facilitate cooperation and coordination and reduce repetition (Appendix B.2).

LCH Ltd has a formal governance structure that is independent of LCH Group and the other CCPs. However, many of the LCH Ltd board-level and executive-level committees have overlapping membership and routinely sit together (Appendix B.2). As at 30 September 2018, 4 of the 15 LCH Group Board members also sit on the LCH Ltd Board.

LCH Ltd does not consider that the group structure creates material conflicts in the management of risks and the fulfilment of LCH Ltd's regulatory and other obligations, particularly since the LCH Ltd Board retains ultimate responsibility for LCH Ltd. 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. In addition, where there is overlap in the responsibility of the LCH Ltd CEO and LCH Group senior management, the authority of the LCH Ltd CEO is not superseded by the authority of LCH Group senior management. The LCH Ltd CEO is the first point of escalation in the event of a potential conflict of interest between LCH Ltd and LCH Group. The Articles of Association permit directors of LCH Ltd to act as directors notwithstanding that they are on the board of another LCH Group entity. Were an actual or potential conflict to arise in relation to a director's role on the LCH Group Board and the LCH Ltd Board, the conflicted member would be excluded from the relevant part of the board meeting unless a majority of the independent directors, in consultation with the CCO and/or GCHOC, gave their prior consent (See CCP Standard 2.3).

Standard 3: Framework for the comprehensive management of risks

A central counterparty should have a sound risk management framework for comprehensively managing legal, credit, liquidity, operational and other risks.

3.1 A central counterparty should have risk management policies, procedures and systems that enable it to identify, measure, monitor and manage the range of risks that arise in or are borne by the central counterparty. This risk management framework should be subject to periodic review.

Identification of risks

LCH Group, in coordination with the LCH Group CCPs, has established a LCH Group Risk Governance Framework that the LCH Group Board expects to be followed across the Group CCPs. The LCH Ltd Risk Governance Framework implements the LCH Group Risk Governance Framework within LCH Ltd. All LCH Group Risk policies must be approved by the LCH Ltd Board in order to be applicable to LCH Ltd (CCP Standard 2.6).

The LCH Ltd Risk Governance Framework aims to comprehensively identify the risks to which LCH Ltd is potentially exposed, including those relating to the SwapClear service. The LCH Ltd Risk Governance

Framework divides risks into a number of categories: financial; operational; settlement, payment and custody; legal, regulatory and compliance; management; and corporate. Many of these categories have also been further divided into specifically identified risks (CCP Standard 14.1 for some additional detail).

Comprehensive risk policies, procedures and controls

The LCH Ltd Risk Governance Framework outlines: the risks faced by the CCP; the overall risk appetite of the CCP; the Board's tolerance and expected minimum standards for each type of risk; roles and responsibilities for measuring, monitoring and addressing each type of risk; and the Board's expectations as to what arrangements need to be in place for a recovery plan. The LCH Ltd Board reviews the LCH Ltd Risk Governance Framework and the compliance of the CCP with the LCH Ltd Board's minimum standards (using a self-assessment produced by the CRO) as part of the quarterly enterprise risk management reporting. LCH Ltd's stated risk appetite is broadly described as 'low'.

The standards in the LCH Ltd Risk Governance Framework are implemented through LCH Group policies, which are adopted and are annually reviewed by the LCH Ltd Board. These policies address risks including: model risk (CCP Standard 2.6); counterparty credit and default management risk (CCP Standard 4); general market risk, and participant-specific sovereign, wrong-way and concentration risk (CCP Standards 5 and 6); liquidity risk (CCP Standard 7); settlement, payment and custody risk (CCP Standards 9 and 15); investment risk (CCP Standard 15); and operational risk (CCP Standard 16).

The LCH Ltd Risk Governance Framework assigns specific responsibilities within LCH Ltd, including to the: LCH Ltd CEO, CRO, CFO, Chief Operating Officer (COO) and Chief Information Officer; LCH Ltd Risk Committee; LCH Ltd Audit Committee; heads of the LCH Ltd services and various business support functions. As discussed in CCP Standard 2, the LCH Ltd CEO has broad responsibility for the management of LCH Ltd; the Risk Governance Framework also assigns specific responsibility to the LCH Ltd CEO for managing strategic and reputational risk. The heads of the LCH Ltd services are responsible for ensuring compliance with the LCH Ltd Board's stated risk standards within their service lines at all times, with support functions held accountable for their performance within each service.

A number of internal boards, committees and groups are involved in overseeing the management of risk at LCH Ltd, including the:

- *LCH Ltd Board.* As noted above, the Board is ultimately responsible for the establishment and oversight of risk management at LCH Ltd, including setting risk tolerances and expected minimum standards (CCP Standard 2.6).
- *LCH Ltd Risk Committee.* The Risk Committee is a board sub-committee which reviews all risk policies prior to recommending approval by the Board, considers and comments on LCH Ltd's risk appetite, tolerance and strategy, and assists the Board in fulfilling its risk management responsibilities (CCP Standard 2.6).
- *LCH Ltd Audit Committee.* The Audit Committee is a board sub-committee responsible for assessing the adequacy of internal controls, auditing the application of risk policies and providing compliance updates to the Board (CCP Standard 2.7).
- *LCH Ltd Technology, Security and Resilience Committee.* The Technology, Security and Resilience Committee is a board sub-committee that assesses LCH Ltd's management of technology, security, operational and cyber risks, and assists the LCH Ltd Board in reviewing LCH Ltd's technology, operational risk and security policies (CCP Standard 16).

- *LCH Ltd Local Management Committee.* The LCH Ltd LMC provides support and advice to the LCH Ltd Board on risk and operational matters, among others (Appendix B.2). The LMC also provides direction and oversight to the LCH Ltd ERCo. The LCH Ltd LMC sits independently from the LMCs of the LCH SA and SwapAgent.
- *LCH Ltd Executive Risk Committee.* The LCH Ltd ERCo, in conjunction with the ERCos of LCH SA and SwapAgent, is responsible for the management, monitoring and oversight of all material risks faced by LCH Ltd, LCH SA and SwapAgent. The LCH Ltd ERCo reports directly to the LCH Ltd Risk Committee and, via the CRO, provides regular updates on its activities to the LCH Ltd LMC (Appendix B.2).
- *LCH Ltd Default Crisis Management Team.* The LCH Ltd DCMT will be convened by the LCH Ltd CEO (or authorised delegate) in the event of the default of a clearing participant and will be responsible for the overall management of the default, including supervision of the service-level DMGs.
- *LCH Ltd Default Management Groups.* LCH Ltd maintains a DMG for each of its clearing services; the Rates service DMG is responsible for both the SwapClear and Listed Rates services. The DMGs, within constraints set by the DCMT, would oversee the default management process as it relates to their services. Membership of the Rates service DMG includes the SwapClear Head of Business Risk and traders seconded from clearing participants (CCP Standard 12.1).

LCH Ltd's Risk Governance Framework sets out an enterprise risk management framework for measuring, monitoring and addressing the risks identified against the Board's expected minimum standards. The LCH Ltd CRO is responsible for ensuring the appropriate frameworks are in place to measure and monitor the risks identified, and that aggregated periodic reports assessing LCH Ltd against these standards are carried out with the findings reported quarterly to the Board. The Risk Governance Framework provides guidelines on the minimum information to be included in these reports for each of the specific risks identified in the Framework.

LCH Ltd shares details of its risk management framework and associated policies with the Bank.

Information and control systems

LCH Ltd has established systems to obtain information to measure and monitor its exposures across the risks identified in the LCH Ltd Risk Governance Framework. Key information systems include:

- *Counterparty credit risk.* The LCH Group Credit team monitors inputs to counterparties' ICS assessments daily where applicable, and as soon as possible when new information becomes available (CCP Standard 4.2).
- *Default fund sizing.* LCH Ltd obtains market data to enable calculation of the core default fund size, as well as any monthly or daily DFAM (CCP Standard 4.4).
- *Margining.* SwapClear uses the PAIRS model to set initial margin requirements (CCP Standard 6). LCH Ltd obtains market data at multiple times intraday in order to calculate both initial and variation margin requirements. LCH Ltd also obtains information used to measure and calculate counterparty risk multiplier, liquidity (concentration) add-on and basis risk add-on margin requirements.
- *Liquidity assessments.* LCH Ltd runs liquidity assessments for intraday, end-of-day, forward-looking and stressed scenarios (CCP Standard 7).

LCH Ltd also seeks to monitor its aggregate exposures to individual and related counterparties across activities. LCH Ltd applies limits to exposures to clearing participants arising from both clearing and investment activities (CCP Standard 15), and to commercial concentration banks arising from both concentration and investment activities (CCP Standard 9.3).

SwapClear provides clearing participants with a tool to estimate initial margin requirements for both their own and their clients' positions (CCP Standard 6).

Internal controls

The LCH Ltd Risk Governance Framework lists a set of performance indicators that should be used to monitor the effectiveness of each aspect of the risk management framework. These indicators include: backtesting of initial margins, counterparty credit scores, and default fund sizing to meet the cover two requirement (CCP Standards 4 and 6); aggregate exposure measures (above); liquidity ratios (CCP Standard 7); and operational risk assessments (CCP Standard 16). These indicators are included in the CRO's presentations to the LCH Ltd Board regarding compliance with LCH Ltd's enterprise risk management framework.

As noted above, the LCH Ltd Board reviews the LCH Ltd Risk Governance Framework annually. More detailed risk policies and procedures are also formally reviewed annually, or more frequently where required. Methodologies for the calculation of key risk parameters, including margin levels (CCP Standard 6.7), stress testing (CCP Standard 4.5), collateral haircuts (CCP Standard 5.3) and liquidity arrangements (CCP Standard 7.1), are independently validated at least annually.

The LCH Ltd Risk Committee is responsible for reviewing that the application of risk policies is consistent with the LCH Ltd Board's expected standards as set out in LCH Ltd's Risk Governance Framework. LCH Ltd's Internal Audit department is responsible for providing independent internal reviews of the effectiveness of LCH Ltd's risk management arrangements, and has direct access to the LCH Ltd Board and Audit Committee. LCH Ltd's operations and controls are also subject to a program of internal reviews and topic-specific external reviews (CCP Standard 2.7).

3.2 A central counterparty should ensure that financial and other obligations imposed on participants under its risk management framework are proportional to the scale and nature of individual participants' activities.

LCH Ltd imposes financial obligations on SwapClear clearing participants primarily in the form of margin requirements and prefunded and promissory default resources. Above minimum standards or requirements, these obligations are proportional to the scale and nature of a participant's activities.

Initial margin requirements for clearing participants in the SwapClear service are calculated using the PAIRS methodology, and are a function of the size, volatility and correlations of a participant's cleared positions (CCP Standard 6.3). Additional margin can be called from a participant if its positions become more concentrated or illiquid, or are deemed to be riskier in some way (CCP Standard 6.1).

Prefunded default fund contributions are called from participants in proportion to their initial margin requirements (for their house positions, but not client positions), and therefore in proportion to the scale and nature of their activities (CCP Standard 4.4). Prefunded default fund contributions are subject to a minimum contribution of £10 million per clearing participant for SwapClear. DFAM is called on participants with STLOIM that exceed thresholds based on the participant's creditworthiness. Consequently, participants that bring more risk to the CCP collateralise more of that risk themselves.

Both Unfunded Contributions (that would meet uncovered losses if the default fund was depleted) and Supplementary Contributions (that would replenish the default fund once the Rates service default management process had been completed) are based on participants' contributions to the default fund, and are therefore proportional to the scale of their activities (CCP Standard 4.8). The allocation of both Prefunded and any Unfunded Contributions to currency- and product-specific Auction Incentive Pools in the Rates service default management process is based on each participant's market risk for each currency and product in the defaulting participant's portfolio (CCP Standard 12.1). As a result, participants that do not clear certain currencies or products (for example, inflation swaps) are less likely to have exposures to losses on these positions. In the event that uncovered credit losses exceeded both Prefunded and Unfunded Contributions, VMGH could be used (CCP Standard 4.8). A clearing participant's potential obligations under VMGH are related to the size and nature of its positions that are in the money.

All SwapClear clearing participants must meet certain operational requirements and standards in order to be a clearing member (CCP Standards 16.6 and 17.2). However, where relevant and practicable, some operational requirements are tied to the scope of a clearing participant's activities – for example, the requirement to participate in default management fire drills is limited to the products and currencies in which the participant is actively clearing (CCP Standard 12.4).

3.3 A central counterparty should provide incentives to participants and, where relevant, their customers to manage and contain the risks they pose to the central counterparty.

SwapClear's methodologies for calculating margin requirements and default fund contributions create incentives for participants to manage and contain the risks they pose to LCH Ltd. As discussed in CCP Standard 3.2, financial obligations imposed on SwapClear clearing participants are generally proportional to the risk the participants and their clients pose to the CCP. This serves as an incentive for clearing participants and their clients to limit such risks. LCH Ltd also has the ability to call additional margin if it considers there are additional risks not captured by its initial margin model, which incentivises the control of these risks by its clearing participants.

3.4 A central counterparty should regularly review the material risks it bears from and poses to other entities (such as other FMIs, money settlement agents, liquidity providers and service providers) as a result of interdependencies, and develop appropriate risk management tools to address these risks.

LCH Ltd regularly reviews the legal (CCP Standard 1), credit (CCP Standard 4), liquidity (CCP Standard 7), general business (CCP Standard 14), custody and investment (CCP Standard 15) and operational risks (CCP Standard 16) that it is exposed to due to interdependencies with other entities, and has policies and procedures to address such risks. LCH Group policies on settlement, payment and custody risk, counterparty credit risk, liquidity risk and operational risk, among others, are reviewed annually by the LCH Ltd Board. Specific risk management tools are used by LCH Ltd to manage the risk from intermediaries, such as investment counterparties, custodians, PPS and concentration banks, and CSDs. These tools include: assigning and reviewing internal credit scores (CCP Standard 4.2); at least biennial operational and legal due diligence; and monitoring of operational performance on an ongoing basis (CCP Standards 9.3, 15.2 and 19).

LCH Ltd has also established business continuity plans to allow for recovery and resumption of critical services. These plans are outlined in the LSEG Business Continuity Management Policy (CCP Standard 16.7 for details). All LCH Ltd's critical outsourced service providers are required to

implement business continuity arrangements equivalent to those of LCH Ltd (CCP Standards 16.5 and 16.9). LCH Ltd has also established a Recovery Plan and a Wind-down Plan (CCP Standard 3.5).

LCH Ltd considers that, by managing the risks posed to its solvency and operation, it limits the risks it poses to other entities and financial markets.

3.5 A central counterparty should identify scenarios that may potentially prevent it from being able to provide its critical operations and services as a going concern and assess the effectiveness of a full range of options for recovery or orderly wind-down. A central counterparty should prepare appropriate plans for its recovery or orderly wind-down based on the results of that assessment. Where applicable, a central counterparty should also provide relevant authorities with the information needed for purposes of resolution planning.

LCH Ltd's Recovery and Wind-down Plans respectively set out how LCH Ltd would continue or cease its operations if it suffered extreme losses. Both plans have been designed to apply across all of LCH Ltd's services, although individual services could be wound down while other services continued operating.

The Recovery Plan identifies the circumstances in which it would be triggered and the recovery tools that would be available. Among other things, the triggers include:

- the use of CCP dedicated resources (skin in the game; CCP Standards 4.8 and 12.1)
- actual or expected treasury investment losses that are greater than €15 million and threaten LCH Ltd's solvency (CCP Standard 14.3)
- operational or general business risk losses that were forecast to reduce LCH Ltd's capital below 110 per cent of the regulatory minimum (CCP Standard 14.2)
- liquidity shortfalls that result in an actual or forecast breach of the 100 per cent liquidity coverage ratio (LCR) level.

A breach of any of the triggers outlined in the Recovery Plan would result in notification to the LCH Ltd LMC (see Appendix B.2 for more details on the LMC). The LMC would review the trigger, consult with the BoE and make a recommendation to the LCH Ltd Board regarding whether to trigger the Recovery Plan. The LCH Ltd Board has ultimate responsibility for deciding whether to invoke the Recovery Plan.

LCH Ltd is confident that its recovery tools possess the desirable characteristics outlined in the CPMI-IOSCO Recovery Guidance. That is, they are: comprehensive, effective and transparent; provide appropriate incentives; and minimise negative impacts on participants and markets. Recovery tools used to allocate uncovered credit losses or liquidity shortfalls arising from a participant default scenario, as well as allocation of treasury investment losses, have been tested in the past as part of annual fire drills (CCP Standard 12.4). In addition, LCH Ltd carries out regular internal testing of recovery tools to ensure staff are familiar with the tools and processes, and to identify potential improvements. Other non-default loss tools such as insurance and allocated capital resources are reviewed through annual renewal cycles and monthly capital reporting, respectively. As part of its Recovery Plan, LCH Ltd has a capital raising strategy in place that it would follow in the event that it needed to replenish its capital (CCP Standard 14.5). LCH Ltd also has rules and procedures in place to replenish the Rates default fund once the default management process is complete (CCP Standard 4.8).

The Wind-down Plan sets out how LCH Ltd would cease its operations in the event of the default of several clearing participants, a non-clearing-participant-default loss, or a decision to wind-down voluntarily. The plan includes detailed estimates of how LCH Ltd would shut down its operations and

how long this would take, which affects the amount of capital that must be set aside for this purpose (CCP Standard 14.3).

The decision to wind-down LCH Ltd would ultimately be made by the LCH Ltd Board, although a number of bodies would be consulted, such as shareholders, the LCH Group Board and regulators. With respect to regulators, LCH Ltd would primarily consult with the BoE; in turn, it would be expected that the BoE would be involved in discussions with regulators in other jurisdictions (including the Bank), either bilaterally and/or through the EMIR and Global Colleges.

Since LCH Ltd is a UK-based CS facility, any crisis management actions would be led by the UK resolution authority, the BoE. In the event that LCH Ltd was entered into resolution, the BoE would have the ability to exercise its resolution tools under the UK *Banking Act 2009*. The BoE has established a CMG for LCH Ltd, of which the Bank is a member. The role of the CMG is to discuss and facilitate development of the resolution plan for LCH Ltd, taking into account the cross-border nature of LCH Ltd's business. This work will cover, among other things, clarification of the information that regulators would require from LCH Ltd for the purposes of resolution planning.

Standard 4: Credit risk

A central counterparty should effectively measure, monitor and manage its credit exposures to participants and those arising from its clearing processes. A central counterparty should maintain sufficient financial resources to cover its credit exposure to each participant fully with a high degree of confidence.

4.1 A central counterparty should establish a robust framework to manage its credit exposures to its participants and the credit risks arising from its clearing processes. Credit exposures may arise from current exposures, potential future exposures, or both.

LCH Ltd maintains a comprehensive framework for managing credit exposures to its participants, which applies to all services, including SwapClear. This framework comprises a stress testing regime (CCP Standards 4.5-4.7); the use of variation margin to mark positions to market (CCP Standard 6); and the maintenance of prefunded financial resources. These financial resources comprise initial margin and additional margin (CCP Standard 6), and a pool of prefunded mutualised resources (CCP Standard 4.4). LCH Ltd also has rules and procedures that set out how LCH Ltd would address any uncovered credit losses it may face as a result of a clearing participant default (CCP Standard 4.8).

To mitigate the credit risk arising from the reinvestment of financial resources received in cash, LCH Ltd maintains an investment risk policy (CCP Standard 15.4).

4.2 A central counterparty should identify sources of credit risk, routinely measure and monitor credit exposures, and use appropriate risk management tools to control these risks. To assist in this process, a central counterparty should ensure it has the capacity to calculate exposures to participants on a timely basis as required, and to receive and review timely and accurate information on participants' credit standing.

LCH Ltd's Risk Governance Framework identifies the universe of risks to which the CCP can potentially be exposed. The Framework identifies a number of sources of credit risk relating to:

- clearing participants (see the remainder of CCP Standard 4)
- PPS banks and concentration banks (CCP Standard 9)

- custodians (CCP Standard 15)
- investment counterparties and issuers of securities held by LCH Ltd as investments (CCP Standard 15).

The Credit team is responsible for managing and monitoring credit risk across LCH Group, including credit risk from clearing participants. Any decision that the Credit team views as having a material impact on risk is escalated to the LCH Ltd ERCo. For prospective clearing participants, the Credit team prepares a credit risk assessment and assign an ICS, which is approved by the LCH Ltd ERCo. LCH Ltd's Rulebook sets out a variety of participation requirements (CCP Standard 17).

The Credit team is responsible for assigning an ICS to each current or prospective clearing participant, sovereign or other counterparty, which range from 1 (highly creditworthy) to 10 (currently defaulting). To assign an ICS, the Credit team analyses the counterparty's financial ratios and operational capability. The inputs vary depending on the type of counterparty (corporate, sovereign or interoperating CCP). In addition to the ICS factors, each counterparty's ICS is formally reviewed at least once a year, and clearing participants and other counterparties with an ICS worse than a predefined threshold are reviewed at least once every six months. The review is approved by the Head of Counterparty Risk, then notified to ERCo. If the review recommends a change to the ICS, it is approved by ERCo.

The LCH Group Counterparty Credit Risk Policy sets out the process for monitoring the credit standing of clearing participants (including the ICS methodology) across the LCH Group CCPs, including LCH Ltd.⁴⁹ The Credit team conducts ongoing monitoring of ICS factors, external ratings, market-implied ratings, share prices and other information that may impact the credit worthiness of the counterparty. Any breaches of exposure limits, areas of concern (including 'watch list' members; CCP Standard 4.3) and action being taken which could also have an impact on the ICS are sent to senior management in a daily report. The Credit team may recommend that the CRO approve an ICS change with immediate effect as a result of such information. Should a clearing participant's ICS deteriorate to a certain level, additional margin will be called. The participant would then be subject to additional monitoring, including regular reporting on the participant to senior management.

SwapClear uses several tools to control its exposures to clearing participants, including: variation margin, initial margin, and various types of additional margin (CCP Standard 6); prefunded mutualised resources (CCP Standard 4.4); and rules for allocating uncovered credit losses (CCP Standard 4.8).

The Rates service Risk team monitors LCH Ltd's credit exposures to clearing participants in the SwapClear and Listed Rates services. Additionally, the LCH Group Market Risk team is responsible for the day-to-day monitoring and reporting of LCH Ltd's credit exposures to clearing participants across all services.

LCH Ltd monitors its current exposure and potential future exposure to each house and client account on a timely basis. Variation margin, which measures current exposure, and initial margin, which measures potential future exposure, are recalculated at three scheduled times per day, and at the end of the day (CCP Standard 6). Additionally, SwapClear recalculates initial margin each time a participant submits a trade, to reflect the change in the participant's position (CCP Standard 6.4).

The Credit team monitors a number of credit-risk-related limits:

⁴⁹ The Group Counterparty Credit Risk Policy also sets out standards for monitoring the credit risk of other counterparties, such as issuers of collateral (CCP Standard 5) and investment counterparties (CCP Standard 15).

- ratio of a participant's stress test losses to additional margin plus default fund contribution to net capital
- ratio of a participant's initial margin to its net capital, which participants must keep below the limit specified for its ICS.

In the event these limits are breached, the Credit team will direct the service to call additional margin (CCP Standard 4.3).

In the course of its monitoring of credit exposures, LCH Ltd may identify a risk not appropriately captured by its existing margin models. To cover this risk, LCH Ltd may at its discretion call additional margin not described in its policies (CCP Standard 6.1).

4.3 A central counterparty should have the authority to impose activity restrictions or additional credit risk controls on a participant in situations where the central counterparty determines that the participant's credit standing may be in doubt.

As discussed in CCP Standard 4.2, the Credit team monitors the inputs into each clearing participant's ICS and other indicators of their creditworthiness. If the Credit team had concerns about a participant, it would report the issue to ERCo, who would decide whether to amend the participant's ICS, which could result in the following:

- Tightening the credit-risk-related limits, as described in the Group Counterparty Credit Risk Policy (CCP Standard 4.2). For example, the participant's maximum permitted ratio of its initial margin to its net capital may decrease.
- Applying higher margin requirements, as described in various LCH Ltd policies. For example, the participant may be called for counterparty risk multiplier margin (CCP Standard 6.1) or required to collateralise its entire STLOIM with daily DFAM (CCP Standard 4.7); or LCH Ltd may reduce the participant's RTTR component tolerance to zero (CCP Standard 4.4).

ERCo can also take other actions, including:

- Reviewing the non-clearing functions the counterparty provides to LCH Ltd.
- Suspending or terminating the participant.

A participant with an ICS at a level that required any of the actions listed above would usually be placed on the watch list.

4.4 A central counterparty should cover its current and potential future exposures to each participant fully with a high degree of confidence using margin and other prefunded financial resources (see CCP Standard 5 on collateral and CCP Standard 6 on margin). In addition, a central counterparty that is involved in activities with a more complex risk profile or that is systemically important in multiple jurisdictions should maintain additional financial resources to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the two participants and their affiliates that would potentially cause the largest aggregate credit exposure for the central counterparty in extreme but plausible market conditions. All other central counterparties should maintain additional financial resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would potentially cause the largest aggregate credit exposure for the central counterparty in extreme but plausible market conditions. In all cases, a central counterparty should document its

supporting rationale for, and should have appropriate governance arrangements relating to, the amount of total financial resources it maintains.

LCH Ltd maintains a single default fund – the Rates service default fund – for the SwapClear and Listed Rates services. In this default fund, LCH Ltd holds prefunded financial resources to cover the default of the two clearing participants and their affiliates that would cause the largest aggregate credit exposure in extreme but plausible conditions (the cover two requirement). LCH Ltd calibrates the size of these resources based on daily stress tests (CCP Standards 4.5–4.7). LCH Ltd offers an optional portfolio margining service, which allows eligible participants and clients to benefit from margin offsets between their contracts cleared in the SwapClear and Listed Rates services.

The LCH Ltd Rulebook provides for the segregation of the Rates service default fund from the financial resources of other LCH Ltd clearing services. Accordingly, the financial contributions of non-defaulting clearing participants in respect of the SwapClear and Listed Rates services cannot be utilised to meet losses arising from a clearing participant default in other services. Further, this segregation provides for the continuation of LCH Ltd’s other services should the Rates service close (and vice versa).

The Rates service default fund consists of two components: a ‘core component’ (£4.6 billion at the end of September 2018), which is sized by stress testing, and a RTTR component (£400 million), which is held against the credit risk arising from the registration of new SwapClear trades as they occur. Clearing participants from both services contribute to the core component, but only SwapClear participants contribute to and can use the RTTR component.

The LCH Ltd Rulebook specifies, at a high level, the method by which the core component and RTTR component are sized. The Rulebook also places a floor of £1 billion and a cap of £5 billion on the total size of the default fund (the combined value of the core component and RTTR component).

The LCH Group Financial Resource Adequacy Policy describes, in more detail than the Rulebook, the process by which stress test losses are used to size the core component. The policy is maintained by Group Risk, and is reviewed annually by the LCH Ltd ERCo, the LCH Ltd Risk Committee and approved by the LCH Ltd Board.

Core component

The size of the core component of the Rates service default fund is derived from the stress test scenario that generates the largest sum of two participant’s STLOIM on any one day during the previous 60 business days.⁵⁰ To calculate the core component, a buffer is added to this combined stressed exposure value, and the aggregate value of any monthly DFAM is then subtracted.

LCH Ltd shifts the balance between ‘defaulter pays’ and mutualised resources used to meet the cover two requirement. It does this by reducing the size of the total default fund core component by the value of monthly DFAM. Unlike the default fund, monthly DFAM is not mutualised and it becomes part of the participant’s initial margin, so it can only be used to cover losses from the clearing participant that posted it. If a participant’s STLOIM under any scenario in the 60-day lookback period exceeds a specified threshold, determined by its ICS, of the sum of the combined stressed exposure value and buffer, that

⁵⁰ 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.

participant may be required to post monthly DFAM to cover the amount its STLOIM exceeds that threshold.⁵¹

LCH Ltd also calls daily DFAM from any participant that has a STLOIM in excess of a specified percentage of the core component; this does not, however, affect the sizing of the core component (CCP Standard 4.7).

The core component of the Rates service default fund is resized on the first business day of the month, and LCH Ltd holds each clearing participant's default fund and monthly DFAM contributions until the default fund is resized the next month. Each participant's contribution is based on their average share of total initial margin requirements for the previous month, based on its house positions only. Additional margin (CCP Standard 6.1) is not included in this calculation. Contributions are subject to a minimum of £10 million per SwapClear clearing participant, £17.5 million per Listed Rates clearing participants that is also a SwapClear participant; or £500 000 per Listed Rates-only clearing participant. Contributions are rebalanced on a monthly basis to account for changes in relative shares of participants' initial margin requirements.

Real-time trade registration component

The RTTR component of the Rates service default fund is a pool of mutualised resources held against the credit risk arising from the registration of new SwapClear trades as they occur. During the SwapClear service's operating hours, trades are novated to the CCP within 10 seconds of being submitted (depending on the execution venue). Most trades are only novated if each participant's incremental initial margin requirement is covered by either existing IM collateral held by LCH Ltd or is within its RTTR component tolerance (the amount of the RTTR a participant is entitled to use).

By holding RTTR component tolerances, the frequency with which LCH Ltd can register trades is not restricted by the frequency with which it can collect initial margin. If participants do not have sufficient initial margin or RTTR tolerance available, trades will be rejected and will need to be submitted once the participant has posted sufficient initial margin.

The RTTR component is currently sized at £400 million. LCH Ltd assigns RTTR component tolerances to participants based on their ICSs, with higher tolerances assigned to better-rated participants. Usage of the RTTR component is limited on a cover two basis, meaning that the highest possible RTTR component tolerance for a member group is £200 million. If usage of the RTTR component was consistently high or low, LCH Ltd may review the size of the RTTR component. Based on the review, the LCH Group Executive Committee and the LCH Ltd Risk Committee may approve a change in the RTTR component size. Each participant contributes to the RTTR component in proportion to its RTTR component tolerance usage relative to other participants over the prior 20 business days, subject to a floor of £3 million and a cap of £30 million. Participant contributions to the RTTR component are rebalanced on the same schedule as those to the core component.

Some small transactions can be automatically registered with SwapClear without the above credit check. Sub-block trading venue trades are trades below a certain size which are transacted on an

51 The size of monthly DFAM called may be reduced in order to comply with the EMIR requirement that the default fund covers potential losses arising from the simultaneous default of the second and third largest clearing participants. To reduce the potential DFAM required due to exposures generated from client accounts, clearing participants and their clients can jointly opt in to provide additional collateral to cover a proportion of that client's stress test exposures.

electronic trading facility.⁵² 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 at the next intraday margin call (CCP Standard 6.4).

Client buffer

LCH Ltd offers an optional client buffer account for its SwapClear Clearing Members as part of its SwapClear Client Clearing Service. The client buffer provides an additional pool of resources to support the intraday provision of credit to cover new trade registrations by clients and intraday margin liabilities on existing positions. A single client buffer account is used to cover all of an individual clearing participant's client accounts (and client buffer lodged by one clearing participant cannot be applied to liabilities arising from clients of other clearing participants). Use of the client buffer is in chronological order of trade submission and is recyclable during the day (that is, if a client's liabilities decrease, the buffer becomes available for use by other clients of that clearing participant). If the client buffer came to be fully depleted, any further trade registrations would rely on the clearing participant's access to the RTTR or excess collateral. The client buffer is funded by the clearing participant in cash in one of GBP, EUR or USD (but not a mix).

4.5 A central counterparty should, through rigorous stress testing, determine the amount and regularly test the sufficiency of its total financial resources available in the event of a default or multiple defaults in extreme but plausible market conditions. Stress tests should be performed daily using standard and predetermined parameters and assumptions. On at least a monthly basis, a central counterparty should perform a comprehensive and thorough analysis of stress-testing scenarios, models and underlying parameters and assumptions used to ensure they are appropriate for determining the central counterparty's required level of default protection in light of current and evolving market conditions. A central counterparty should perform this analysis of stress testing more frequently when the products cleared or markets served display high volatility, become less liquid, or when the size or concentration of positions held by a central counterparty's participants increases significantly. A full validation of a central counterparty's risk management model should be performed at least annually.

LCH Ltd sizes the default fund core component using daily stress tests, which it calls exposure stress tests. Exposure stress tests are also used to calculate daily DFAM and monthly DFAM (CCP Standard 4.4).

The Rates service's stress testing methodology uses 303 stress scenarios. Each scenario is a set of movements in yield curves, inflation curves and exchange rates (CCP Standard 4.6). The STLOIM of a participant from a particular scenario is the loss on the participant's portfolio that would result from that scenario, less that participant's initial margin.⁵³ To calculate the STLOIM of a participant on a particular day, the Rates service takes the participant's worst STLOIM from the 303 scenarios.

52 See https://www.lch.com/system/files/media_root/sub-block%20trading%20venue%20transaction.pdf for the size of these trades, which varies by product, currency and maturity. Electronic trading facilities include: swap execution facilities and designated contracted markets registered to the CFTC; regulated markets, multilateral trading facilities and organised trading facilities registered under the EU Markets in Financial Instruments Directive; and other electronic trading facilities approved by LCH.

53 If a participant has clients, LCH Ltd assumes the default of any client whose default would increase the STLOIM. That is, each client whose profit-and-loss plus initial margin from that scenario is negative is assumed to default.

LCH Ltd assesses the adequacy of its stress testing methodology through reverse stress tests (CCP Standard 4.6), monthly reviews by an internal working group of staff from the Rates service and Risk, and annual independent validation.

The monthly reviews of the stress testing methodology cover the factors driving the latest rebalancing of the default fund, stress scenarios for any new products being introduced to the Rates service, and the comprehensiveness of the Rates service's stress scenarios. The comprehensiveness of stress scenarios is assessed using qualitative and quantitative analysis.

The quantitative analysis involves the use of distribution-led tool which estimates the distribution of a large number of risk factors, and uses that distribution to calculate the plausibility of the scenario currently sizing the default fund. The tool is then used to identify new scenarios with similar plausibility that could result in larger losses. If the Rates service internal working group found that a new scenario was required, this would need to be approved through SwapClear and Listed Rates internal governance procedures, with the LCH Ltd ERCo making the final decision on the adoption of the proposed scenario.

The annual validation of the Rates service's stress testing methodology may be conducted by an external party or by the independent model validation team in LCH Group (see CCP Standard 2.6 for a discussion of reviews more generally). The validation completed in October 2017 did not find any reason to conclude that the methodology was unsatisfactory, though it did specify a few required actions, which the Rates service has reviewed and implemented.

4.6 In conducting stress testing, a central counterparty should consider the effect of a wide range of relevant stress scenarios in terms of both defaulters' positions and possible price changes in liquidation periods. Scenarios should include relevant peak historic price volatilities, shifts in other market factors such as price determinants and yield curves, multiple defaults over various time horizons, simultaneous pressures in funding and asset markets, and a spectrum of forward-looking stress scenarios in a variety of extreme but plausible market conditions.

The Rates service's set of 303 stress scenarios comprises 158 historical scenarios and 145 theoretical scenarios. The stress regime is developed to identify extreme but plausible tail losses in each member portfolio beyond the 99.7 per cent confidence level applied in the PAIRS margin model. A scenario may be deemed to be plausible if it has happened in the past 30 years.

Historical scenarios are sets of yield curve, inflation curve and exchange rate moves that have occurred in the Rates service's dataset. The historical scenarios used by the Rates service were generated in a variety of different ways, such as:

- identifying the largest historical 5-day moves in the short, medium and long tenors of key yield curves
- identifying, for each of a few key currencies, the largest historical widening and narrowing moves in the spread between interbank offer rates (such as EURIBOR) and overnight rates (such as EONIA)
- replicating the yield curve moves observed during the 1987 stock market crash and the UK referendum on EU membership.

The theoretical scenarios are hypothetical movements that are judged to be extreme but plausible by LCH Ltd. Almost all of the Rates service's theoretical scenarios were generated by positing a particular combination of movements in yield curves or inflation curves and then calibrating the size of the movements based on historical data. LCH Ltd used a variety of types of movements to generate its theoretical scenarios, including:

- a level shift or twist in all yield curves
- narrowing or widening in the spread between interbank offer rates and overnight rates in many currencies simultaneously
- narrowing or widening moves in the yield curves of different pairs of major currencies
- decorrelation (narrowing or widening of the spread) between futures and swaps.

The Rates service includes 10 forward-looking scenarios, which are scenarios generated by assuming a macroeconomic or financial event and then projecting the movements in yield curves that might occur as a result. The Rates service's current forward-looking scenarios include several hypothetical eurozone break-up scenarios as well as a hypothetical devaluation of the MXN and a sovereign credit crisis. The Rates service also uses scenarios based on market movements of the same magnitude but opposite direction of that which occurred in historical events (such as the UK referendum on EU membership).

The Rates service uses two types of reverse stress testing to assess the adequacy of the financial resources it holds against clearing participant defaults:

- The first type assesses whether it is plausible that the default of more than two participants could cause losses in excess of the Rates service's current financial resources. To do this, the Rates service calculates the distribution of losses in the service due to participant defaults, which depends on the assumed probability of default for each participant and its stressed exposure at default. The 'extreme but plausible' (once-in-30-year) loss is calculated from this distribution, and compared to the existing default resources.
- The second type of reverse stress tests assesses whether there are plausible scenarios that should be added to the Rates service's stress testing. This is done by adjusting the movements in risk factors existing stress test scenarios to generate stress scenarios that would exhaust all of the Rates service's prefunded default resources in the event of the default of the two participants with the largest aggregate exposure. The Rates service then assesses the plausibility of these scenarios qualitatively and quantitatively.

Reverse stress testing occurs each quarter; results are discussed at the LCH Ltd ERCo and notified to the LCH Ltd Risk Committee.

4.7 A central counterparty should have clearly documented and effective rules and procedures to report stress-test information to appropriate decision-makers and ensure that additional financial resources are obtained on a timely basis in the event that projected stress-test losses exceed available financial resources. Where projected stress-test losses of a single or only a few participants exceed available financial resources, it may be appropriate to increase non-pooled financial resources; otherwise, where projected stress-test losses are frequent and consistently widely dispersed across participants, clear processes should be in place to augment pooled financial resources.

Stress testing is incorporated as part of the routine oversight and monitoring of SwapClear and Listed Rates clearing participants. The STLOIM for the two participants giving rise to the largest exposures in the Rates service are included in a daily report that is distributed to the LCH Group Executive Committee. Furthermore, large STLOIM are discussed at bi-weekly meetings attended by the LCH Ltd CRO. Additionally, a summary of the stress test results and accompanying analysis is presented to the LCH Ltd Risk Committee for review on a quarterly basis.

The Rates service calls monthly DFAM from any participant for which the largest STLOIM in the past 60 business days is large relative to the default fund (CCP Standard 4.4).

LCH Ltd also calls daily DFAM from any participant with STLOIM in excess of a predefined proportion of the default fund. The predefined proportion ranges from zero to 45 per cent, depending on the participant's ICS. The amount called is the difference between that participant's STLOIM and the relevant proportion of the core component of the default fund on that day, offset by any monthly DFAM contributed by that participant. On the morning of each business day, LCH Ltd notifies participants via email of any daily DFAM due.⁵⁴ A participant's PPS bank must provide LCH Ltd with confirmation that it will pay the amounts required within one hour of receiving the notification. The purpose of daily DFAM is to ensure participants with outsized exposures collateralise more of their own risk.

4.8 A central counterparty should establish explicit rules and procedures that address fully any credit losses it may face as a result of any individual or combined default among its participants with respect to any of their obligations to the central counterparty. These rules and procedures should address how potentially uncovered credit losses would be allocated, including the repayment of any funds a central counterparty may borrow from liquidity providers. These rules and procedures should also indicate the central counterparty's process to replenish any financial resources that the central counterparty may employ during a stress event, so that the central counterparty can continue to operate in a safe and sound manner.

The LCH Ltd Recovery Plan describes the steps LCH Ltd would take to maintain the continuity of the Rates service in the event that it suffered extreme losses. The plan describes the arrangements by which LCH Ltd would allocate losses arising from participant defaults (covered in this Standard) and losses arising from sources other than participant defaults (CCP Standard 3.5).

Allocation of credit losses

LCH Ltd's SwapClear service has rules and procedures that set out how it would cover losses from a defaulting clearing participant. The first level of protection is its prefunded financial resources, which would be applied in the following order:

- the defaulting clearing participant's margin across all services
- the defaulting clearing participant's default fund contributions across all services⁵⁵
- LCH Ltd's own resources (€44.1 million for the Rates service, as at the end of September 2018)
- non-defaulting clearing participants' default fund contributions (as of the end of September 2018, £5 billion minus the value of the defaulting clearing participant's contribution).

If the losses were greater than the size of these resources, uncovered credit losses would be allocated using the following rules-based tools:

- First, the Rates service would have powers to call non-defaulting clearing participants for Unfunded Contributions if the default fund was reduced, or if the Rates service determined that it would be likely to be reduced, by 25 per cent or more. The value of Unfunded Contributions for

⁵⁴ This calculation is based on a participant's positions at the end of the previous business day and the initial margin requirement based on those positions.

⁵⁵ Typically a member's margin and default fund contributions can only cover losses from that particular clearing service. However, any unutilised portion of a defaulting member's margin and default fund contributions may be allocated to cover their shortfall in another service. This does not apply to the margin of the defaulting member's clients.

each default would be capped at the value of each non-defaulting clearing participant's last default fund contribution and subject to a maximum of three defaults in any six-month period.

- Second, the Rates service would have powers to invoke its Loss Distribution Process if uncovered losses remained unallocated. Under this process, the Rates service would allocate uncovered credit losses by not paying the full amount that non-defaulting clearing participants with cumulative net gains since the default were due, from variation margin, coupons, fees and price alignment interest (a process known as VMGH). Payments to non-defaulting clearing participants with cumulative net gain positions would be determined by the distribution haircut fraction, which is the value of the uncovered loss divided by the total cash gain. At the same time, non-defaulting clearing participants with cumulative net loss positions would be expected to pay the full amount. The Loss Distribution Process would continue for 10 days (the loss distribution period) or, if sooner than 10 days, until the defaulting clearing participant's trades were successfully closed out or auctioned and transferred under the Rates service default management process. In the event that the Loss Distribution Process process was likely to extend beyond the loss distribution period or if the loss applied to a single non-defaulting clearing participant reached the higher of £200 million or twice the value of its previous default fund contribution, surviving clearing participants would be able to vote in a ballot on whether they wished the Loss Distribution Process to continue (and therefore for the monetary and time caps on VMGH to be increased). The ballot would require 75 per cent of non-defaulting participants (weighted by default fund contribution) to vote in favour of the continuation of the Loss Distribution Process, provided that 50 per cent by number of those eligible to vote did so.
- Third, the Rates service could request that non-defaulting clearing participants make voluntary payments if it was clear it would not have sufficient resources to meet its obligations to non-defaulted participants from the Loss Distribution Process. These payments can be made by participants at any time during the default management process. The voluntary payments would allow clearing participants or a subset of clearing participants to provide additional funds to keep the service open without requiring consent from clearing participants to maintain the Loss Distribution Process. Non-defaulting clearing participants would not be obliged to make voluntary payments and could continue to be SwapClear or Listed Rates clearing participants if they did not contribute. LCH Ltd acknowledges in the Recovery Plan that there would be a coordination risk associated with this process because clearing participants might refuse to contribute if they expected other clearing participants to do the same.

If insufficient voluntary payments were made to cover the remaining credit losses, the Rates service would make an Insufficient Resources Determination and close the Rates service (CCP Standard 3.5). If the Rates service were wound down, all outstanding SwapClear and Listed Rates contracts would be closed. The Rates service would calculate a sum owing between it and each non-defaulting clearing participant. LCH Ltd would view itself as owing participants any payments withheld from them under the Loss Distribution Process (that is, it would effectively unwind the Loss Distribution Process). Clearing participants that owed funds would be obliged to pay in full. If there were insufficient funds to meet the claims of participants that were owed funds, these claims would be reduced pro rata. Separately, each clearing participant would be entitled to the return of its cash initial margin, and the amount owed to or from a clearing participant would be set off against the return of any cash initial margin to form a net sum. Non-cash collateral would be returned separately.

Replenishment

The Rates service has rules and procedures to replenish the default fund once the Rates service default management process had been completed. If the value of the remaining Rates service default fund was lower than the Rates service Fund Floor (that is, the minimum size of the default fund – currently set at £1 billion) at the time that the default management process was completed, the Rates service would call non-defaulting clearing participants for Supplementary Contributions in order to bring the Rates service default fund up to no less than the Rates service Fund Floor. Non-defaulting clearing participants would need to meet these calls within two business days.⁵⁶ During this period, the Rates service would continue to meet cover two by calling daily DFAM from its participants.⁵⁷ The determination of the Rates service default fund contributions would revert to the usual resizing method at the next calculation date (at the start of the month) at least 30 days after the Rates service default management process was completed. The default fund would therefore be fully replenished with fixed mutualised resources in one to two months.⁵⁸

Standard 5: Collateral

A central counterparty that requires collateral to manage its or its participants' credit exposures should accept collateral with low credit, liquidity and market risks. A central counterparty should also set and enforce appropriately conservative haircuts and concentration limits.

5.1 A central counterparty should generally limit the assets it (routinely) accepts as collateral to those with low credit, liquidity and market risks.

LCH Ltd adheres to the LCH Group Collateral Risk Policy, which sets out the principles for determining and reviewing the collateral that LCH Ltd accepts from its participants to cover margin requirements and default fund contributions. The policy restricts eligible collateral to that which has low credit, liquidity and market risk. To further mitigate risk, on a daily basis LCH Ltd monitors the market value, credit quality and liquidity of collateral lodged.

Acceptable collateral

LCH Ltd accepts the following collateral from SwapClear participants:

- default fund contributions must be paid in GBP cash
- initial margin requirements can be met using eligible cash and non-cash collateral
- variation margin must be met in the currency of the underlying exposure

56 Any member wishing to resign from the service can do so within two business days of the notice. If they do so, their resignation would be effective at the next calculation date of the default fund (unless further defaults occur). The resigned member would still need to meet the Supplementary Contribution, but would not be required to make default fund contributions when it reverts to the usual resizing method.

57 If the Rates service default fund was at the floor (at £1 billion), the core component of that fund would be £600 million (due to the £400 million RTTR component); any daily DFAM obligations to meet cover two would be determined using the core component amount.

58 If another clearing participant defaults during this 30-day period, then default fund contributions will not revert to the usual resizing method until 30 days after the completion of that participant's default management process.

- intraday margin calls, which combine initial and variation margin, are paid in cash, but in limited circumstances can be met with securities.⁵⁹

Cash collateral. LCH Ltd accepts GBP, EUR and USD cash as initial margin. LCH Ltd also has the capacity to accept AUD, CAD, CHF, JPY, SEK, DKK and NOK cash as initial margin, although limits apply to how much of each currency LCH Ltd will accept. FCMs may only post USD when posting cash collateral as initial margin.

Non-cash collateral. LCH Ltd currently accepts: sovereign debt of Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Norway, Spain, Sweden, Switzerland, the UK and the US; securities issued by certain US and European government agencies; and US mortgage-backed securities issued by the General National Mortgage Association.

LCH Ltd does not currently accept central bank guarantees as collateral, although under the LCH Group Collateral Risk Policy, LCH Ltd could determine such guarantees to be eligible if they were issued by central banks in countries that were approved for CaLM investments. The LCH Group Collateral Risk Policy does not allow LCH Ltd to accept commercial bank guarantees as collateral.

The eligibility of new currencies and traded securities as collateral is determined by the LCH Ltd ERCo, in line with minimum criteria set out in the Collateral Risk Policy. These criteria require that consideration be given to the credit, market, liquidity, legal and operational risks associated with holding the collateral.

LCH Ltd monitors and manages risks associated with collateral to ensure that securities eligible as collateral are highly liquid and have low market and credit risk. If risks associated with a particular issuer of eligible collateral change significantly, LCH Ltd reserves the right to declare the collateral no longer acceptable.

The Collateral Risk Policy is owned by the Group CRO. The Collateral Risk Policy is reviewed by LCH Ltd ERCo and the LCH Ltd Risk Committee, and approved by the Board, annually.

Wrong-way risk

LCH Ltd does not allow participants to post as collateral securities issued by themselves or by entities from the same group. In addition, wrong-way risk haircuts are applied if there is a strong correlation between LCH Ltd's potential exposure to the clearing participant and the value of the relevant collateral (for example, the creditworthiness of the clearing participant and the issuer of the collateral are correlated due to sharing the same country of domicile).

CaLRM monitors wrong-way risk across clearing participant groups on a daily basis. LCH Ltd can require participants to reduce wrong-way risk exposures if necessary.

5.2 In determining its collateral policies, a central counterparty should take into consideration the broad effect of these policies on the market. As part of this, a central counterparty should consider allowing the use of collateral commonly accepted in the relevant jurisdictions in which it operates.

To provide flexibility in collateral eligibility, LCH Ltd accepts a range of currencies and traded securities as initial margin (CCP Standard 5.1). LCH Ltd maintains on its website a list of collateral eligible for use

⁵⁹ LCH Ltd permits FCMs to meet intraday margin calls on client accounts by lodging non-cash collateral (CCP Standard 8.2)

in its SwapClear service.⁶⁰ Typically, LCH Ltd engages with its participants in advance of changes to collateral eligibility to minimise any disruption from such changes.

To ensure its collateral policy does not have a negative effect on the liquidity and price of acceptable collateral, LCH Ltd requires that traded securities it accepts as collateral have sufficient market liquidity. LCH Ltd also has a daily report of key risk indicators that could affect LCH Ltd's ability to liquidate collateral. LCH Ltd does not accept securities close to maturity, subject to specific corporate events, or that have optionality. Concentration limits are applied to the collateral each participant can post (CCP Standard 5.5).

LCH Ltd accepts Australian government securities and AUD cash as initial margin, and variation margin calls in AUD-denominated derivatives are received and paid in AUD.

5.3 A central counterparty should establish prudent valuation practices and develop haircuts that are regularly tested and take into account stressed market conditions.

LCH Ltd marks collateral to market daily, using observed market prices from published sources. The LCH Group Collateral Risk Policy specifies minimum criteria regarding availability of pricing data for cash and non-cash collateral. There is a pricing data control framework in place to ensure the accuracy of data and for escalation of exceptions (CCP Standard 6.2).

LCH Ltd applies base haircuts to all non-cash collateral posted. Base haircuts are set to cover the market risk associated with the securities posted as collateral, and are calibrated to cover 99.7 per cent of historical price moves, over a three-day holding period, using a 10-year lookback period. The three-day holding period captures the expected time lag between the last revaluation and a default, as well as the expected liquidation period. The 10-year lookback period aims to ensure that stressed market and liquidity conditions, such as the euro area crisis in 2011–12, are factored into the haircuts. LCH Ltd also performs regular collateral haircut stress tests, and may apply a buffer, to ensure base haircuts will be sufficient in stressed market conditions or to mitigate potential procyclicality.

Additional haircuts are applied to cover credit, wrong-way, concentration and liquidity, and foreign exchange risks (CCP Standards 5.1, 5.5 and 5.6). In the event that collateral issued by a particular security issuer is deemed to represent extra risk for the CCP, LCH Ltd may increase the additional haircuts and limit the amount of that collateral it will accept.

Collateral haircuts and any additional buffers are reviewed by LCH Ltd on a quarterly basis or when there are material market moves that affect the valuation or liquidity of eligible collateral. Changes to haircuts must be approved by the LCH Ltd ERCo. LCH Ltd's collateral haircut models are subject to independent external review on an annual basis (CCP Standard 2.6).

5.4 In order to reduce the need for procyclical adjustments, a central counterparty should establish stable and conservative haircuts that are calibrated to include periods of stressed market conditions, to the extent practicable and prudent.

LCH Ltd's methodology for setting collateral haircuts is designed to establish stable and conservative haircuts (CCP Standard 5.3). LCH Ltd considers the potential procyclical effects of changing haircuts as part of the quarterly review process, and has the discretion to prevent haircuts from being lowered. Collateral haircuts must comply with the Group Procyclicality Policy (CCP Standards 2.6 and 6.3)

60 See <http://www.lch.com/risk-collateral-management/collateral-management/acceptable-collateral>.

which - among other things - specifies that the haircut methodology should not result in very large increases in haircuts over a given period of time, subject to financial resources being adequate.

5.5 A central counterparty should avoid concentrated holdings of certain assets where this would significantly impair the ability to liquidate such assets quickly without significant adverse price effects.

Under the Group Collateral Risk Policy, LCH Ltd may address concentration and liquidity risk by applying:

- concentration limits to collateral posted by participants, either as caps on the percentage of margin requirements or hard caps
- additional haircuts to concentrated positions, calibrated by extending the holding period beyond the three days that is typically assumed to be necessary to close out the position.

LCH Ltd monitors collateral concentration risks on a daily basis. LCH Ltd's Collateral Concentration Monitoring Framework sets out thresholds for internal monitoring and limits for sovereign issues and government agency collateral concentration. Concentration limits and additional haircuts are reviewed by LCH Ltd on a quarterly basis.

5.6 A central counterparty that accepts cross-border collateral should mitigate the risks associated with its use and ensure that the collateral can be used in a timely manner.

When determining the eligibility of cross-border collateral, the LCH Ltd ERCo must consider all major risks, including legal, operational and foreign exchange risk, to ensure that collateral can be used in a timely manner.

LCH Ltd must be able to hold and liquidate, or convert cash and non-cash collateral to GBP, EUR or USD, without legal challenge. LCH Ltd obtains legal advice regarding its ability to enforce its rights in respect of cross-border collateral, from all relevant jurisdictions. This advice is refreshed periodically.

LCH Ltd must have the operational capability to convert cash collateral into the currency used to settle liabilities in the event of a default. For a security to be accepted, it must be issued in an acceptable currency and have sufficient market liquidity. To reduce the impact of any operational issue at a CSD, LCH Ltd maintains accounts with multiple CSDs and international CSDs (ICSDs).

LCH must also consider foreign exchange risk when collateral is denominated in a different currency to that of the underlying exposure. LCH Ltd imposes haircuts on cash and non-cash collateral where there is a mismatch between the currency of the collateral and the clearing member's 'liability currency'. The foreign exchange haircut is calibrated using the same methodology as the base haircut; it covers 99.7 per cent of historical price moves, over a three-day holding period, using a 10-year lookback period. LCH Ltd determines liability currencies on a portfolio basis; a portfolio's liability currency is whichever of EUR, GBP and USD corresponds to the currency the majority of the portfolio's exposure to LCH Ltd is denominated in.

Currently, on the first day collateral is posted LCH Ltd imposes a fixed foreign exchange haircut on non-cash collateral irrespective of whether there is a currency mismatch and does not impose a foreign exchange haircut on cash collateral. On the next day, LCH Ltd adjusts the foreign exchange haircut if the haircut methodology above would result in a higher collateral requirement. LCH Ltd is aiming to implement a fully automated solution on this methodology in 2018.

5.7 A central counterparty should use a collateral management system that is well designed and operationally flexible.

Collateral management system

LCH Ltd operates its own online proprietary collateral management system. Participants are able to: send instructions to LCH Ltd to lodge, release, or substitute non-cash securities as collateral; deposit and withdraw cash; update tri-party transactions; and view balances and the status of instructions online. LCH Ltd's collateral management system is integrated with LCH Ltd's back office.

The collateral management system is available for participants to view balances and input collateral instructions 24 hours per day. Instructions are processed by the Collateral Operations team between 7 am and 11 pm (UK time), and between 8 am and 4.30 pm (Sydney time) in support of AUD concentration movements.

Re-use of collateral

LCH Ltd re-invests cash collateral received in line with its Investment Risk Policy (CCP Standard 15.4). LCH Ltd does not re-use non-cash collateral except in the event of a default.

Standard 6: Margin

A central counterparty should cover its credit exposures to its participants for all products through an effective margin system that is risk based and regularly reviewed.

6.1 A central counterparty should have a margin system that establishes margin levels commensurate with the risks and particular attributes of each product, portfolio and market it serves.

LCH Ltd's Rates service comprises two margining classes – an OTC Rates margin class and a Listed Rates margin class. The OTC Rates margin class includes all SwapClear products, and those interest rate futures positions that have been moved from the Listed Rates margin class for the purposes of portfolio margining (CCP Standard 6.5).⁶¹ The Listed Rates margin class covers all other interest rate futures positions. The discussion in CCP Standard 6 relates only to the OTC Rates margin class; references to SwapClear in this standard include portfolio-margined interest rate futures.

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. This practice ensures that LCH Ltd's valuations of SwapClear participant positions remain current and that observed uncovered losses do not accrue over time.

SwapClear requires clearing participants to post initial margin on all positions. Initial margin requirements aim to cover, with single-tailed confidence of at least 99.7 per cent, the risk of a fall in the value of a participant's outstanding portfolio with the CCP during the expected close-out period of five days (seven days for client accounts) should that participant default. SwapClear sets initial margin

⁶¹ The short-term interest rate futures eligible for portfolio margining are 3-month Euribor futures, 3-month Sterling futures and 3-month CurveGlobal SONIA futures. Medium and long term futures contracts have been added to the list of products eligible for portfolio margining in the past year. These include 2-year Schatz futures, 3-5-year Bobl Futures, 10-year Bund futures and Gilt futures.

requirements using its PAIRS model, which uses the historical expected shortfall methodology (CCP Standard 6.3).

SwapClear calls initial margin and variation margin after the end of each business day. Additionally, SwapClear makes combined variation margin and initial margin calls intraday if a participant's combined variation margin and initial margin liability exceeds a predetermined threshold. Intraday margin is not paid out to participants whose margin requirements have fallen (CCP Standard 6.4).

Additional margin

Further to the margin it calculates using the base PAIRS model, LCH Ltd collects additional margin in SwapClear to cover risks not fully captured by the model. Current classes of additional margin are counterparty risk multiplier margin, liquidity margin add-on, basis risk margin add-on, net capital additional margin, group add-on, strategic portfolio margin and sovereign risk margin. LCH Ltd also collects daily and monthly DFAM (CCP Standard 4.7).

Counterparty risk multiplier margin is called on a daily basis where a participant's ICS has deteriorated beyond a predetermined threshold (CCP Standard 4.2). It is applied to both the house and client accounts of the participant. The amount called is the larger of: a specified percentage of the account's initial margin; or a specified percentage of the account's STLOIM. The percentages used are higher for participants with a worse ICS.

Liquidity margin add-on (also called 'initial margin multiplier') aims to cover the risk of additional losses that could be incurred if LCH Ltd is required to close out a portfolio that is large relative to the market. In a default event, the sale of a large portfolio may have a market impact, which would increase LCH Ltd's losses in the default management process. Liquidity add-on is calculated separately for house and client accounts, and is the larger of:

- initial margin multiplier by first principles, which is based on an estimate of the price impact of hedging the relevant portfolio. The estimate is made using results from a survey of participants about the ability of the market to absorb large trades.
- initial margin multiplier, which is set as a percentage of the initial margin requirement where initial margin is above a predetermined threshold. The multiplier as a percentage of the initial margin requirement varies from 30 per cent to 100 per cent.

Basis risk margin add-on covers two risks that are not directly captured by the initial margin model: tenor basis risk, which is the risk that the curves for different tenors of an interbank offer rate will move relative to each other; and OIS discounting risk, which is the risk that the value of an interest rate swap priced using OIS discounting will vary relative to the value of the same swap priced using LIBOR discounting.

Net capital additional margin is a concentration charge for participants with exposures that amount to a significant percentage of that participant's net capital. It is called if a participant's stress test loss over initial and additional margin exceeds a pre-specified share of the participant's net adjusted capital.

A group add-on mitigates the risk that a set of affiliated participants exposed to similar risks may have a net position that is large relative to the market. This risk may not be captured by the initial margin requirements and liquidity margin add-on calculated for individual house accounts.

Strategic portfolio margin is applied to constrain the benefit from portfolio margining. The add-on is called to limit the offset that can be provided between different products in a portfolio to 80 per cent.

Products are separated by currency, and into interest rate swaps, inflation swaps, and interest rate futures.⁶² If the base initial margin model provides an offset greater than 80 per cent between different products, additional margin will be called.

The sovereign risk margin is designed to address exchange rate risk in non-deliverable interest rate swaps. It aims to cover the risk of significant unexpected moves in certain currencies.

LCH Ltd calculates additional margin requirements for each house and client account at the end of each day, and calls the required margin the next morning. LCH Ltd has the discretion to call additional margin on an ad hoc basis.

LCH Ltd has powers to call any additional margin it determines is required to cover risks that are not adequately captured by its existing margin models.

6.2 A central counterparty should have a reliable source of timely price data for its margin system. A central counterparty should also have procedures and sound valuation models for addressing circumstances in which pricing data are not readily available or reliable.

SwapClear receives data on interest rates (from which it calculates zero-coupon yield curves), inflation curves, and exchange rates throughout each business day in order to calculate its end-of-day margin call. SwapClear also updates these data at three scheduled times each day (9 am; 2.15 pm; and 5 pm UK time), and can obtain updated data on an ad hoc basis at other times.

LCH Ltd receives most price data via Reuters and Bloomberg, with inflation swaps data sourced directly from participants active in inflation swaps. Data are subject to validation checks to ensure that bid and ask prices are quoted correctly and that each price is within a predefined range relative to the previous price received. LCH Ltd also ensures the quality of the inflation swaps data by a 'crossing mechanism', whereby clearing participants can be required to trade on prices submitted to the CCP if they repeatedly submit bad data.

Under circumstances in which a data point is deemed inaccurate or is not available, a proxy data point will be substituted. If possible, this proxy data point will be taken from alternative data sources. In the event that alternative data sources are not available or are deemed unreliable, LCH Ltd may use the previous day's observation as a proxy.

6.3 A central counterparty should adopt initial margin models and parameters that are risk based and generate margin requirements 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. Initial margin should meet an established single-tailed confidence level of at least 99 per cent with respect to the estimated distribution of future exposure. For a central counterparty that calculates margin at the portfolio level, this requirement applies to each portfolio's distribution of future exposure. For a central counterparty that calculates margin at more granular levels, such as at the sub-portfolio level or by product, the requirement should be met for corresponding distributions of future exposure. The model should: use a conservative estimate of the time horizons for the effective hedging or close out of the particular types of products cleared by the central counterparty (including in stressed market conditions); have an appropriate method for measuring credit exposure that accounts for relevant product risk factors and portfolio

62 For example, AUD interest rate swaps, USD interest rate swaps and USD inflation swaps are three different products.

effects across products; and to the extent practicable and prudent, limit the need for destabilising, procyclical changes.

Initial margin requirements in SwapClear are calculated using its PAIRS model, a historical expected shortfall model. The PAIRS model calculates initial margin at the portfolio level, rather than for each product individually. The initial margin requirement for each participant's house account aims to cover, with single-tailed confidence of at least 99.7 per cent, the losses that SwapClear could incur on that house account over a five-day period if that participant defaulted. The initial margin requirement on client accounts is calculated in the same way, except they are scaled up to cover the equivalent of a seven-day holding period.⁶³ The longer assumed close-out period for client accounts is to allow for time to decide on and execute porting of the client's positions to another clearing participant.

The PAIRS model calculates the change in the price of each account that would occur under a range of scaled historical scenarios. Each scenario is a set of movements in zero-coupon yield curves, inflation curves and exchange rates that occurred in a five-day interval. LCH Ltd uses the 2 500 most recent overlapping five-day periods (a lookback period of approximately 10 years). The yield curve, inflation curve and exchange rate movements in each scenario are scaled up (down) if current volatility is high (low) relative to volatility at the time of the scenario. The initial margin requirement is then set equal to the average of the six worst losses from the 2 500 scenarios, which is the average loss conditional on being at or below the 0.24th percentile of the distribution of profit-and-loss.

LCH Ltd's management of procyclicality is governed by the LCH Group Procyclicality Policy (CCP Standard 2.6). The policy provides guidance and sets standards with respect to margin, ICS ratings and Unfunded Contributions to default funds. It places obligations on the first-line Risk functions of each service, the Group and CCP Head of Counterparty and Credit Risk, CCP CROs and Group and CCP Heads of CaLRM to demonstrate to the satisfaction of ERCo each year that the standards set out in the policy are being enforced.

LCH Ltd limits procyclical changes in initial margin by using a long lookback period and slow-moving measure of volatility (an exponentially weighted moving average with a decay parameter of 0.992 which places fairly high weight on past observations). LCH Ltd also imposes a floor on initial margin requirements, which is calibrated to cover potential losses over a five-day holding period with 99.5 per cent confidence, based on a 10-year lookback period, with no scaling based on volatility. To retain the stressed market conditions from the global financial crisis, LCH Ltd has begun to incorporate 1 January 2008 to 30 June 2010 as permanent stressed scenarios. The lookback period for the floor is increasing progressively; by mid-2020, the lookback period will be 12½ years (comprising the most recent 10 years plus the 2½ year global financial crisis period). The initial margin requirement is set at the higher of the expected shortfall model margin requirement and the margin floor.

Specific wrong-way risk arises when there is a direct relationship between the CCP's exposure to a participant and that participant's credit quality. LCH Ltd does not allow participants to post as collateral securities issued by themselves or by entities from the same group, and monitors the potential for wrong-way risk on a daily basis (CCP Standard 5.1).

6.4 A central counterparty should mark participant positions to market and collect variation margin at least daily to limit the build-up of current exposures. A central counterparty should

⁶³ LCH Ltd calculates the initial margin requirement using five-day returns, and then multiplies that requirement by $\sqrt{7/5}$. LCH Ltd has found that this approach is more conservative and results in fewer backtesting breaches than calculating the initial margin requirement using seven-day returns.

have the authority and operational capacity to make intraday margin calls and payments, both scheduled and unscheduled, to participants.

All SwapClear positions are marked to market on at least a daily basis. At the end of each day, LCH Ltd calls variation margin from participants with mark-to-market losses and pays out variation margin to participants with gains. SwapClear collects an amount (calculated daily and paid monthly) from participants that have received variation margin and pays it to participants that have paid variation margin. This is to ensure that the fair price of a swap is not affected by the fact that variation margin is exchanged; participants that receive variation margin can invest that cash to earn a return, while participants that post variation margin forgo the return they would have earned absent the payment. SwapClear calls and receives daily variation margin and initial margin on the same schedule. After the service closes at the end of each day, SwapClear calculates the variation and initial margin requirement for each house or client account. While SwapClear is closed, SwapClear informs each participant of the amount of variation margin that it must post on each account when the service opens. A participant's PPS bank must provide LCH Ltd with confirmation by 9 am UK time that it will pay the amounts (CCP Standard 9). If a participant's PPS bank does not provide confirmation in time, LCH Ltd will discuss the issue with the participant. The LCH Ltd default rules provide LCH Ltd with the power to declare a participant to be in default if the participant fails to make a payment when due.

SwapClear recalculates the variation margin and initial margin requirements of house and client accounts at three scheduled times during the day (9 am, 2.15 pm, and 5 pm UK time), following each data update (CCP Standard 6.2). SwapClear then calculates the payment, if any, required to fully collateralise these two requirements. Intraday calls must be confirmed within one hour of the call being received by the PPS bank (CCP Standard 8.2). Intraday margin is classified as initial margin, and is not paid out to participants whose margin requirements have fallen. A participant will be called for intraday margin if the sum of the payment obligations on its house and client accounts exceeds its 'credit tolerance'. Credit tolerances are set as an absolute cap across LCH Ltd services based on a member's ICS. LCH Ltd assigns higher credit tolerances to better-rated participants, with the highest credit tolerance capped at £50 million.

SwapClear has the authority and capability to conduct unscheduled intraday margin runs during its opening hours if there are material market movements.

6.5 In calculating margin requirements, a central counterparty may allow offsets or reductions in required margin across products that it clears or between products that it and another central counterparty clear, if the risk of one product is significantly and reliably correlated with the risk of the other product. Where a central counterparty enters into a cross-margining arrangement with one or more other central counterparties, appropriate safeguards should be put in place and steps should be taken to harmonise overall risk management systems. Prior to entering into such an arrangement, a central counterparty should consult with the Reserve Bank.

SwapClear's PAIRS model calculates the profit or loss a portfolio would experience under the zero-coupon yield curve, inflation curve and exchange rate changes observed in each of the five-day intervals over the lookback period (CCP Standard 6.2). In doing so, it recognises fully the correlations between different zero-coupon yield curves, inflation curves and exchange rates. LCH Ltd has provided evidence that there are economic relationships between its yield curves, inflation curves and exchange rates, and that the correlations between them are reliably present. However, LCH Ltd caps the potential offset from correlations between different products to 80 per cent. If the offset exceeds this, additional

margin is called (CCP Standard 6.1). LCH Ltd also regularly reviews these correlations through its sensitivity analysis (CCP Standard 6.6).

LCH Ltd allows for portfolio margining between SwapClear products and interest rate futures from its Listed Rates service. For clearing participants that have opted into portfolio margining, futures positions from Listed Rates are moved into a combined portfolio with SwapClear eligible products if doing so reduces the overall required margin. LCH Ltd has assessed that there are strong and stable correlations between SwapClear products denominated in 14 of the 21 of the currencies it offers and these interest rate futures (denominated in EUR, GBP and USD). LCH Ltd does not provide portfolio margining benefit between SwapClear products in the other currencies because strong and stable correlations were not demonstrated. LCH Ltd also caps the offset that can be applied to the combined portfolio to 80 per cent of the potential offset.

LCH Ltd does not currently have any cross-margining arrangements with any other CCPs.

6.6 A central counterparty should analyse and monitor its model performance and overall margin coverage by conducting rigorous daily backtesting and at least monthly, and more frequent where appropriate, sensitivity analysis. A central counterparty should regularly conduct an assessment of the theoretical and empirical properties of its margin model for all products it clears. In conducting sensitivity analysis of the model's coverage, a central counterparty should take into account a wide range of parameters and assumptions that reflect possible market conditions, including the most volatile periods that have been experienced by the markets it serves and extreme changes in the correlations between prices.

SwapClear conducts daily backtesting to test the adequacy of its initial margin requirements. SwapClear conducts monthly sensitivity analysis to assess the validity of the assumptions of its initial margin model, comparing the model's performance when individual assumptions are varied while holding others constant.

Backtesting

SwapClear conducts daily backtests to assess whether its initial margin requirements achieve 99.7 per cent coverage as intended. According to daily backtests, SwapClear's initial margin methodology achieved 99.98 per cent coverage on average over the last 18 months.

SwapClear conducts backtesting on observed positions in individual house and client accounts, and on hypothetical portfolios. A 'backtesting breach' occurs if the initial margin requirement calculated on an end-of-day portfolio would have been insufficient to cover the 'clean' profit-and-loss of the account over any of the multiday periods of a length up to the holding period. The clean profit-and-loss of an account is the profit-and-loss the account's portfolio would have made over a multiday period, had the portfolio remained unchanged throughout that period, with no new trades made or variation margin paid/received.

SwapClear produces daily and monthly backtesting reports. Both reports analyse the backtest results through 'business backtesting' and statistical analysis, though the monthly reports are more detailed. In business backtesting, SwapClear compares the number of observed breaches with the number of expected breaches given the targeted coverage level. The statistical tests are used to determine whether the deviation in the number of breaches from the theoretically expected level is statistically significant. Backtesting results are reported daily to the Financial Risk Working Group and the LCH Ltd

Risk Committee Chair, monthly to the LCH Ltd ERCo, and at least quarterly to the LCH Ltd Risk Committee.

Backtesting results would prompt investigation by Rates service risk management if the initial margin model falls below the targeted coverage, fails a statistical test, or results in initial margin shortfalls for particular products or market conditions. Based on such an investigation, the LCH Group CRO or the Group Head of Market and Liquidity Risk may choose to take participant-specific action, such as calling additional margin, or may initiate a review of the underlying initial margin methodology.

Sensitivity analysis

SwapClear conducts monthly sensitivity analysis of its initial margin model. Sensitivity analysis assesses the validity of the assumptions made in the initial margin model, typically by comparing the output and performance of the model as individual assumptions are changed while holding other assumptions constant. The assumptions tested include: the use of absolute versus relative returns; stationarity of returns; correlations; and different methods of volatility scaling. SwapClear assesses the model's performance on actual house and client portfolios as at the date of the report, as well as on hypothetical portfolios exposed to specific risk factors.

The results are reviewed by the Financial Risk Working Group and the LCH Ltd ERCo on a quarterly basis. In addition, sensitivity analysis may form part of the annual review of the initial margin model. Any changes to the initial margin model prompted by sensitivity analysis would go through the usual model governance procedures (CCP Standard 2.6).

The sensitivity analysis of SwapClear's initial margin model conducted in 2017/18 indicated no cause for changes to the current model.

6.7 A central counterparty should regularly review and validate its margin system.

The LCH Group Model Governance, Validation and Review Policy requires that the Independent Model Validation team conduct annual validations of SwapClear's margin model. The Independent Model Validation team last validated SwapClear's initial margin, liquidity margin add-on and inflation product performance in September 2017. The next review is expected to occur in 2018. SwapClear's initial margin model is also subject to daily backtesting and quarterly sensitivity analysis (CCP Standard 6.6).

The LCH Group Model Governance, Validation and Review Policy also requires that a validation be performed whenever a new margin model is adopted or a material change is made to an existing margin model (CCP Standard 2.6).⁶⁴

SwapClear provides a high-level description of its initial margin model on its website. SwapClear also provides both house and client participants with a tool (SMART) that enables them to estimate the initial margin requirement that would result from hypothetical portfolios specified by the user, which assists participants to manage their risk and funding requirements.

6.8 In designing its margin system, a central counterparty should consider the operating hours of payment and settlement systems in the markets in which it operates.

LCH Ltd settles all margin payments through its PPS (CCP Standard 9). The PPS operates in the UK from 9 am to 4 pm UK time, and then in the US from 4 pm to 9 pm UK time. These times reflect the operating

64 A material change to a model is defined as follows: leads to a substantial change in outcomes; a change is made to a key parameter which, in the future, may lead to a substantial change in outcomes; the revision leads to a change in theoretical and empirical underpinnings of the model; or the revision leads to a change in risk policy.

times of the relevant payments systems in the UK and US and the currency cut-off times of the PPS banks. Intraday margin calls via the US PPS and calls in the UK between 2.30 pm and 4 pm UK time will be called in USD to account for the liquidity and operating hours of relevant currency markets and payment and settlement systems. As noted in CCP Standard 6.4, SwapClear makes intraday margin calls following its three scheduled market data updates (9 am, 2.15 pm, and 5 pm UK time) in the event exposures exceed participant-specific tolerances.

LCH Ltd also operates an Australian PPS similar to the model operating in the UK and US. These arrangements facilitate payments to and from its clearing participants and allow for settlement of AUD obligations directly between ESAs held with the Bank (CCP Standard 9.1). Other clearing participants are still able to make AUD payments via the existing UK PPS arrangements, which operate in parallel to the Australian system. Under the Australian PPS, payment instructions are made during the Sydney business day. LCH Ltd accepts AUD-denominated government securities as initial margin, which can be lodged in Austraclear, Euroclear and Clearstream. LCH also accepts AUD cash as initial margin via the Australian PPS during the Sydney business day.

Standard 7: Liquidity risk

A central counterparty should effectively measure, monitor and manage its liquidity risk. A central counterparty should maintain 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 should include, but not be limited to, the default of the participant and its affiliates that would generate the largest aggregate liquidity obligation for the central counterparty in extreme but plausible market conditions.

7.1 A central counterparty should have a robust framework to manage its liquidity risks from its participants, commercial bank money settlement agents, nostro agents, custodians, liquidity providers and other entities.

Sources of liquidity risk

LCH Ltd manages liquidity risk in accordance with the LCH Group Liquidity Risk Policy. The policy is written by the LCH Group Risk department and approved by LCH Ltd's Board. LCH Ltd also maintains a Liquidity Plan, which describes the principles and procedures that it applies to meet the Group Liquidity Risk Policy. Both the Liquidity Risk Policy and the Liquidity Plan are reviewed annually. Each CCP within LCH Group must be able to meet its own liquidity requirements independently from other CCPs in the Group. Within LCH Ltd, liquidity is managed at a cross-service level. Therefore liquidity from one clearing service can be used to meet liquidity requirements in other clearing services, except that: liquidity risk from the settlement of deliverable foreign exchange options (cleared in LCH Ltd's ForexClear service) through CLSClearedFX is managed independently; and liquid resources of an FCM and their clients cannot be used to meet non-FCM's liquidity needs.

LCH Ltd uses its liquidity resources to meet:

- *Operational liquidity needs.* Business-as-usual liquidity draws that are unrelated to a participant default. These include: repayment of excess cash collateral; changes in margin liabilities; substitution of cash collateral upon participant request; provision of liquidity to facilitate settlement; and an overall reduction in initial margin and thus cash posted for margin coverage.

- *Default liquidity needs.* Liquidity requirements in the event of the default of a clearing participant. These include: fulfilment of the settlement obligations of the defaulting participant, which primarily arise from LCH Ltd clearing services that involve the physical delivery of securities (RepoClear and EquityClear); posting variation margin to non-defaulting participants; potential temporary shortfalls due to losses arising from liquidation of cleared positions and collateral; and potential shortfalls due to investment losses if the defaulting participant is also an investment counterparty. Default liquidity needs take into account participants' intermediary roles as PPS banks, concentration banks and nostro agents.

These liquidity requirements cover needs arising from both direct clearing participants and clients of clearing participants, where relevant.

Other potential draws on liquidity include disruptions in markets, which could impair LCH Ltd's ability to liquidate its assets, and disruptions in settlement and payment flows related to issues at PPS banks. All participants are required to have contingency plans in place in the event of disruption at a PPS bank so that they can continue to meet obligations to LCH Ltd on an ongoing basis (CCP Standard 9.3).

Managing liquidity risk

LCH Ltd prevents the build-up of large liquidity (and credit) exposures to participants by calling variation margin, including on an intraday basis. LCH Ltd's framework for managing its remaining liquidity risks includes the use of operational and analytical tools to measure and monitor its settlement and funding flows (CCP Standard 7.2), as well as daily and intraday liquidity stress testing (CCP Standard 7.8). LCH Ltd maintains sufficient liquid resources to meet business-as-usual needs as well as obligations that could arise in the event of the default of the two clearing participants and their affiliates with the largest aggregate payments obligations to the CCP (CCP Standard 7.3), based on daily liquidity stress testing. LCH Ltd also holds sufficient liquid resources such that no one member would utilise more than 25 per cent of the available liquid resources remaining, assuming the default of the largest liquidity user and that the repo market is closed. Similarly, the largest liquidity user cannot use more than 25 per cent of the available liquid resources remaining, assuming the default of the second-largest liquidity user and that the repo market is closed.

LCH Ltd also provides participants with information to assist them in managing their liquidity needs. For example, a tool is provided to participants to assist them in calculating their margin (CCP Standard 6). When possible, participants are advised by LCH Ltd if they are close to being called for DFAM (CCP Standard 4.7). In addition, LCH Ltd imposes limits on the proportion of non-cash collateral that participants can post and seeks to provide advanced warning, if possible, if participants are required to swap lodged non-cash collateral for cash.

7.2 A central counterparty should have effective operational and analytical tools to identify, measure and monitor its settlement and funding flows on an ongoing and timely basis, including its use of intraday liquidity.

Liquidity management is primarily the responsibility of the CaLM function. CaLM uses LCH Ltd's core banking system, Calypso, to manage and monitor LCH Ltd's liquidity needs and its access to resources. CaLM manages LCH Ltd's cash portfolio so that it can meet expected and unexpected operational liquidity outflows. At the start of each day, CaLM monitors the liquidity available, which incorporates end-of-day margin collected from the previous day and maturing investments, and also potential operational liquidity outflows, such as advised collateral substitutions and the amount of excess cash that clearing participants have requested be repaid. This monitoring can also potentially provide an

early warning of default of a clearing participant or PPS bank. LCH Ltd sets various timing cut-offs for participants to request the return of cash and, therefore, from a certain point in the day onwards, there are only inflows of liquidity. CaLM is then able to make informed decisions about investing excess cash. LCH Ltd also monitors the concentration of its exposures to participants, including in their role as settlement banks, against exposure limits.

The Collateral Operations team frequently monitors LCH Ltd's intraday liquidity usage by monitoring balances at commercial concentration banks using SWIFT messages.

LCH Ltd also monitors its liquidity risk through the use of an internally defined LCR. This is the ratio of available liquid assets to total liquidity requirements (CCP Standard 7.3). The LCR is calculated and monitored on both an end-of-day and intraday basis. LCH Ltd's internal policies require it to maintain a minimum LCR – that is, it must ensure that the value of its available liquid resources relative to its total liquidity requirement is above 100 per cent and a buffer amount set internally.

CaLRM is responsible for monitoring the LCR. Any breaches of the LCR must be notified to CaLM and the LCH Ltd ERCo, and CaLM would make recommendations to address the breach (for example, based on the options discussed in CCP Standard 7.9). CaLRM also monitors variations in the value of available liquid resources above the stressed liquidity requirement (known as the liquidity buffer). A material reduction in the value of the liquidity buffer must be immediately reported to the LCH Ltd ERCo, the LCH Ltd CRO and the Head of CaLM for LCH Ltd, who would together determine the action required. The LCH Ltd Head of CaLM has ultimate responsibility for LCH Ltd maintaining sufficient liquid resources at all times. The LCH Ltd CRO would need to approve any proposal by the LCH Ltd Head of CaLM to deviate from the Group Liquidity Risk Policy.

7.3 A central counterparty should maintain sufficient liquid resources in all relevant currencies to settle securities-related payments, make required variation margin payments and meet other payment obligations on time with a high degree of confidence under a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would generate the largest aggregate payment obligation to the central counterparty in extreme but plausible market conditions. In addition, a central counterparty that is involved in activities with a more complex risk profile or that is systemically important in multiple jurisdictions should consider maintaining additional liquidity resources sufficient to cover a wider range of potential stress scenarios that should include, but not be limited to, the default of the two participants and their affiliates that would generate the largest aggregate payment obligation to the central counterparty in extreme but plausible market conditions.

To ensure that LCH Ltd maintains sufficient liquid resources to meet its obligations, it sets daily operational liquidity targets and a default liquidity requirement:

- *Operational liquidity targets.* To ensure that sufficient liquidity is available to meet business-as-usual requirements, LCH Ltd sets operational liquidity targets for each currency for which LCH Ltd considers it has meaningful operational exposures, based on internal thresholds. The targets are set assuming that the CCP will not receive additional cash from clearing participants (in any currency) – that is, only outflows are considered. The CaLRM function, which sits within LCH Group Risk department, is responsible for recalculating and monitoring the operational targets daily.
- *Default liquidity requirement.* LCH Ltd defines the default (or 'stressed') liquidity requirement as the liquidity required in the event of the default of the two clearing participants and their affiliates

that would generate the largest aggregate liquidity obligations (the cover two requirement). The default liquidity requirement is calculated daily through liquidity stress testing (CCP Standard 7.8). These stress tests are conducted at an aggregated level across all currencies. They are also run individually at the currency level on the three most active currencies within LCH Ltd (EUR, GBP and USD), assuming complete closure of the foreign exchange markets. Liquidity stress testing is conducted by CaLRM.

Together, these form LCH Ltd's total liquidity requirement, which is used in the calculation of its LCR.

Liquidity needs in currencies that account for a smaller share of the value of transactions in LCH Ltd (which include AUD) are monitored daily, based on historical operational and variation margin flows. Since the majority of LCH Ltd's variation margin flows in these currencies arise from SwapClear, LCH Ltd also monitors the worst-case loss in SwapClear for each less active currency. This is calculated using the same PAIRS methodology for computing initial margin requirements and provides coverage of around 99.7 per cent of the distribution of price movements. Observed increases in operational flows or potential exposures in these currencies are investigated by CaLRM. CaLRM notifies CaLM and ERCo where LCH Ltd's exposures in these currencies exceeds a certain share of LCH Ltd's total liabilities, or exceeds a certain share of total market volume in those currencies. Any actions would be approved by ERCo. A summary of non-material currency exposures is submitted to the LCH Ltd ERCo on a quarterly basis.

7.4 For the purpose of meeting its minimum liquid resource requirement, a central counterparty's qualifying liquid resources in each currency include cash at the central bank of issue and at creditworthy commercial banks, committed lines of credit, committed foreign exchange swaps and committed repos, as well as highly marketable collateral held in custody and investments that are readily available and convertible into cash with prearranged and highly reliable funding arrangements, even in extreme but plausible market conditions. If a central counterparty has access to routine credit at the central bank of issue, the central counterparty may count such access as part of the minimum requirement to the extent it has collateral that is eligible for pledging to (or for conducting other appropriate forms of transactions with) the relevant central bank. All such resources should be available when needed.

LCH Ltd's primary sources of liquidity are: cash posted by clearing participants to meet margin requirements; cash contributions to the default fund; and LCH Ltd's own capital.⁶⁵ Cash is invested predominantly in very short-dated reverse repo transactions with daily maturities, as well as in highly liquid government securities, and held in cash at a central bank in accordance with the LCH Group Investment Risk Policy (CCP Standard 15).

LCH Ltd has arrangements in place to convert its investments and collateral held in custody into cash in a timely manner. It has established Global Master Repurchase Agreements (GMRAs) with a number of highly rated counterparties and regularly determines the amount of liquidity that could be raised with those counterparties (CCP Standard 7.6). LCH Ltd can also sell collateral it holds outright.

LCH Ltd has holdings of liquid resources in those minor currencies that it accepts as initial margin.

LCH Ltd has informed the Bank that it would seek to draw on central bank liquidity where available and when required. LCH Ltd has an ESA at the Bank which can be used to generate intraday AUD liquidity in

⁶⁵ Subject to the constraint that liquid resources of an FCM and their clients cannot be used to meet non-FCM's liquidity needs (CCP Standard 7.1).

exchange for Bank-eligible securities. This facility can be extended overnight, although the Bank expects that LCH Ltd would attempt to seek to generate liquidity in the market before seeking it from the Bank on an overnight basis. LCH Ltd's use of its ESA is discussed further in CCP Standard 9.

Australian dollar liquidity framework

LCH Ltd holds collateral eligible for repo with the Bank in its Austraclear account sufficient to cover its estimated AUD liquidity needs in the event of the default of the two clearing participants and their affiliates with the largest AUD obligations in stressed market conditions. LCH Ltd estimates this requirement as the sum of the SwapClear worst-case loss (using its standard methodology for less actively traded currencies in CCP Standard 7.3) and any operational outflows (buy-side settlements and cash-to-non-cash switches) for the two largest clearing participants and their affiliates. This provides coverage of around 99.7 per cent of the distribution of price movements. In the event that it needed to access AUD liquidity, LCH Ltd would seek to repo this collateral with market counterparts; LCH Ltd has established GMRA's with a number of market participants. In the event that it could not liquidate the collateral in the market, LCH Ltd could repo the collateral to the Bank under the Bank's standard terms.

In the event that LCH Ltd's AUD liquidity needs exceeded the value it could access using its AUD collateral, it would seek further liquidity by entering into foreign exchange swaps with market participants using surplus liquidity from other currencies. LCH Ltd conducts stress testing at an aggregated level across all currencies to ensure it has sufficient liquidity in the event of the default of the two clearing participants and their affiliates giving rise to the largest payment obligations in extreme but plausible conditions (CCP Standard 7.3).

7.5 A central counterparty may supplement its qualifying liquid resources with other forms of liquid resources. If the central counterparty does so, these liquid resources should be in the form of assets that are likely to be saleable or acceptable as collateral for lines of credit, swaps or repos on an ad hoc basis following a default, even if this cannot be reliably prearranged or guaranteed in extreme market conditions. Even if a central counterparty does not have access to routine central bank credit, it should still take account of what collateral is typically accepted by the relevant central bank, as such assets may be more likely to be liquid in stressed circumstances. A central counterparty should not assume the availability of emergency central bank credit as part of its liquidity plan.

LCH Ltd has access to various forms of non-qualifying liquid resources, including uncommitted credit lines with commercial banks and uncommitted access to intraday liquidity at CSDs and ICSDs (which could potentially be extended overnight). LCH Ltd regularly uses intraday liquidity facilities at CSDs and ICSDs to support business-as-usual settlement. Nonetheless, LCH Ltd does not need to rely on any of these resources (or on the provision of central bank credit) to meet its stressed liquidity needs (as defined in CCP Standard 7.3).

LCH Ltd has arrangements in place with a number of highly rated counterparties to undertake foreign exchange transactions, allowing it to use surplus liquidity in a particular currency to mobilise liquidity in different currencies. However, LCH Ltd maintains sufficient liquid resources in GBP, EUR and USD to meet its default liquidity requirements without access to foreign exchange markets (CCP Standard 7.8). LCH Ltd also has access to central bank credit in certain currencies, including AUD. Therefore LCH Ltd does not rely on foreign exchange markets for the majority of its default liquidity requirements (by value). Under its Rulebook, LCH Ltd can also change the currency in which it settles obligations, which may enable LCH Ltd to resolve a liquidity shortfall in a specific currency (CCP Standard 7.9).

7.6 A central counterparty should obtain a high degree of confidence, through rigorous due diligence, that each provider of its minimum required qualifying liquid resources, whether a participant of the central counterparty or an external party, has sufficient information to understand and to manage its associated liquidity risks, and that it has the capacity to perform as required under its commitment. Where relevant to assessing a liquidity provider's performance reliability with respect to a particular currency, a liquidity provider's potential access to credit from the central bank of issue may be taken into account. A central counterparty should regularly test its procedures for accessing its liquid resources at a liquidity provider.

Some of the tools LCH Ltd would use to address a liquidity shortfall are used on an ongoing basis as part of LCH Ltd's standard investment and liquidity management activities (for example, maturing investments, and the purchase and sale of securities). Other tools that LCH Ltd would use are not applied on a day-to-day basis (for example, repos, borrowing, and foreign exchange transactions).⁶⁶ As noted in CCP Standard 7.4, LCH Ltd has GMRA in place with a number of highly rated counterparties to undertake repos.

To ensure that it could access liquidity using these tools, LCH Ltd conducts regular tests (or 'war games'), which include:

- capacity testing exercises with entities with which it has GMRA in place to test the amount of liquidity that LCH Ltd could raise under repo
- simulating the liquidation of collateral by asking counterparties to show hypothetical bid prices and quantities on a synthetic portfolio of securities of a type and concentration that could be held by a clearing participant
- testing the capacity of its foreign exchange counterparties.

These tests are conducted by CaLM quarterly on a rolling basis, so that LCH Ltd tests its ability to apply each tool at least once a year.

7.7 A central counterparty with access to central bank accounts, payment services or securities services should use these services, where practical, to enhance its management of liquidity risk. A central counterparty that the Reserve Bank determines to be systemically important in Australia and has obligations in Australian dollars should operate its own Exchange Settlement Account, in its own name or that of a related body corporate acceptable to the Reserve Bank, to enhance its management of Australian dollar liquidity risk.

LCH Ltd uses its ESA to make the final stage of its AUD payments (the settlement of AUD variation margin between LCH Ltd and its clearing participants' settlement banks (PPS banks)). As noted in CCP Standard 7.3, LCH Ltd holds collateral eligible for repo with the Bank in an Austraclear account in its own name. LCH Ltd uses this collateral to generate liquidity in its ESA using the Bank's intraday repo facility to manage its AUD settlements. LCH Ltd would also have access to overnight liquidity from the Bank under standard terms, although it would attempt to raise liquidity from market counterparts before seeking access to liquidity from the Bank on an overnight basis.

LCH Ltd also has accounts with the BoE (for concentration of GBP), De Nederlandsche Bank (for concentration of EUR), the Bank of Canada (for concentration of CAD), the Swiss National Bank (for

⁶⁶ For clarity, repo describes the exchange of securities for cash, as opposed to reverse repo, which is the exchange of cash for securities. LCH Ltd performs reverse repos on a business-as-usual basis.

concentration of CHF), the Norges Bank (for concentration of NOK) and the Sveriges Riksbank (for concentration of SEK) (CCP Standard 9.1). LCH Ltd has informed the Bank that it favours the use of central bank facilities if they are practical and available.

7.8 A central counterparty should determine the amount and regularly test the sufficiency of its liquid resources through rigorous stress testing. A central counterparty should have clear procedures to report the results of its stress tests to appropriate decision-makers at the central counterparty and to use these results to evaluate the adequacy of, and adjust, its liquidity risk management framework. In conducting stress testing, a central counterparty should consider a wide range of relevant scenarios. Scenarios should include relevant peak historic price volatilities, shifts in other market factors such as price determinants and yield curves, multiple defaults over various time horizons, simultaneous pressures in funding and asset markets, and a spectrum of forward-looking stress scenarios in a variety of extreme but plausible market conditions. Scenarios should also take into account the design and operation of the central counterparty, include all entities that might pose material liquidity risks to the central counterparty (such as commercial bank money settlement agents, nostro agents, custodians, liquidity providers and linked FMIs) and, where appropriate, cover a multiday period. In all cases, a central counterparty should document its supporting rationale for, and should have appropriate governance arrangements relating to, the amount and form of total liquid resources it maintains.

LCH Ltd runs liquidity stress tests to forecast liquidity requirements that could arise over a 30-day liquidity horizon following the default of the two clearing participants and their affiliates giving rise to the largest liquidity requirements (the cover two liquidity stress tests). The tests are conducted separately for LCH Ltd's three material currencies (GBP, EUR and USD) and in aggregate over all currencies. The tests are run daily at end-of-day and at four times intraday (using participant positions as at the end of the previous day, with full cash-delivery obligations conservatively modelled to be open until the last possible point in a given settlement window). The tests cover all liquidity risks related to clearing participants and their affiliates, including settlement obligations, variation margin requirements and shortfalls arising from investment losses (which would arise if a defaulter was also an LCH Ltd investment counterparty). The liquidity stress tests are used to determine the default liquidity requirement.

- *Settlement obligations.* On the default of a clearing participant, LCH Ltd would assume obligations to fulfil physical settlement for its securities clearing services (RepoClear and EquityClear). These are fixed obligations, for which LCH Ltd estimates its stressed default liquidity needs based on gross cash outflows – that is, it does not allow offsets from potential cash inflows where securities were delivered to the non-defaulting members to generate cash flows.
- *Variation margin requirements.* Similar to settlement obligations, LCH Ltd needs to ensure that sufficient liquidity is available to cover potential variation margin losses on the defaulting participant's portfolio before exposures are fully closed out. The variation margin loss is another component in the overall cover two liquidity requirement. LCH Ltd models variation margin outflows with credit stress test losses, aggregating stress test losses across clearing services. For each participant and each clearing service, LCH Ltd calculates stress test losses under each credit stress scenario. These stress scenarios are grouped into five market states; stress losses are then aggregated (within each market state) across clearing services for each clearing participant (and their affiliates).

In addition to the cover two liquidity stress tests, LCH Ltd also runs several additional extreme but plausible stress test scenarios, which target events that are considered to have a probability of up to once in 30 years. These scenarios model the impact of restricted access to liquid resources due to the closure of certain parts of the repo market, the impact of a regional economic crisis, and the default of multiple clearing participants. The results of these additional stress tests are used for management information.

The development and implementation of the liquidity stress testing models (and the liquidity risk management framework more generally) is undertaken by CaLRM and subject to oversight by the LCH Ltd ERCo. CaLRM reviews the results from liquidity stress testing each day. It also conducts an internal model review each quarter (and more frequently in stressed market conditions), which includes reverse liquidity stress testing to test the adequacy of its liquid resources and assess whether there are plausible scenarios that could cause a liquidity shortfall. Any material findings of the quarterly review are reported to the LCH Ltd ERCo. Any changes to the liquidity stress testing model are proposed by CaLRM and must be assessed by the LCH Ltd Risk Management department and approved by the LCH Ltd ERCo; material changes must also be notified to the LCH Ltd Risk Committee. The liquidity stress testing model is subject to validation by an independent model validation team each year.

LCH Ltd also conducts reverse stress tests to determine scenarios under which LCH Ltd's liquidity resources would be exhausted, and has processes in place to assess the plausibility of such scenarios.

7.9 A central counterparty should establish explicit rules and procedures that enable the central counterparty to effect same-day and, where appropriate, intraday and multiday settlement of payment obligations on time following any individual or combined default among its participants. These rules and procedures should address unforeseen and potentially uncovered liquidity shortfalls and should aim to avoid unwinding, revoking or delaying the same-day settlement of payment obligations. These rules and procedures should also indicate the central counterparty's process to replenish any liquidity resources it may employ during a stress event, so that it can continue to operate in a safe and sound manner.

The actions that LCH Ltd would take to address a liquidity shortfall or replenish its liquidity resources are described in the LCH Ltd Liquidity Plan and in LCH Ltd's Recovery Plan. The Liquidity Plan covers the resources and tools that would be used to meet operational or default liquidity needs (CCP Standard 7.3).

LCH Ltd typically holds a buffer of liquid resources in excess of those required to meet its projected operational and default liquidity requirements. Therefore LCH Ltd would likely be able to continue to use these resources in the event of a liquidity stress event that exceeded its operational and default liquidity requirements (for example, an event beyond a cover two default). LCH Ltd's Recovery Plan also defines additional tools that could be used in the event that these resources (and the tools described in the Liquidity Plan) were insufficient to meet the liquidity shortfall.

Additionally, some of the tools LCH Ltd uses to manage its day-to-day liquidity needs (but does not include in its available liquid resources for the purposes of assessing their adequacy) may also be available to address a liquidity shortfall. These include: allowing investments to mature without reinvesting the proceeds (cash would be held on deposit at institutions approved under the LCH Group Investment Risk Policy until the liquidity requirement crystallised); sale or repo of non-cash collateral held in LCH Ltd's investment portfolio; accessing credit or foreign exchange lines with commercial banks; or intraday liquidity facilities with CSDs or ICSDs.

LCH Ltd also has access to a number of other tools, set out in its Rulebook and Procedures, which give it the ability to manage the level of liquidity within the firm both under normal market conditions and during periods of reduced market liquidity. These include active management of participant collateral movements (such as changing the notice period and/or approval limits for collateral substitutions), as well as prioritisation regarding the return of excess collateral. LCH Ltd also has the ability under its Rulebook to change the currency in which it settles obligations; this might enable LCH Ltd to resolve a situation in which there was a liquidity shortfall in a specific currency. LCH Ltd would prioritise the various tools depending on the timing, size and duration of the liquidity requirements and the prevailing market conditions.

The Recovery Plan describes the steps that LCH Ltd would take to maintain the continuity of the services it provides in the event that it suffered extreme losses in the event of a participant default. If a loss from a participant default exceeded the size of prefunded resources, LCH Ltd would have powers to address that liquidity shortfall by: calling non-defaulting participants for Unfunded Contributions; invoking the Loss Distribution Process and using VMGH; requesting voluntary payments from non-defaulting participants; and by closing all outstanding SwapClear contracts and closing the service (CCP Standard 4.8).

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 (which can reflect market-wide conditions, or be linked to a particular market). LCH Ltd addresses restricted access to liquidity sources in its liquidity stress testing.

Standard 8: Settlement finality

A central counterparty should ensure clear and certain final settlement, at a minimum by the end of the value date. Where necessary or preferable, a central counterparty should facilitate final settlement intraday or in real time.

8.1 A central counterparty's rules and procedures should clearly define the point at which settlement is final.

The Settlement Finality Regulations contained within the LCH Ltd Rulebook set out the conditions under which the settlement of obligations in respect of registered exchange-traded contracts and OTC contracts are final and irrevocable (CCP Standard 1.5). These Regulations are supported by LCH Ltd's designation under the UK *Financial Markets and Insolvency (Settlement Finality) Regulations 1999*, which implement *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*. This seeks to provide certain protections for payment and settlement systems by minimising the disruption caused by insolvency proceedings brought against a participant in such a system.

LCH Ltd's settlement with respect to derivatives cleared in SwapClear involves cash payments and the transfer of non-cash securities for margin requirements. All derivative contracts cleared through SwapClear are cash settled. Variation margin and default fund contributions are also required in cash. Variation margin payments associated with contracts of SwapClear clearing members (but not FCMs nor US SwapClear clearing members) are treated as transfer of collateral, although such clearing members may elect to treat variation margin as settlement payments. For a SwapClear contract that is collateralised to market, the net present value of the contract is aggregated over the life of the contract.

For a contract that is settled to market, the exposure is extinguished (and the net present value is reset) daily. FCMs and US SwapClear clearing members must treat variation margin as settlement.

LCH Ltd instructs cash payments to and from participants via 'Payment Transfer Orders', sent to the relevant participant's settlement bank in LCH Ltd's PPS (see CCP Standard 9 for more details on the PPS), generally via SWIFT.⁶⁷ Under LCH Ltd's Settlement Finality Regulations, a Payment Transfer Order executed through the PPS becomes irrevocable when confirmation is sent by the relevant PPS bank to LCH Ltd that the payment will be met. The LCH Ltd Procedures specify that a participant's obligation to LCH Ltd will be deemed met only when funds have been transferred from the PPS bank to LCH Ltd's concentration bank, and any time permitted by the relevant payment system for the recall of any such payment has expired. The Procedures specify that LCH Ltd's obligation to a participant will be deemed met when payment instructions in respect of that payment have been given to the participant's PPS bank, to the extent that LCH Ltd has taken steps to transfer to the PPS bank the funds necessary to enable the PPS bank to perform the payment instructions.

For the SwapClear service, transfer of securities is relevant for the purpose of collateralisation. By means of the collateral management system, clearing participants instruct the transfer of securities pursuant to the Charge Agreements between them and LCH Ltd via 'Securities Transfer Orders', sent to a Securities System Operator (a CSD or securities settlement facility (SSF)). LCH Ltd's rights over non-cash collateral are on a 'security interest' basis, which is governed by Charge Agreements between LCH Ltd and each clearing participant (CCP Standard 1.2). Under LCH Ltd's Settlement Finality Regulations, a Securities Transfer Order becomes irrevocable at the time after which the Securities System Operator prescribes such instruction may not be revoked by a participant or other person.

LCH Ltd seeks legal opinions regarding the enforceability of the LCH Ltd Rulebook in all jurisdictions in which its participants are incorporated. The Rulebook aims to provide a high degree of legal certainty with regard to settlement finality, among other things (CCP Standard 1.5).

8.2 A central counterparty should ensure final settlement no later than the end of the value date, and preferably intraday or in real time, to reduce settlement risk.

Where a net call is made on a participant, the participant's PPS bank is required under the PPS agreement to make an irrevocable commitment to fund the obligation due to LCH Ltd. This commitment is due by 9 am UK time if the call was made overnight, or within one hour if the call was made intraday. Confirmation of calls made via the Australian PPS (see CCP Standard 9) are subject to the same one-hour limit on days on which the SwapClear service is open, but are due at 10 am Sydney time on the next open day where the call instruction is delivered on a day when LCH Ltd is closed.

Calls made in GBP, EUR, USD, CAD or MXN are processed with same-day value, and must be credited to LCH Ltd's nominated account by the close of business. Where the obligation is denominated in another currency, the call is made with a value date of the following day. In this case, the PPS bank must make an irrevocable commitment on the same timeframe as for other currencies, but due to payment system cut-off times, actual payment does not occur until the following day (next-business-day value).

Concentration payments from the PPS bank to LCH Ltd's account at the relevant concentration bank must be completed within two hours of receipt of the concentration instruction. Concentration instructions for GBP, EUR and USD are sent regularly throughout the day; instructions for JPY and CAD are sent by 9 am UK time; and instructions for other currencies are sent at 8 am UK time. Where the

67 Fax or email confirmation would be used in a contingency scenario where SWIFT was unavailable.

net obligation is in favour of participants at a PPS bank, payment occurs from the concentration bank to that PPS bank according to the same two-hour timeline as outlined above.

LCH Ltd observes participants' settlement currency preferences on all days other than currency holidays. For major currencies (GBP, EUR and USD), if a participant's preferred settlement currency is unavailable due to a holiday, LCH Ltd will issue calls in one of the other major currencies. Should USD or EUR be unavailable LCH Ltd would call GBP; if GBP is unavailable USD would be called. EUR would be called only in a situation where GBP and USD are both unavailable.

Where LCH Ltd permits clearing participants (FCMs only) to meet intraday margin calls on client accounts by lodging non-cash collateral, such transfers of securities must be settled on the value date of the margin call and completed within one hour of the participant's notification of its intention to transfer such collateral.

Final settlement of derivatives cleared through SwapClear occurs via the PPS according to the same timelines for margin calls and pays set out above.

8.3 A central counterparty should clearly define the point after which unsettled payments, transfer instructions or other obligations may not be revoked by a participant.

LCH Ltd's Rulebook defines the point after which accepted but unsettled payments are irrevocable. As described under CCP Standard 8.1, Payment Transfer Orders through the PPS are irrevocable under LCH Ltd's Settlement Finality Regulations once the PPS bank has confirmed the commitment via SWIFT message. Securities Transfer Orders sent to a Securities System Operator are irrevocable under LCH Ltd's Settlement Finality Regulations at the time after which the Securities System Operator prescribes such instructions may not be revoked by a participant or other person.

Standard 9: Money settlements

A central counterparty should conduct its money settlements in central bank money where practical and available. If central bank money is not used, a central counterparty should minimise and strictly control the credit and liquidity risk arising from the use of commercial bank money.

9.1 A central counterparty should conduct its money settlements in central bank money, where practical and available, to avoid credit and liquidity risks. A central counterparty that the Reserve Bank determines to be systemically important in Australia and has Australian dollar obligations should settle its Australian dollar obligations across an Exchange Settlement Account held at the Reserve Bank, in its own name or that of a related body corporate acceptable to the Bank.

In its statement of risk appetite, as set out in the LCH Ltd Risk Governance Framework, the LCH Ltd Board specifies that it expects the LCH Ltd to use central banks for payments and cash settlements where possible. LCH Ltd settles its AUD obligations across its ESA held at the Bank, via its PPSs (see below).

Settlement arrangements for SwapClear involve arrangements to settle obligations between LCH Ltd and its participants, including for initial margin, variation margin and cash settlement of contracts, default fund contributions and participation fees. Cash payments to and from SwapClear participants are settled through the PPS. The PPS is regulated and overseen by the BoE as a 'recognised payment system' under the UK *Banking Act 2009*. 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 (using a correspondent bank if they do not have a local presence). Any payments to or from the concentration bank represent the net position against LCH Ltd of all of the participants that use a given PPS bank.⁶⁸

LCH Ltd operates a UK, a US, and an Australian PPS. The UK PPS is open from 6am – 4pm UK time, and the US PPS operates from 4pm – 10pm UK time. There are 13 UK PPS banks, 10 US PPS banks and 5 Australian PPS banks. LCH Ltd uses central banks as its concentration banks for AUD (Reserve Bank of Australia), CAD (Bank of Canada), CHF (Swiss National Bank), EUR (De Nederlandsche Bank), GBP (BoE), NOK (Norges Bank) and SEK (Sveriges Riksbank). LCH Ltd uses commercial concentration banks for all other currencies: Citibank and BNY Mellon for USD (LCH Ltd does not have access to the US Federal Reserve); and HSBC for the remaining currencies.⁶⁹

Australian Protected Payments System

The Australian PPS arrangements are similar to the model operated in the UK and US. The Bank expects any direct clearing participant that has an active ESA and has joined the SwapClear service since LCH Ltd had its CS licence varied to allow it to offer the SwapClear service in Australia, to become a PPS bank and to use its PPS arrangements to settle its AUD obligations across its ESA (that is, to self-PPS). This will ensure that settlement of those participants’ AUD obligations does not involve unnecessary tiering, complexity or reliance on third-party commercial settlement banks.

All five Australian participants that are required to use the Australian PPS currently do so.

9.2 If central bank money is not used, a central counterparty should conduct its money settlements using a settlement asset with little or no credit or liquidity risk.

The PPS involves transitional settlement across the books of the commercial banks that act as PPS banks (see CCP Standard 9.3 for a description of the risk management practices applied by LCH Ltd in respect of its PPS arrangements).

9.3 If a central counterparty settles in commercial bank money or its participants effect settlements using commercial settlement banks, it should monitor, manage and limit credit and liquidity risks arising from the commercial bank money settlement agents and commercial settlement banks. In particular, a central counterparty should establish and monitor adherence to strict criteria for commercial banks appropriate to their role in the settlement process, taking account of matters such as their regulation and supervision, creditworthiness, capitalisation, access to liquidity and operational reliability. A central counterparty should also monitor and manage the concentration of its and its participants’ credit and liquidity exposures to commercial bank money settlement agents and settlement banks.

A clearing participant’s obligation to LCH Ltd is only deemed satisfied once funds have been transferred from the PPS bank to LCH Ltd’s concentration bank and any time permitted by the relevant payment system for the recall of any such payment has expired (CCP Standard 8.1). LCH Ltd has credit exposure to its commercial concentration banks, which begins once funds are received by the concentration bank

⁶⁸ For example, consider a PPS bank that acts on behalf of just two participants. If one participant is owed \$1 from LCH Ltd, and the other participant owes \$1 to LCH Ltd, there will be no payment from the PPS bank to the concentration bank.

⁶⁹ Citibank is the concentration bank for USD in the UK PPS, and BNY Mellon is the concentration bank for USD in the US PPS.

from a PPS bank, and continues until the funds are transferred by the concentration bank to another entity to complete an LCH Ltd treasury investment.

LCH Ltd requires that all commercial banks participating in the PPS must maintain their status as a bank under the supervision of banking authorities in relevant jurisdictions. To manage credit and liquidity exposures, LCH Ltd sets risk-based criteria for PPS banks which include:

- a requirement that the bank maintain an ICS better than a predefined threshold⁷⁰
- operational requirements around accounting and SWIFT messaging
- adherence to the terms and conditions of the PPS agreement.

LCH Ltd reserves the right to apply more stringent criteria when, in its assessment, a PPS bank's financial resources or operational capability are not commensurate with its level of business. In the event that a PPS bank's ICS deteriorates beyond the predefined threshold or it fails to meet the required operational capability criteria, LCH Ltd may deem that the bank is no longer eligible to operate as a PPS bank. The LCH Group Settlement, Payment and Custody Risk Policy states that, in the event that a bank's PPS bank status is terminated by LCH Ltd, a suitable transition period should be provided to minimise the impact on financial system stability. LCH Ltd envisages that any exit process will take no longer than three months, and will ultimately depend on how quickly affected participants can establish arrangements with another PPS bank. To deal with an unexpected and immediate exit of a PPS bank (for example, due to insolvency), all participants are required to have contingency plans such that they can continue to meet obligations to LCH Ltd on an ongoing basis. These contingency arrangements are typically tested annually. These arrangements are recorded by LCH Ltd's Collateral Operations team, and would be temporary until replacement PPS arrangements were established.

In the event that a bank no longer wishes to act as a PPS bank, a minimum of 90 days' notice must be given and arrangements made with LCH Ltd for an orderly exit.

LCH Ltd's preference is to use central banks as concentration banks (CCP Standard 9.1). Commercial concentration banks are required to meet the above criteria for PPS banks, as well as the following:

- a more stringent ICS threshold than for PPS banks
- specified intraday and overnight unsecured exposure limits – intraday unsecured exposures to commercial concentration banks are subject to limits based on LCH Ltd's capital (this includes exposures from both investment and concentration activity), while overnight unsecured exposures are subject to nominal limits
- more stringent monitoring and escalation of intraday limit breaches.

LCH Ltd also maintains at least two contingency options for its commercial concentration banks, in accordance with the LCH Group Payment, Settlement and Custody Risk Policy. These arrangements are tested annually.

New PPS and concentration banks must be approved by the LCH Ltd ERCo, upon request from CaLM, Clearing Services or the Operations department. The Operations department is responsible for conducting due diligence of PPS and concentration banks, as well as continued monitoring of their operational performance. Operational and legal due diligence is performed at least once every two years for each intermediary, including PPS banks. The due diligence process aims to provide certainty

⁷⁰ ICS are set using the same methodology as for clearing participants (CCP Standard 4).

that the assets belonging to LCH Ltd and its participants are fully segregated and identifiable, and would be promptly accessible in the event the PPS bank, concentration bank or participant defaulted. Reports on the operational performance of PPS and concentration banks are reviewed by the LCH Ltd ERCo and the Risk Committee. The Collateral Operations department frequently monitors LCH Ltd's intraday liquidity exposures to commercial concentration banks.

LCH Ltd does not impose concentration limits on the volume of payment activity that flows through individual PPS banks. Participants choose their own PPS banks, remain liable for meeting obligations due to LCH Ltd until funds have been transferred to LCH Ltd's concentration bank, and must maintain contingency arrangements for meeting obligations to LCH Ltd in the event that a PPS bank failed or experienced an operational disruption. LCH Ltd conducts testing of PPS contingency arrangements on an annual basis. Participants' credit exposures to individual PPS banks are time limited, as determined by the deadlines for concentration payments stated in the PPS Agreements (CCP Standard 9.5).

9.4 If a central counterparty conducts money settlements on its own books, it should minimise and strictly control its credit and liquidity risks.

LCH Ltd does not conduct money settlement on its own books.

9.5 A central counterparty's legal agreements with any commercial bank money settlement agents should state clearly when transfers on the books of the relevant commercial bank are expected to occur, that transfers are to be final when effected, and that funds received should be transferable as soon as possible, at a minimum by the end of the day and ideally intraday, in order to enable the central counterparty and its participants to manage credit and liquidity risks.

LCH Ltd executes a standardised set of binding terms and conditions (the 'PPS Agreement') with the commercial banks that participate in the PPS. There is a specific agreement for each of the UK PPS, US PPS and the Australian PPS. The PPS Agreement requires PPS banks to confirm PPS calls made to participants for which they provide PPS services; calls made overnight UK time must be confirmed by 9 am UK time the following morning, and intraday calls must be confirmed within one hour of the call being received by the PPS bank (CCP Standard 8.2). Transfers must then be credited to LCH Ltd's nominated account 'without delay', and by the latest at the close of business on the value date. Confirmation of calls made via the Australian PPS are subject to the same one-hour limit on days on which the SwapClear service is open, but are due at 10 am Sydney time on the next open day where the call instruction is delivered on a day when LCH Ltd is closed.

LCH Ltd's concentration bank accounts at central banks are governed by specific agreements between LCH Ltd and the applicable central banks. A specific agreement on concentration activities was executed with BNY Mellon as an addendum to the PPS Agreement already in place. LCH Ltd considers that the standard PPS Agreement remains sufficient to govern the concentration activities of Citibank and HSBC.

Participants' credit exposures to individual UK PPS banks are limited by a requirement in the PPS Agreement that all PPS transfers onwards to the concentration bank should be made within two hours of the transfer request being made by LCH Ltd (CCP Standard 8.2). US PPS banks must perform the concentration process if requested by LCH Ltd and must do so before the US close of business.

Standard 10: Physical deliveries

A central counterparty should clearly state its obligations with respect to the delivery of physical instruments or commodities and should identify, monitor and manage the risks associated with such physical deliveries.

LCH Ltd's SwapClear service does not offer any contracts that can be physically delivered.

The Bank has concluded that CCP Standard 10 does not apply to LCH Ltd's SwapClear service.

10.1 A central counterparty's rules should clearly state its obligations with respect to the delivery of physical instruments or commodities.

Not applicable to LCH Ltd's SwapClear service.

10.2 A central counterparty should identify, monitor and manage the risks and costs associated with the storage and delivery of physical instruments or commodities.

Not applicable to LCH Ltd's SwapClear service.

Standard 11: Exchange-of-value settlements

If a central counterparty is involved in the settlement of transactions that comprise two linked obligations (for example, securities or foreign exchange transactions), it should eliminate principal risk by ensuring that the final settlement of one obligation is conditional upon the final settlement of the other.

LCH Ltd's SwapClear service does not involve exchange-of-value settlements.

The Bank has concluded that CCP Standard 11 does not apply to LCH Ltd's SwapClear service.

11.1 A central counterparty should eliminate principal risk associated with the settlement of any obligations involving two linked obligations by ensuring that the payment system or securities settlement facility employed operates in such a way that the final settlement of one obligation occurs if and only if the final settlement of the linked obligation also occurs, regardless of whether the securities settlement facility settles on a gross or net basis and when finality occurs.

Not applicable to LCH Ltd's SwapClear service.

11.2 A central counterparty should eliminate principal risk associated with the settlement of linked obligations by ensuring that it employs an appropriate delivery versus payment (DvP), delivery versus delivery (DvD) or payment versus payment (PvP) settlement mechanism.

Not applicable to LCH Ltd's SwapClear service.

Standard 12: Participant default rules and procedures

A central counterparty should have effective and clearly defined rules and procedures to manage a participant default. These rules and procedures should be designed to ensure that the central counterparty can take timely action to contain losses and liquidity pressures and continue to meet its obligations.

- 12.1 A central counterparty should have default rules and procedures that enable the central counterparty to continue to meet its obligations in the event of a participant default and that address the replenishment of resources following a default. A central counterparty should ensure that financial and other obligations created for non-defaulting participants in the event of a participant default are proportional to the scale and nature of individual participants' activities.**

Rules and procedures

The LCH Ltd Rulebook sets out the contractual rights and obligations of LCH Ltd and its clearing participants (CCP Standard 1). The management of the default of a SwapClear or Listed Rates clearing participant would be governed by two main parts of the Rulebook:

- the LCH Ltd Default Rules contain general default rules, which set out rights and related obligations that apply to the default of a participant in any of LCH Ltd's services, and a supplement on the Rates service default fund, which sets out rights and obligations specific to a SwapClear or Listed Rates clearing participant default
- the LCH Ltd Procedures describe, among other things, the requirement to participate in the default management process and fire drills, and the possibility of relying on affiliated participants or approved outsourcing agents to meet that requirement.

In addition to the LCH Ltd Rulebook, the Rates service default management process is described in several internal policies:

- The Group Default Management Policy (owned by Group Risk) details the standards that must be met in each CCP across the Group in dealing with the default of a clearing participant. It is reviewed annually by the LCH Ltd ERCo, the LCH Ltd Risk Committee, and also approved by the LCH Ltd Board.
- The LCH Ltd Default Management Guidelines (owned by the LCH Ltd Risk Management department) implement the default management process according to the Group Default Management Policy, and outline the key roles and responsibilities in managing a clearing participant default. The guidelines are reviewed by the LCH Ltd ERCo and LMC when there are material changes.
- The Rates Service Default Management Process document describes the details of the default management process and follows the principles outlined in the Group Default Management Policy and the LCH Ltd Default Management Guidelines. It is subject to regular reviews to reflect changes in the service and industry best practice.

Default management

In the event of a default of a SwapClear or Listed Rates clearing participant, the Rates service DMG would be responsible for the day-to-day management of the default process. The Rates service DMG includes the LCH Ltd CEO or Deputy CEO, who would generally act as chair during a default, at least one director of LCH Ltd's Risk Management department and a revolving group of senior traders that would

be seconded to LCH Ltd from non-defaulting clearing participants in the event of a default.⁷¹ The LCH Ltd DCMT, which consists of the LCH Ltd CEO, CRO and various other LCH Ltd executives, would be responsible for the overall management of the default in LCH Ltd. The DCMT would coordinate the DMGs for LCH Ltd's different services. The LCH Ltd CEO is responsible for convening the LCH Ltd DCMT in the event of a participant default in one of LCH Ltd's services. LCH Group and each LCH Group CCP also have a DCMT; the LCH Group DCMT would meet to consider coordination across CCPs if required.

The Rates service default management process can be viewed as comprising five stages, some of which run concurrently. If multiple clearing participants defaulted simultaneously, LCH Ltd would manage, hedge and auction (if required) each defaulting participant's portfolio separately, though it may seek operational efficiencies where appropriate.

1. Declaration of default and immediate actions

A clearing participant default can be triggered either by LCH Ltd declaring the participant to be in default or the occurrence of an 'automatic early termination event' (CCP Standard 12.2). LCH Ltd would undertake the following actions after a default, mostly in parallel:

- LCH Ltd would send a default notice to the relevant member
- the LCH Group marketing and communications function would publish a default notice on its website and execute its pre-agreed market communication strategy
- the ability of the defaulting participant to submit trades would be revoked (this would also prevent clients from submitting trades through the defaulting participant)
- the Chair of the Rates service DMG would organise a meeting within one hour of the declaration of default and the Rates service DMG would be given access to risk-related information
- CaLM may convert some or all of the non-cash collateral held on behalf of the defaulting participant and its clients into cash.

2. Porting of client accounts

LCH Ltd would seek to port the positions and collateral of a defaulting clearing participant's clients during the client's porting window (see also CCP Standard 13). Following a participant default, LCH Ltd would choose a porting window for each type of client account, which would be a period of at least 24 hours commencing on the day of the default.⁷² A client that had not nominated backup clearing participants in advance would be given the opportunity to seek an alternative clearing participant. The SwapClear and Listed Rates services would provide each client's backup clearing participants with a report on the client's positions, margin and collateral. The backup clearing participant would then decide whether to accept the client, and LCH Ltd would port those clients that had a backup clearing participant willing to accept them.

LCH Ltd may combine the portfolios of any clients from a single participant that do not port. Combined client portfolios would be hedged and auctioned separately (both from the defaulter's house portfolio

⁷¹ It is a SwapClear participation requirement that participants make available (on a rotational basis) representatives, with requisite skills or experience acceptable to LCH Ltd, as members of the Rates service DMG. Members of the DMG must treat any information they receive as confidential to LCH Ltd, are not permitted to contact their employer during the hedging process, and must not join another CCP's DMG.

⁷² LCH Ltd would have the discretion to increase or decrease the porting window for individual clients. The LCH Ltd default rules specify circumstances under which LCH Ltd could reduce an individual client's porting window below 24 hours (though not below 12 hours).

and each other). The positions of each client account would remain identifiable in the client portfolios, to enable LCH Ltd to allocate costs appropriately and maintain protection from fellow client risk (to the extent that the clients' accounts provide such protection; CCP Standard 13). LCH Ltd allocates the costs of hedging the client portfolios according to the proportion of each client's initial margin. LCH Ltd allocates the auction costs to each position in the auctioned portfolio.

3. Hedging and portfolio splitting

The Rates service DMG would plan and execute a set of hedge trades to reduce the market risk on the portfolio of the defaulting clearing participant and the combined portfolios of non-porting clients. The hedge trades must either be in SwapClear-eligible products with non-defaulting SwapClear clearing participants or in futures products executed on an exchange that clears trades through the Listed Rates service:

- If a participant of the OTC Rates margin class alone defaulted, the portfolio would be hedged using SwapClear products or futures (or both). If futures were used, the DMG would ultimately prepare for auction one or more OTC interest rate derivatives sub-portfolios, one or more inflation derivatives sub-portfolios and one or more sub-portfolios containing futures.
- If a participant of the Listed Rates margin class alone defaulted, the portfolio would be hedged using futures. It is likely that the hedging process would remove all positions and, if so, no auction would be held. Nonetheless, the Rates service DMG reserves the right to auction some or all of the outstanding futures positions.
- If a participant active in both margin classes defaulted, the portfolio would likely be hedged using SwapClear products and futures. If futures were used, the DMG would ultimately prepare for auction one or more OTC interest rate derivatives sub-portfolios, one or more inflation derivatives sub-portfolios and one or more sub-portfolios containing futures.

The Rates service DMG would also split these sub-portfolios by currency, and may split a particular currency sub-portfolio into smaller sub-portfolios if it determined that doing so would lead to a more efficient auction process.⁷³ The Rates service DMG will also construct an OTC-futures basis portfolio to transfer futures risk associated with the portfolio margined contracts into OTC equivalent risk and an OTC futures basis position.

4. Portfolio auctions

If a defaulting clearing participant's portfolio contained SwapClear products, an auction would be required. LCH Ltd would auction the defaulting clearing participant's house portfolio, and if applicable, the non-porting client portfolios. Each currency portfolio would be auctioned separately in an order determined by the DMG. All OTC Rates margin class participants that cleared in a given currency and product would be expected to bid on any OTC Rates-only portfolio denominated in that currency and product; participants in the OTC Rates margin class that also cleared futures with LCH Ltd would also be expected to bid on each basis portfolio denominated in currencies in which they cleared. The winner of the auction would be the participant that submitted the highest bid; or if multiple participants submitted an equal highest bid, the first participant to submit the equal highest bid. Under section 2C

⁷³ If a currency portfolio was split, it is expected that it would be split into one or more portfolios with very low market risk (delta neutral or near neutral), and one 'residual portfolio' comprising the other trades that could not be allocated to the delta neutral portfolios. The residual portfolio would be auctioned together with any hedges in that currency entered into by the DMG, so that the portfolio being auctioned was nearly risk-neutral.

of the LCH Ltd Procedures, LCH Ltd would have the discretion to reject bids if it considered that accepting the bid may: breach a legal or regulatory requirement; cause legal action to be taken against LCH Ltd; endanger LCH Ltd, its participants or any of the markets in which it operates; or cause LCH Ltd or its participants reputational harm.

In the event that the auction gave rise to auction losses, these would be allocated to the default waterfall. LCH Ltd's rules allocate losses to clearing participants' prefunded and unfunded default fund contributions in an order that is intended to provide participants with incentives to bid competitively in the auction (see 'Use and sequencing of financial resources' below). If the auction loss on a portfolio was smaller than the prefunded resources attributed to it, that auction would very likely proceed to portfolio transfer and settlement. If the auction loss exceeded the prefunded resources attributed to it, the DMG would have the discretion to re-auction the portfolio.

5. Portfolio transfer and settlement

Each portfolio would be transferred at the close of business on the day on which it was successfully auctioned. The associated bid amounts and margin payments would be settled between the winner and LCH Ltd by the next morning. The winner of a currency portfolio would be responsible for the risk on that portfolio as soon as the Rates service DMG determined the winner, even though the portfolio transfer would not occur until the close of business on the day of the auction. Hence, in the end-of-day margin run that is called the next morning, the auction winner would pay or receive variation margin to reflect any changes in the net present value of the portfolio from when the Rates service DMG determined the winner.⁷⁴

Use and sequencing of financial resources

In the event of a clearing participant default, LCH Ltd would allocate any losses it incurred during the default management process according to the default waterfall as specified in the Rulebook. LCH Ltd's primary sources of liquidity are: cash posted by clearing participants to meet margin requirements; cash contributions to default fund; and LCH Ltd's own capital (see CCP Standard 7 for discussion on how LCH Ltd manages liquidity risk in a default). Losses incurred during the default management process would be applied to LCH Ltd's prefunded resources in the following order:

1. defaulter's margin and default fund contributions
2. CCP capital allocated to the default waterfall
3. non-defaulting participants' default fund contributions
4. non-defaulting participants' unfunded default fund contributions and VMGH

The method used to allocate losses between non-defaulting participants' differs for pre-auction losses and auction losses (see below). The pre-auction loss comprises: the net cumulative loss on the defaulting participants' portfolio incurred due to variation margin, fees, coupons and an amount (to ensure that the fair price of a swap is not affected by the fact that variation margin is exchanged; CCP Standard 6.4); and losses due to hedging activities prior to each auction. The auction loss is the difference between the net present value of the portfolio prior to the relevant auction and the winning

⁷⁴ Any coupons or other amounts sent for settlement on or before the end of the day on which a portfolio was auctioned would be the responsibility of the defaulting participant, and would be allocated to the default waterfall. The winner would only become responsible for making these payments on the day after the portfolio was auctioned.

bid. Losses would be strictly applied according to the default waterfall, such that each category of resources would be fully exhausted before losses are allocated to the next category.

Non-defaulting participants' default fund contributions

Once the defaulter's margin and default fund contributions, and the CCP capital allocated to the default waterfall were exhausted, LCH Ltd would allocate losses to the non-defaulting participants' default fund contributions. The order in which losses are applied would be determined by whether the defaulting participant was active in the OTC Rates or Listed Rates margin class, or both.

If the defaulter was a participant of the OTC Rates margin class only:

- losses would first be applied to the surviving participants of the OTC Rates margin class
- then to the surviving portfolio-margining participants of the Listed Rates margin class
- then to the other surviving participants of the Listed Rates margin class.

If the defaulter was a participant of the Listed Rates margin class only:

- losses would first be applied to the surviving participants of the Listed Rates margin class
- then to the surviving participants of the OTC Rates margin class.

If the defaulter was a participant in both margin classes, losses would be applied to the OTC Rates and Listed Rates margin classes in proportion to the losses in each margin class in the defaulter's portfolio. The order of application for the OTC Rates margin class would be the same as set out above. The order would also be the same for the Listed Rates margin class, except that surviving portfolio-margining participants of the Listed Rates margin class would have losses applied to them before other surviving members of the Listed Rates margin class.

Allocation of pre-auction losses

Pre-auction losses would be allocated to the defaulting participant's margin, followed by their default fund contribution, and then the CCP capital contribution to the default waterfall. Any remaining pre-auction losses would be allocated equally to non-defaulting participants, in proportion to their default fund contributions.

Allocation of auction losses

Auction losses would be allocated to the defaulting participant's margin, followed by their default fund contribution, and then the CCP capital contribution to the default waterfall.

The allocation of any remaining auction losses would take into account non-defaulting participants' share of total market risk in each currency and product. Each surviving clearing participant's default fund contribution would be distributed to currency- and product-specific 'Auction Incentive Pools' in proportion to the surviving participant's share of the total market risk in each currency and product. For example, a participant with a portfolio largely consisting of interest rate derivatives denominated in AUD would have most of its remaining default fund contribution attributed to an AUD interest rate derivatives pool. Any pre-auction losses allocated to surviving clearing participants would be taken into consideration prior to LCH Ltd establishing the Auction Incentive Pools.

In the event that a defaulter's margin and default fund contributions or the CCP's capital contribution were not exhausted prior to LCH Ltd establishing the Auction Incentive Pools, these would be distributed to each Auction Incentive Pool in proportion to the defaulting participant's risk in each

portfolio. However, these resources may be redistributed to ensure that the losses are first allocated to the defaulter's prefunded resources and the CCP capital contribution before being allocated to non-defaulting participants' contributions.

In the event that an auction produced a profit, LCH Ltd would treat the profit as if it was the defaulter's margin for the purposes of loss allocation.

Auction losses would be allocated to non-defaulting participants in a way that would provide incentives to participants to bid competitively in currencies in which they had substantial market risk. Losses from an auction in a given currency would be allocated first to the currency-specific pools of participants that did not bid (but were expected to do so under the Rulebook), and then to participants that submitted unsuccessful bids, before being allocated to the currency-specific pools of winning bidders and surplus pools attributed to other currencies.

Unfunded financial resources

Although the final allocation of losses would not be calculated until all auctions were complete, LCH Ltd would monitor pre-auction losses and auction losses on a daily basis throughout the default management process. If the pre-auction loss or the auction loss used 25 per cent or more of prefunded default fund contributions at any time in the default management process, then LCH Ltd may call Unfunded Contributions (Assessments) from clearing participants. If the prefunded resources were exhausted, LCH Ltd would then allocate losses to non-defaulting clearing participants' Unfunded Contributions. Losses are allocated to Unfunded Contributions in the same manner as losses are allocated to the non-defaulting participants' prefunded default fund contributions.

If, at any time in the default management process, pre-auction losses or auction losses consumed all Unfunded Contributions, LCH Ltd would attempt to allocate the remaining losses with VMGH (CCP Standard 4.8).

Replenishment

As discussed under CCP Standard 4.8, LCH Ltd has rules and procedures to replenish the default fund following completion of the default management process. If the value of the Rates service default fund was lower than the Rates service Fund Floor (that is, the minimum size of the default fund – currently set at £1 billion) when the default management process was completed, LCH Ltd would call non-defaulting clearing participants for contributions in order to bring the Rates service default fund up to no less than the Rates service Fund Floor. The default fund size would be recalculated using the usual method based on stress tests on the first day that is both at least 30 days after the most recent participant default and is the first business day of a month.

12.2 A central counterparty should be well prepared to implement its default rules and procedures, including any appropriate discretionary procedures provided for in its rules. This requires that the central counterparty should:

- (a) require its participants to inform it immediately if they:**
 - (i) become subject to, or aware of the likelihood of external administration, or have reasonable grounds for suspecting that they will become subject to external administration; or**
 - (ii) have breached, or are likely to breach, a risk control requirement of the central counterparty; and**

- (b) have the ability to close out, hedge or transfer, a participant's open contacts in order to appropriately control risk of a participant that:**
- (i) becomes subject to external administration; or**
 - (ii) breaches a risk-control requirement of the central counterparty.**

LCH Ltd's Clearing Membership Agreement (CCP Standard 1) establishes legally binding notification requirements that SwapClear and Listed Rates clearing participants must meet in relation to specified events. In particular, a SwapClear or Listed Rates participant must immediately notify LCH Ltd when: it becomes aware of a petition for bankruptcy or administration order; it ceases, or believes it may cease, to meet the criteria for admission; or there has been a change in its business that would affect the participant's ability to perform its obligations under the LCH Ltd Rulebook.

A clearing participant is in default if:

- LCH Ltd has declared the participant to be in default. LCH Ltd can declare a participant in default if the participant appears to be unable, or appears likely to become unable, to meet its obligations to LCH Ltd. LCH Ltd can also declare a participant in default if the participant fails to observe any other financial or contractual obligation under the LCH Ltd Rulebook. The authority to declare a participant in default lies with the LCH Ltd CEO.
- An automatic early termination event has occurred. LCH Ltd has powers in its default rules to specify certain events as automatic early termination events. LCH Ltd has only specified two automatic early termination events, for participants incorporated under Swiss law and with registered offices in Switzerland.⁷⁵

The LCH Ltd default rules give LCH Ltd the right to undertake a number of actions in respect of a defaulting clearing participant, including: hedging the market risk on the defaulter's contracts; transferring contracts to other participants; and terminating contracts. Protections under the UK *Companies Act 1989* and the UK *Financial Markets and Insolvency (Settlement Finality) Regulations 1999 (as amended)* seek to give priority to LCH Ltd's default arrangements over insolvency proceedings (CCP Standard 1.5).

The LCH Ltd Rulebook provides LCH Ltd with discretion regarding aspects of the default management process. For example, LCH Ltd would have some discretion on the length of porting windows, on whether to split currency portfolios and on the order in which to auction currency portfolios (see CCP Standard 12.1 for more details about LCH Ltd's discretion with respect to porting windows). The LCH Ltd CEO would have the authority to make any final decisions regarding porting, hedging or the auction (although this authority could be delegated to others, such as to the Rates service DMG). The LCH Ltd CEO also has the authority to approve exceptions to the Group Default Management Policy if its application would lead to results not in line with the policy's intent. The preparedness of the LCH Ltd CEO and others to carry out these discretionary procedures is tested in regular fire drills (CCP Standard 12.4).

⁷⁵ For more information, see LCH Ltd Circular No 2604, available at: http://secure-area.lchclearnet.com/member_notices/circulars/2010-03-19.asp.

12.3 A central counterparty should publicly disclose key aspects of its default rules and procedures.

The Rates service default management process is governed by the LCH Ltd Rulebook, which is publicly available on LCH Ltd's website. The Rulebook sets out the rights and obligations of LCH Ltd, SwapClear and Listed Rates clearing participants in relation to a default (CCP Standard 12.1). LCH Ltd notifies its participants of any amendments to the Rulebook. A high-level summary of the default management process is also published on the SwapClear website.

12.4 A central counterparty should involve its participants and other stakeholders in the testing and review of the central counterparty's default procedures, including any close out procedures. Such testing and review should be conducted at least annually and following material changes to the rules and procedures to ensure that they are practical and effective.

LCH Ltd conducts fire drills to test clearing participants' and the CCP's awareness of and ability to implement the default management process. The LCH Group Default Management Policy requires that each year LCH Ltd participate in at least one Group-wide fire drill and conduct at least one partial fire drill. Group-wide fire drills test the default management framework across all of LCH Group's CCPs. Partial fire drills test the default management framework of LCH Ltd alone, or the framework of a particular service, such as SwapClear.⁷⁶ In either type of fire drill, the DMGs of the relevant services are convened. Group-wide fire drills also involve a variety of teams within LCH Group and LCH Ltd, such as Group Risk and Group Compliance. Partial fire drills may or may not involve these teams, depending on the purpose of the drill.

Fire drills must test:

- the coordination of the default management process from start to finish
- the capability to manage a default across multiple markets
- the production of reports on positions and risk, especially intraday reports
- the liquidation and hedging strategy
- any implementation of risk mitigants such as, but not limited to, stopping payments
- the ability to port client positions
- the ability to turn off a defaulted participant's access to trading systems immediately.

A post-event review document is sent to clearing participants after each fire drill, and LCH Ltd sometimes solicits feedback from participants through a questionnaire.

The LCH Ltd Procedures require that each SwapClear and Listed Rates clearing participant be able to participate, or demonstrate that it has an affiliated clearing participant that can participate, in the Rates service default management process. A prospective participant must pass a 'driving' test as part of its pre-membership requirements to demonstrate its ability to participate in the default management process (CCP Standard 17.2). The driving test assesses a clearing participant's ability to price and bid for a notional portfolio of trades within a specific currency in a specified timeframe, and is intended to

⁷⁶ Partial fire drills may also be run prior to the launch of a new product or material change. For example, prior to launching clearing of inflation rate derivatives, LCH Ltd required those clearing participants that wished to clear the product from launch to participate in such a fire drill. The drill tested the participants' ability to value and bid on, and the DMG's ability to hedge, an inflation rate derivatives portfolio.

replicate the auction component of the default management process. Participants may be required to take part in further driving tests before clearing any additional currencies or new products.

Each clearing participant is required to participate in any Rates service fire drill for a product or currency that it is actively clearing, or to demonstrate that it has an affiliated clearing participant that can participate. LCH Ltd advises clearing participants that they may apply for an exemption from participating in a fire drill auction for particular products or currencies, where they believe that their trade volume and risk profile in those products or currencies are sufficiently small. LCH Ltd considers exemption applications based on both the participant's absolute level of activity in that product and currency, and its activity relative to other participants. Nevertheless, in the event of a clearing participant default, all relevant participants would be subject to the allocation of auction losses as described in CCP Standard 12.1, regardless of any exemption they had received from participating in certain parts of a fire drill.

A clearing participant can meet LCH Ltd's requirements regarding participation in the default management process and in fire drills by demonstrating that it has a legally binding agreement with an outsourcing agent that LCH Ltd has approved for the purpose of meeting the requirement. Participants that use this option are required to appoint at least three outsourcing agents. LCH Ltd may subject outsourcing agents to more rigorous driving tests and fire drills than clearing participants, and the SwapClear and Listed Rates services may call additional collateral from participants that appoint outsourcing agents to reflect the additional time required to invoke an outsourcing process in the default management process.

The LCH Ltd Risk Committee reviews a summary of the preceding year's fire drills on an annual basis. Additionally, the LCH Ltd ERCo and the Group Audit Committee review a report on each Group-wide fire drill, and the LCH Ltd LMC reviews a summary of each Group-wide fire drill report.

12.5 A central counterparty should demonstrate that its default management procedures take appropriate account of interests in relevant jurisdictions and, in particular, any implications for pricing, liquidity and stability in relevant financial markets.

The Rates service default management process has been designed to allow sufficient flexibility to manage a defaulting clearing participant's positions in any currency, including AUD positions. A key stage of the default management process that might impact market stability would be the hedging of the defaulting participant's portfolio. The design of the Rates service default management process should help to ensure that this potential stability impact is mitigated, to the extent possible, and that no jurisdiction is unduly favoured or disadvantaged:

- The Rates service DMG would attempt to eliminate as much of the market risk in the defaulter's portfolio as quickly as possible, having regard to the market conditions and liquidity. This should serve to minimise risk on the portfolio; the timing of hedging activity may also influence any market impact from the hedging trades so may not minimise the losses. The DMG would hedge the biggest risks from the defaulter's portfolio first. In the default of a large Australian participant, this could mean that the DMG would hedge the AUD portfolio first.
- The Rates service DMG would have the ability to second a trader with specific experience in hedging a particular currency, such as AUD, if required. LCH Ltd has informed the Bank that traders seconded to the DMG would typically have primary experience in EUR, USD and GBP, which are likely to be the biggest portfolios and the likely source of most of the risk to SwapClear after a participant default. However, since market conventions are sufficiently similar across currencies,

LCH Ltd is confident that an experienced trader would be able to hedge AUD positions effectively. In addition, LCH Ltd seeks confirmation from DMG members regularly that they would be comfortable hedging indicative portfolios in each currency. The ability of the DMG to quickly and efficiently hedge the portfolio of a defaulting participant should help to minimise any resulting market movements and flow on effects to financial stability.

- Auctions for a given currency and product set would be held in the appropriate time zone for that currency.
- SwapClear included all the currencies it clears in its 2018 fire drill. Accordingly, the Rates service DMG and participants with AUD portfolios have tested their ability to respectively hedge, and value and bid on, an AUD portfolio.

If an Australian clearing participant defaulted, the Rates service default management process would run as normal with no particular changes required. The Bank expects periodically to engage with LCH Ltd regarding how its crisis management arrangements take appropriate account of Australian stability interests.

Standard 13: Segregation and portability

A central counterparty should have rules and procedures that enable the segregation of positions of a participant's customers and the collateral provided to the central counterparty with respect to those positions.

13.1 A central counterparty should, at a minimum, have segregation and portability arrangements that effectively protect a participant's customers' positions and related collateral from the default or insolvency of that participant. If the central counterparty additionally offers protection of such customer positions and collateral against the concurrent default of the participant and a fellow customer, the central counterparty should take steps to ensure that such protection is effective.

Clients access the SwapClear service through one of two models (the SwapClear Clearing Member model and the CFTC-recognised FCM model), depending on which type of direct clearing member a client uses to access the service (CCP Standard 17.2). The SwapClear Clearing Member model is relevant to the Australian members of SwapClear (which are all SwapClear Clearing Members). LCH Ltd has provided legal analysis to the Bank and ASIC regarding its ability to enact its default rules, as they relate to client clearing, in the event of a default of an Australian clearing participant on the basis that it is a SwapClear Clearing Member. Clients domiciled in Australia can clear using either model (by contrast, clients domiciled in the US are required to clear through FCMs).

LCH Ltd has rules and procedures to protect the positions and collateral of a clearing participant's clients from the default or insolvency of that clearing participant. LCH Ltd has informed the Bank that a client's positions and collateral are legally segregated on LCH Ltd's books and records from those of its clearing participant at all times. An FCM client's collateral is also physically segregated from that of its clearing participant at all times.

The extent to which a SwapClear account protects against the concurrent default of the clearing participant and a fellow client (that is, from fellow client risk) depends on the specific SwapClear account type (CCP Standard 13.2). LCH Ltd has legal arrangements in place that are intended to entitle

LCH Ltd to deal with a client's positions and collateral in a way that recognises the beneficial entitlement of the client and protects the client from a defaulting clearing participant's insolvency estate.

13.2 A central counterparty should employ an account structure that enables it readily to identify positions of a participant's customers and to segregate related collateral. A central counterparty should maintain customer positions and collateral in individual customer accounts or in omnibus customer accounts, or equivalent.

Under the SwapClear Clearing Model, LCH Ltd offers four broad types of direct client accounts: an ISA; a CSA; an OSA using gross margin; and an OSA using net margin. Under the FCM model, LCH Ltd offers only an LSOC account. The accounts differ in the extent to which each individual client's positions and collateral are segregated from those of other clients (the degree of protection from fellow client risk) and the probability that its positions could be ported. The precise account offering differs across the LCH Ltd services, although each service offers an ISA and at least one type of OSA. Certain services also offer LSOC accounts.

The account structures offered by the SwapClear service to clients of clearing participants (direct clients) are described below. SwapClear Clearing Members are free to choose which of the four relevant accounts they offer their clients, although they are obliged under EMIR to at least offer their clients the option of individual and omnibus segregation.

- *Individual segregation.* The ISA is an asset-segregated individual position account.⁷⁷ It contains positions of a single legal entity and positions are not exposed to losses from positions outside that particular account (and so are not exposed to fellow client risk). Initial margin requirements are netted across all positions within the account. Each position account has its own corresponding collateral account (on LCH Ltd's books), into which specific cash and non-cash assets lodged in respect of the client are recorded. Therefore these assets are segregated for that client's benefit in the event of its clearing participant's default. In addition, a client's excess margin is posted to the CCP and segregated from the margin of other clients and clearing participants. If, in the event of a clearing participant default, the positions of each of the defaulting clearing participant's ISA clients needed to be ported to another clearing participant, each client's specific non-cash collateral assets could be transferred alongside its positions (rather than solely the value of lodged collateral).
- *Custodial segregation.* The CSA is also an asset-segregated individual position account. As with the ISA, positions in a CSA are not exposed to fellow client risk. However, the client can lodge non-cash assets directly with LCH Ltd using a CSD, rather than via a clearing participant. LCH Ltd would hold these assets as collateral in its account at the CSD for the client. This option allows the client to remove its exposure to the transit risk from lodging its assets through its clearing participant.⁷⁸ The clearing participant would usually continue to set eligibility and concentration limits and haircuts for collateral to be lodged in CSAs by its clients. In the event of a clearing participant default:

⁷⁷ In the 'asset segregation' model, specific assets lodged as collateral are recorded into each client's account with its clearing participant. Those specific assets could then potentially be ported to another clearing participant along with the client's positions in the event of the default of its clearing participant. EMIR requires CCPs to use this model for ISAs. It contrasts with the 'value segregation' model, under which the value of a non-defaulting client's lodged collateral is protected, but the client is not identified with – and therefore is unlikely to have returned to it – the specific assets that it has lodged.

⁷⁸ Transit risk refers to the risk that the clearing participant fails to lodge the client's assets at the CCP, due to operational issues or the default of the clearing participant.

- where porting of the positions and collateral in a CSA to another clearing participant was successful, LCH Ltd would be required to port the client’s specific non-cash collateral assets (rather than solely the value of the collateral lodged) together with its positions and any other collateral in the CSA, and these non-cash assets would be protected from liquidation by LCH Ltd
 - where such porting was unsuccessful, the client’s excess non-cash collateral would be protected from liquidation by LCH Ltd.
- *Gross omnibus.* The Gross OSA is a value-segregated account. Within the account, client positions are managed in ‘position sets’; individual position sets contain positions from a single legal entity, while joint position sets contain positions from multiple legal entities.⁷⁹ Participation in each joint position set is controlled by the clearing participant or an asset manager with the agreement of a clearing participant. Initial margin is called on a net basis within each position set, but margin obligations are not netted across position sets. A client with positions in an individual position set is not exposed to other client’s positions. Although a client with positions in a joint position set is exposed to fellow client risk from other clients’ positions within that set, it is not exposed to positions outside its position set. Lodged collateral is held on a co-mingled basis across all position sets and clients. In the event that LCH Ltd needed to liquidate this collateral (for example, to close out loss-making positions or to facilitate porting following a clearing participant default), all clients within the Gross OSA may be exposed to any losses incurred in the liquidation process. If, in the event of a clearing participant default, the positions of the defaulting clearing participant’s Gross OSA clients needed to be ported to another clearing participant, any positions in a joint position set would have to be ported together to the same alternative clearing participant. Individual position sets, on the other hand, may be ported independently.
 - *Net omnibus.* The Net OSA is an asset-segregated joint position account. It may contain positions of more than one legal entity. Each clearing participant can have multiple Net OSAs, including dedicated accounts for affiliated entities; participation in a Net OSA is controlled by the clearing participant or an asset manager with the agreement of a clearing participant. Initial margin requirements are netted across all positions within an account. A client with positions in a Net OSA is exposed to fellow client risk from the positions of other clients within that Net OSA, but not to any other positions outside that account. Lodged cash and non-cash collateral is segregated in its own collateral account on LCH Ltd’s books, and the specific assets lodged are recorded to the account. Collateral is therefore segregated in collective favour of all clients within that account, rather than in favour of individual clients. In the event of a clearing participant default, all positions in a Net OSA would have to be ported together to the same clearing participant. The specific assets attributed to the clients in the Net OSA could be ported alongside those positions (rather than solely the value of lodged collateral).

FCMs offer one broad type of account to their clients:

- *Legally separated operationally co-mingled.* In an LSOC account the post-haircut value of collateral is legally segregated; it cannot be used to meet obligations of other clients. Each client’s positions are recorded separately on LCH Ltd’s books. Collateral is operationally held together. Clients are only exposed to fellow client risk in the event that the defaulting participant has not provided

⁷⁹ Although clients holding positions in a joint position set or account are likely to be affiliated in some way, they do not have to be part of the same corporate group or have any other form of relationship. Accordingly, they might not know the identity of other clients with positions in that set or account.

sufficient collateral to cover the gross aggregate requirements of the clients in the accounts or the collateral that is held is sold for less than the margin requirement (this shortfall would be shared equally across all clients in the account). For each client, initial margin requirements are calculated on a net basis across their positions. However, there is no netting of positions between different clients. Except in the event the direct participant defaults, variation margin payments are netted across clients, with a single value paid or received by the FCM. In the event of default, LCH guarantees each client's gross variation margin gains. This guarantee is limited to the available resources (the defaulting participant's margin and the default fund). This guarantee limits exposure to fellow client risk in variation margin. In the event of default, clients could be ported to different non-defaulting FCMs (subject to the additional requirements in CCP Standard 13.3).

Excess collateral posted to an LSOC account is treated in one of two ways. In an 'LSOC Without Excess' account, the FCM does not provide reports on the collateral to be allocated to each client. Therefore, the value of collateral legally segregated for each client is their initial margin requirement. In this case, LCH Ltd cannot allocate excess collateral to specific clients. Any collateral posted by the FCM, or that arises in the relevant account, in excess of gross initial margin requirements is deemed 'unallocated excess'. Unallocated excess cannot be used by LCH Ltd to cover losses in the event of a default and so is returned to the defaulting participant's trustee. An FCM can elect to provide an 'LSOC With Excess' account. In this case, the FCM reports the value of collateral for each client to LCH Ltd at least daily, which can include collateral in excess of the clients' initial margin requirement. This excess collateral is legally segregated.

SwapClear also offers account segregation for indirect clients (the clients of SwapClear Clearing Members' clients). SwapClear offers a net indirect omnibus segregation account and a gross indirect omnibus segregation account. Under the net structure, the positions of all indirect clients of each direct client would be held in an omnibus sub-account specific to that direct client. Initial margin would be called on a net basis across all the indirect clients' positions in that sub-account. Under the gross structure, the positions of indirect clients would be held in separate sub-accounts specific to each indirect client. LCH Ltd would call initial margin separately for each indirect client sub-account.

In order to register trades into the SwapClear Client Clearing Service, the clearing participant or direct client must provide certain information to SwapClear about the direct client. By contrast, SwapClear collects no information on the identity of indirect clients, beyond identification of the direct client with which they are associated.

LCH Ltd allows an optional client buffer for SwapClear Clearing Member client accounts (CCP Standard 4.4). In the case of a clearing participant default, any client buffer allocated to a client account may be ported by LCH Ltd to a backup clearing participant (along with the client's positions and collateral) or used to cover potential losses on that client account.

SwapClear has arrangements, documented in the Rulebook, that are intended to protect the interests of clients in a default by ensuring it has the right to deal with relevant positions and assets in a way that recognises the beneficial entitlement of the client. These arrangements are necessary because positions are entered into, and assets are lodged as collateral, by the clearing participant as principal (except that non-cash assets may be lodged directly to LCH Ltd by clients using CSAs). Absent those arrangements, a defaulting clearing participant's client's assets could potentially be included as part of the defaulting clearing participant's insolvency estate. SwapClear has informed the Bank that it seeks legal opinions to determine whether the legal jurisdictions of the clearing participants that wish to offer client clearing services have laws that enshrine these arrangements. In cases where these do not exist,

the clearing participant is required to enter into a security deed in favour of its clients, which is enforceable in the event of a default of the clearing participant (over the client's collateral or value of collateral, as appropriate). LCH Ltd conducts due diligence with respect to these security deeds.

As noted in CCP Standard 1.4, LCH Ltd has provided legal analysis to the Bank and ASIC regarding its ability to enact its default rules, as they relate to client clearing, in the event of a default of an Australian clearing participant that is a SwapClear Clearing Member. Among other things, these default rules provide for LCH Ltd to transfer a defaulting clearing participant's client's positions and collateral to a non-defaulting clearing participant, or to terminate and close out those positions and return any remaining collateral to the client.

13.3 To the extent reasonably practicable under prevailing law, a central counterparty should structure its portability arrangements in a way that makes it highly likely that the positions and collateral of a defaulting participant's customers will be transferred to one or more other participants.

To protect clients in the event of a default of a clearing participant in the SwapClear service, LCH Ltd has arrangements in place to enable positions, initial margin and the record of the cumulative variation margin for those positions since registration to be transferred to another clearing participant (additional provisions apply to clients of FCMs, as outlined below). Clients are encouraged to maintain at least one backup clearing participant to which its positions could be offered if its clearing participant defaulted. Although it is not common practice for backup clearing participants to guarantee to accept transferred trades, these nominations increase the likelihood of portability because nominated backup clearing participants would have an established relationship with the client and operational arrangements in place. If a client's nominated backup clearing participant was also in default or a backup clearing participant had not been nominated prior to the original clearing participant's default, the client would be given the opportunity to find an alternative clearing participant (CCP Standard 12.1). LCH Ltd's rules do not allow it to close out a client's positions and collateral until 24 hours after a clearing participant's default (or 12 hours if initial margin had been eroded by 50 per cent or more).⁸⁰

If a clearing participant default occurred, SwapClear would confirm with each individual client of the defaulted clearing participant whether the client intended to transfer or liquidate its positions. If a client intended to transfer, SwapClear would confirm with the client the identity of its backup clearing participant. SwapClear would post a suite of reports to the backup clearing participant to enable it to assess the client's portfolio. These reports would contain position and trade information, initial and variation margin details, sensitivities and valuations of portfolios. The backup clearing participant would have 48 hours after the time of default to consent to the transfer. Positions that were unable to be transferred by that time may be closed out. LCH Ltd can transfer client accounts both intraday and as part of its end-of-day processes.

The applicable account structure may impact the porting process. Positions and collateral held in accounts with other clients – that is, a Net OSA or a joint position set within a Gross OSA – could only be ported if all positions of all clients within the account or position set were ported to the same backup clearing participant. If this could not be achieved, positions would be closed out. Portability would be more straightforward for positions and accounts held for a single client – that is, an ISA, a CSA or an

⁸⁰ LCH Ltd takes into account the additional time required to port a client's positions and collateral in other ways. For example, LCH Ltd extends the assumed close-out period by an additional two days for client accounts when calculating initial margin requirements (CCP Standard 6.3).

individual position set within a Gross OSA. LCH Ltd publicly discloses aspects of its portability arrangements on its website.

Under the FCM model, porting of the defaulting participant's clients' positions and collateral is coordinated by all FCMs and LCH Ltd with oversight from the CFTC. LCH Ltd can only port the clients' positions following non-objection from the CFTC, and provided that there is not a deficit in collateral held in the account (versus the collateral requirement in LCH Ltd's records). A collateral transfer also requires approval from the US Bankruptcy Court (which LCH Ltd has stated typically occurs on the day of a default) as well as approval from the defaulting participants' bankruptcy trustee.

Portability procedures are tested as part of the SwapClear fire drill process. SwapClear runs an end-to-end test of its default management process at the same time as the annual LCH Group fire drill. In addition, SwapClear runs its own fire drill exercises throughout the year for SwapClear and its clearing participants to test and practice aspects of the default management process (CCP Standard 12.4). The results of these fire drills continue to indicate that the porting process could potentially be challenging for a clearing participant that has a large number of clients. However, LCH Ltd has indicated to the Bank that it is comfortable that it could handle such porting for its current clearing membership.

SwapClear also supports the ability of clients to port positions as part of ordinary, non-default operations. SwapClear aims to complete porting requests within two days; for this to occur the request must be received by LCH Ltd by 5 pm UK time on day 0. Requests are initiated by the clearing participant receiving the positions (the receiving clearing participant) and made to SwapClear Client Services. The request must designate the positions to be transferred, noting whether collateral will be transferred and providing evidence that the request has been made on behalf of the client. The receiving clearing participant is required to approve the transfer of positions and collateral by 5 pm UK time on day 2. If approval is not given by that time, the transfers will be rejected. A clearing participant has no powers to prevent a client of good standing from transferring its positions to another clearing participant. There are, however, provisions to prevent a client that is in breach of its financial obligations to the clearing participant, or that is insolvent or bankrupt, from transferring its positions.

13.4 A central counterparty should disclose its rules, policies and procedures relating to the segregation of a participant's customers' positions and related collateral. In particular, the central counterparty should disclose whether customer collateral is segregated on an individual or omnibus basis. In addition, a central counterparty should disclose any constraints, such as legal or operational constraints, that may impair its ability to segregate or port a participant's customers' positions and related collateral.

LCH Ltd discloses its rules, policies and procedures about the segregation of a clearing participant's clients' positions and related collateral. In particular, LCH Ltd publishes a specific disclosure document on its website about the segregation and protection offered by its different client accounts, which it is required to do to meet its obligations under EMIR. In that document, LCH Ltd discloses relevant legal or operational constraints, such as exposure to fellow counterparty risk and arrangements surrounding the porting of positions and collateral held under omnibus segregation. It also publishes on its website a plain-language description of the various client accounts it offers. The information disclosed is intended to cover the levels of client protection offered, segregation and portability arrangements, and any risks or uncertainties associated with such arrangements. LCH Ltd also makes more detailed information regarding its account offerings available to SwapClear clearing participants and clients. LCH Ltd has in the past provided training for participants and for entities that clear as clients, in an effort

to clarify arrangements for porting and further familiarise participants and clients with these arrangements.

Standard 14: General business risk

A central counterparty should identify, monitor and manage its general business risk and hold, or demonstrate that it has legally certain access to, sufficient liquid net assets funded by equity to cover potential general business losses so that it can continue operations and services as a going concern if those losses materialise. Further, liquid net assets should at all times be sufficient to ensure a recovery or orderly wind-down of critical operations and services.

14.1 A central counterparty should have robust management and control systems to identify, monitor and manage general business risks, including losses from poor execution of business strategy, negative cash flows or unexpected and excessively large operating expenses.

LCH Ltd identifies, monitors and manages its general business risks across all services in accordance with the LCH Ltd and LCH Group Risk Governance Frameworks (CCP Standard 3.1). The frameworks identify the range of risks to which the CCP may be exposed. The frameworks identify business risk as a unique risk, defined as the risk of a decline in business arising from declining volumes, if lower revenues cannot be offset by adjusting variable costs. The LCH Ltd Framework identifies a variety of additional business risks or potential sources of loss that are not related to a clearing participant default, including:

- custody risk on LCH Ltd's investment in securities arising from a custodian's insolvency, negligence, misuse of assets or fraud (CCP Standard 15)
- investment risk arising from the investment of member collateral to manage daily liquidity needs (CCP Standard 15)
- operational risk arising from inadequate or failed internal control processes, people and systems, or from external events (CCP Standard 16)
- legal risk arising from the possibility that unenforceable contracts, lawsuits or adverse judgements could disrupt or negatively affect the operations of LCH Ltd
- project risk resulting in loss of earnings arising from poor execution of projects
- strategic risk arising from adverse business decisions, improper implementation of decisions or lack of responsiveness to industry, external or regulatory changes
- reputational risk arising from the risk that potential negative publicity, whether true or not, could cause a decline in the client base, costly litigation or revenue reductions
- business continuity risk arising from the disruption of critical business or IT processes (CCP Standard 16)
- information security and cyber risk arising from unauthorised access, disruption and the loss or misuse of sensitive information (CCP Standard 16)
- regulatory and compliance risk resulting in loss of licence or other penalties due to non-compliance with regulations governing CCP activities in each jurisdiction in which LCH Ltd operates
- pension risk arising from a rise in liabilities of the defined benefit scheme.

LCH Ltd's tolerance for each risk is determined by the LCH Ltd Board, and risks are monitored against these tolerances (CCP Standard 3). Quarterly reports on the results of this monitoring are presented to the LCH Ltd LMC and the LCH Ltd Board, and are also reviewed by the LCH Ltd ERCo. An LCH Group-wide report is also presented to the LCH Group Executive Committee and Board, facilitating coordination among LCH Group CCPs when considering, monitoring and mitigating risks, including general business risks.

The head of each service is responsible for monitoring business risk. LCH Ltd identifies key drivers of business risk and monitors these business risk drivers on a quarterly basis. This monitoring of business risk also drives LCH Ltd's calculation of its business risk capital requirements (CCP Standard 14.2). To determine this, LCH Ltd has conducted scenario analysis concerning the potential financial impact of its business risk drivers; where changes to business risks are identified, the Finance department will re-forecast business risk losses using this scenario analysis and reassess the adequacy of capital held to cover business risk. The annual budgeting and medium-term financial plan processes also assist LCH Ltd to identify any changes to business risk drivers.

The LCH Ltd ERCo assesses, and advises the LCH Ltd CRO on, all approvals required for all new products and services. The LCH Ltd ERCo assesses new proposals in accordance with the LCH Group New Product Approval Process, which includes a business feasibility review as well as an assessment of the expected cost and benefit, regulatory requirements and associated risks of the proposed new product or service. New products are approved by either the CRO or the LCH Ltd Board. However, where a proposed new product or service presents no novel risk features and does not require the amendment of risk controls, the LCH Ltd ERCo may assess and approve it, provided that it notifies the LCH Ltd Risk Committee. The LCH Ltd CEO retains the right to veto the launch of any new products or product enhancements (Appendix B.2).

14.2 A central counterparty should hold, or demonstrate that it has legally certain access to, liquid net assets funded by equity (such as common stock, disclosed reserves or other retained earnings) so that it can continue operations and services as a going concern if it incurs general business losses. The amount of liquid net assets funded by equity a central counterparty should hold, or have access to, should be determined by 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.

As at 31 December 2017 LCH Ltd had available capital resources of €439.2 million after the deduction of LCH Ltd's capital contributions to its default waterfalls.⁸¹ Of that, LCH Ltd has allocated total capital of €321.0 million to cover:

- credit and market risks not covered by dedicated financial resources (for LCH Ltd this includes, among other things, treasury risks (CCP Standard 15.4))
- operational risk, including legal risk (CCP Standard 16.1)
- business risks
- the implementation of its Wind-down Plan.

Capital allocated to cover these risks cannot be used for any other purpose, and is distinct from capital held to cover losses that may arise from a clearing participant default (CCP Standard 4). LCH Ltd's capital

⁸¹ LCH Ltd reports its capital resources as the lower of: own cash; or share capital and audited resources, less 'skin in the game', as required under EMIR.

position is monitored daily, and formally calculated by the Finance department on a monthly basis. LCH Ltd's capital position must be approved by the LCH Ltd CFO and reported to the LCH Ltd Board.

LCH Ltd determines the value of capital it allocates to cover these risks (which it refers to as its 'regulatory capital requirement') in accordance with EMIR, which requires it to take into account its general business risk profile. Under EMIR, LCH Ltd is required to calculate the business risk component of its capital requirement as the higher of 25 per cent of its annual gross operating expenses or its own assessment of capital required to cover business risks. The LCH Ltd Board reviews and approves, on an annual basis, an assessment of capital required to cover business risks. To make this assessment, LCH Ltd analyses:

- reasonably foreseeable macroeconomic risks across its business lines
- the impact of stress scenarios on clearing revenues, where the simultaneous occurrence of these is consistent, across LCH Group
- other reasonably foreseeable risks and opportunities that are identified during LCH Ltd's annual budgeting and medium-term financial plan processes.

LCH Ltd's calculation of its capital allocated to the implementation of its Wind-down Plan takes into account the time required to implement this plan (CCP Standard 14.3).

LCH Ltd's capital is invested in accordance with the LCH Group Investment Risk Policy (CCP Standards 14.4 and 15.4).

LCH Ltd provides the Bank with regular updates on its available capital resources (CCP Standard 21).

14.3 A central counterparty should maintain a viable recovery or orderly wind-down plan and should hold, or have legally certain access to, sufficient liquid net assets funded by equity to implement this plan. At a minimum, a central counterparty should hold, or have legally certain access to, liquid net assets funded by equity equal to at least six months of current operating expenses. These assets are in addition to resources held to cover participant defaults or other risks covered under CCP Standard 4 on credit risk and CCP Standard 7 on liquidity risk. However, equity held under international risk-based capital standards can be included where relevant and appropriate to avoid duplicate capital requirements.

LCH Ltd has Recovery and Wind-down Plans that set out how it would continue or cease its operations if it suffered extreme losses (CCP Standard 3.5). The Wind-down Plan demonstrates how LCH Ltd believes that it could achieve an orderly wind-down within six months. As at 31 December 2017, LCH Ltd had allocated capital of €124.6 million, equal to six months' operating expenses, to implement this plan. The capital that LCH Ltd allocates to meet its regulatory capital requirement cannot be used to cover other losses (CCP Standard 14.2).

As part of LCH Ltd's Recovery Plan, arrangements are in place to address non-clearing-participant-default losses that could arise from treasury investment losses, including in the event of the default of an investment counterparty, or various operational and business risks (CCP Standard 3.5):

- In the case of solvency-threatening investment-related losses caused by the default of an issuer of a debt instrument or an investment counterparty, losses up to €15 million would be allocated to

LCH Ltd (CCP Standard 15.4).⁸² The remainder would be allocated to clearing participants in proportion to each clearing participant's share of margin. Treasury investment losses not deemed to be solvency threatening or which do not arise from the default of an issuer or investment party would be allocated to LCH Ltd.

- Other non-clearing-participant-default losses would be absorbed by insurance policies held by LCH Group against a number of operational and business risks, including civil liability, fraud and loss of property. This insurance could be used to cover specific risks that fall within the scope of the cover. LCH Ltd could utilise surplus capital held against operational and business risks to cover any remaining losses.

14.4 Assets held to cover general business risk should be of high quality and sufficiently liquid in order to allow the central counterparty to meet its current and projected operating expenses under a range of scenarios, including in adverse market conditions.

LCH Ltd's capital is invested in accordance with the LCH Group Investment Risk Policy (CCP Standard 15.4). The Investment Risk Policy specifies key investment principles of capital preservation and liquidity management. Consistent with these principles, approved investments are generally limited to: cash deposits with central banks and overnight deposits with approved commercial banks; securities issued by approved sovereigns, government guaranteed institutions or supranationals; and reverse repo transactions.

14.5 A central counterparty should maintain a viable plan for raising additional equity should its equity fall close to or below the amount needed. This plan should be approved by the board of directors and updated regularly.

LCH Ltd's Recovery Plan outlines a strategy for raising additional equity capital, if needed. LCH Ltd would use this strategy to replenish capital consumed either in the management of a participant default or in absorbing a solvency-threatening non-default loss, where LCH Ltd's loss-allocation tools and insurance policies were insufficient to absorb this loss completely (CCP Standard 14.3).

As LCH Ltd is a wholly owned subsidiary of LCH Group, any required additional capital could be raised at the Group level and provided to LCH Ltd. Any increase in the share capital of LCH Group would require shareholder approval. The LCH Ltd Board would consider alternative means, such as seeking new external investors, to obtain capital directly if LCH Group was unable to support a required capital raising.

The Recovery Plan is reviewed and approved by the LCH Ltd Board at least every 18 months, or more frequently when this is warranted by significant business model changes. The Chair of the LCH Ltd Risk Committee reports to the LCH Group Board with regard to the Recovery Plan, among other things.

Standard 15: Custody and investment risks

A central counterparty should safeguard its own and its participants' assets and minimise the risk of loss on and delay in access to these assets. A central counterparty's investments should be in instruments with minimal credit, market and liquidity risks.

⁸² For the purposes of its Recovery Plan, LCH Ltd considers a loss to be solvency threatening if the absorption of the loss by LCH Ltd's capital would result in the remaining capital being below 110 per cent of the regulatory capital requirement (CCP Standard 3.5).

15.1 A central counterparty should hold its own and its participants' assets at supervised and regulated entities that have robust accounting practices, safekeeping procedures and internal controls that fully protect these assets.

LCH Ltd selects the custodians at which it holds its own and participants' assets in accordance with criteria specified in the LCH Group Settlement, Payment and Custody Risk Policy. This policy expresses a preference that securities are held at CSDs rather than credit institutions, and that uninvested cash (if any) is held at central banks rather than other intermediaries (investment of cash is discussed in detail in CCP Standard 15.4).

Custodians and CSDs must be assigned, and maintain, an ICS better than a predetermined threshold and satisfy a number of operational, legal and regulatory requirements (CCP Standard 15.2). ICSs are set and monitored on an ongoing basis by LCH Ltd, in accordance with the Group Counterparty Credit Risk Policy (CCP Standard 4.2). Should the ICS of a custodian or CSD deteriorate beyond the specified requirement, LCH Ltd may seek to use an alternative CSD or custodian, or may request internal governance approval for an exception to the policy. Exceptions must be approved by the LCH Ltd ERCo, and must detail how any associated risk will be mitigated. LCH Ltd also requires that its custodians and CSDs have sufficient supervision and accounting practices, which it verifies through a due diligence process. Intermediaries, including custodians and CSDs, must be approved by the LCH Ltd ERCo.

The Settlement, Payment and Custody Risk Policy is reviewed annually by the LCH Ltd ERCo and the LCH Ltd Risk Committee, and must be approved by the LCH Ltd Board each year.

15.2 A central counterparty should have prompt access to its assets and the assets provided by participants, when required.

To ensure that it has prompt access to its assets and the assets provided by participants, LCH Ltd performs operational and legal due diligence on all custodians and CSDs that it uses. LCH Ltd's operational due diligence covers matters including business continuity management, service availability and data loss. LCH Ltd's legal due diligence covers matters including client asset protection, sub-custodian appointment, internal controls and default arrangements. These operational and legal due diligence are refreshed at least every two years, or sooner if LCH Ltd identifies a significant change at the custodian or CSD. The Collateral Operations team is responsible for addressing any issues (identified through LCH Ltd's due diligence) regarding the level of service availability provided by a custodian or CSD; where necessary, these issues are escalated to the LCH Ltd ERCo. LCH Ltd senior management may engage with custodians and CSDs if any shortcomings are identified.

LCH Ltd holds securities provided by clearing participants as margin collateral in accounts in its own name and under a legal charge. These arrangements seek to ensure that in the event of a participant default, LCH Ltd is able to access the assets without recourse to the custodian or CSD. As part of the due diligence process, LCH Ltd's Operations department must be satisfied that assets belonging to it are fully segregated, identifiable and accessible promptly in the event that the custodian or CSD defaulted (CCP Standard 1.2). When accepting clearing participants in a new jurisdiction, or conducting due diligence on a non-UK domiciled custodian or CSD, LCH Ltd will seek legal advice for that jurisdiction. More generally, LCH Ltd monitors country-specific risks via its ICS framework (CCP Standard 4.2).

15.3 A central counterparty should evaluate and understand its exposures to its custodians, taking into account the full scope of its relationships with each.

LCH Ltd monitors exposures to its custodians on a daily basis; exposures to custodians are also reported to the LCH Ltd ERCo monthly. To diversify its exposure, LCH Ltd uses a range of CSDs and custodians. This includes two major ICSDs, domestic UK and Australian CSDs/SSFs and three US custodians. Austraclear, an Australian CSD, can be used by clearing participants to lodge AUD-denominated collateral. LCH Ltd also regularly reviews the credit standing and performance of its custodians (CCP Standards 15.1 and 15.2).

LCH Ltd considers the full scope of its relationship with a counterparty, including clearing, investment and custodian activities, when assessing its exposure. LCH Ltd has a concentration limit framework in place, which requires that its total overnight exposure across clearing and investment activities with a single counterparty should not exceed a predefined proportion of LCH Ltd's capital resources. LCH Ltd also requires that its intraday unsecured exposures to a commercial counterparty across investment and concentration activity should not exceed a predefined percentage of its capital resources (CCP Standard 9.3).

The Settlement, Payment and Custody Risk Policy does not allow LCH Ltd to hold a clearing participant's assets with a custodian that belongs to the same group as that participant. Exceptions may be granted by the LCH Ltd ERCo if a legal opinion is provided to confirm the bankruptcy remoteness of the intermediary from the clearing participant and the segregation of assets in the event of insolvency.

15.4 A central counterparty's investment strategy should be consistent with its overall risk management strategy and fully disclosed to its participants, and investments should be secured by, or be claims on, high-quality obligors. These investments should allow for quick liquidation with little, if any, adverse price effect.

LCH Ltd invests cash – including cash margins, default fund contributions, paid-up share capital and cash arising from settlement failures – in accordance with the LCH Group Investment Risk Policy. The key investment principles are capital preservation and liquidity management. LCH Ltd seeks to ensure that it can quickly liquidate its investments without significant adverse price effects by restricting investments to high-quality liquid securities, setting concentration limits on securities, and managing the composition of its overall investment portfolio based on investment type and maturity dates. LCH Ltd provides participants with high-level information on how it manages its portfolio on request.

The Investment Risk Policy restricts investments to: cash deposits with central banks and overnight deposits with approved commercial banks; securities issued by approved sovereigns, government guaranteed institutions or supranationals; and reverse repo transactions. The Investment Risk Policy permits the use of foreign exchange swaps for the purpose of managing foreign exchange and liquidity risk as part of the liquidity risk management framework. Investment counterparties must maintain an ICS better than a specified threshold. In practice, LCH Ltd invests the bulk of its cash in secured products.

LCH Ltd's primary currencies for investments are EUR, GBP and USD. All cash investments must be in a currency that is used for clearing in LCH Ltd; to the extent possible, investments are in the same currency as the cash was received.

The rate of remuneration LCH Ltd provides on cash posted by its participants is determined at a service level. For SwapClear this is set at a spread to the relevant cash rate; the precise spread applied varies across currencies.

To minimise credit and liquidity risk, the Investment Risk Policy sets concentration limits on: exposures to individual counterparties, measured at the investment counterparty group level; investments representing an exposure to a particular sovereign or supranational; and exposures to reverse repo collateral by issuer and maturity. As discussed in CCP Standard 15.3, exposure to a single counterparty should not exceed a predefined proportion of LCH Ltd's capital resources. The Investment Risk Policy sets LCH Ltd's maximum acceptable exposure to interest rate risk as a percentage of its capital resources and caps the average maturity of the portfolio.

In addition, the Investment Risk Policy requires that at least 95 per cent of total investments with commercial banks must be on a secured basis on average each month (and no lower than 90 per cent at any time).

LCH Ltd does not invest in corporate bonds or equities, limiting the potential for wrong-way risk in the investment of participant's cash. Specific wrong-way risk haircuts may be applied to reverse repo investments if deemed necessary. An additional haircut for foreign exchange risk is applied to reverse repo transactions where there is a mismatch between the currency of the securities and the currency of the cash invested.

LCH Ltd holds capital to cover credit and counterparty credit risk (CCP Standard 14.2). Some of this capital is held to cover investment risk, including credit risk associated with unsecured bank deposits and reverse repos, as well as other credit risks related to investments. In the event of solvency-threatening treasury investment losses arising from the default of an issuer of a debt instrument (such as a sovereign) or the default of an investment party, losses up to €15 million would be allocated to LCH Ltd, with the remainder allocated to clearing participants (CCP Standards 3.5 and 14.3). Treasury investment losses not deemed to be solvency threatening or which do not arise from the default of an issuer or investment party would be allocated to LCH Ltd.

The Investment Risk Policy is reviewed by the LCH Ltd ERCo and the LCH Ltd Risk Committee, and approved by the LCH Ltd Board, each year.

Standard 16: Operational risk

A central counterparty should 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. Systems should be designed to ensure a high degree of security and operational reliability and should have adequate, scalable capacity. Business continuity management should aim for timely recovery of operations and fulfilment of the central counterparty's obligations, including in the event of a wide-scale or major disruption.

Identifying and managing operational risk

16.1 A central counterparty should establish a robust operational risk management framework with appropriate systems, policies, procedures and controls to identify, monitor and manage operational risks.

LCH Ltd's operational risk policies, procedures and controls have been developed in accordance with the LCH Ltd Risk Governance Framework, which implements the overall LCH Group Risk Governance Framework (CCP Standard 3.1). LCH Group maintains an Operational Risk Policy, which contains the principles and standards for the identification, assessment, management, reporting and monitoring of operational risks facing LCH Group and its subsidiaries. This policy is supported by the Operational Risk

Manual, which contains the LCH Group procedures and systems for the identification, assessment, management, reporting and monitoring of operational risks. As with the Operational Risk Policy, the Operational Risk Manual applies to all LCH Group entities, including LCH Ltd.

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

- Primary responsibility for the day-to-day identification, assessment, management, reporting and monitoring of operational risks – the first line of defence – lies with LCH Ltd’s business lines and management services. These include the Business, First Line Risk, Operations and IT departments, which are responsible for designing, operating and maintaining effective systems of internal controls to address these risks (subject to the confines of the Operational Risk Policy and Manual). Appointed staff within each area are responsible for ensuring that the risk profile for their business line is current as well as leading the identification, assessment and reporting of operational risks and controls. They are also responsible for enhancing risk awareness and for ensuring that the Business Head approves actions in relation to risks outside and near appetite. Business Heads have responsibility for regularly reviewing information relating to the operational risk profile of their business line, for ensuring that all material risks are identified and that such risks and the corresponding controls and mitigating actions are properly recorded and current. Relevant policies and procedures are discussed in more detail below. BSL also has responsibility for day-to-day identification and management of operational risks, with respect to the IT and support services it provides to LCH Group; the LCH Ltd CTO remains the owner of the operational risks, and is responsible for ensuring adequate controls are in place (CCP Standard 16.5).
- Responsibility for the second line of defence lies with the LCH Group Risk Resilience department and the Group Risk Resilience Committee. The Risk Resilience department sits within Group Risk and reports to the LCH Ltd CRO. The Risk Resilience department maintains the Operational Risk Policy and Manual, produces a quarterly Group Risk Resilience Report and provides operational risk policy oversight, support, training and challenge to the first line (CCP Standard 16.2). The Group Risk Resilience Committee is a sub-committee of the Group ERCos and has been constituted to assist in exercising the authority delegated to them by the Boards and Board Risk Committees.
- The third line of defence comprises the LCH Ltd Internal Audit department and Audit Committee. The Internal Audit department reviews the management of, and governance over, operational risks within LCH Ltd (CCP Standard 16.2). The LCH Ltd Audit Committee’s terms of reference includes requirements for maintaining, reviewing and strengthening LCH Ltd’s system of internal controls and operational risk framework.

LCH Ltd has procedures in place to identify, monitor and manage operational risks facing the CCP on an ongoing basis. The key components of LCH Group’s Operational Risk Policy include: annual risk and control self-assessments; deep dives into individual processes; scenario analysis; a centralised operational risk and control library listing all operational risks for LCH Group; key risk indicators, used to measure and track the emergence of risks; assessments of new products, processes and systems; and regular monitoring and reporting. LCH Ltd allocates capital for operational risk at a minimum of 15 per cent of average total gross income over three years.

LCH Ltd also maintains an Incident Management Process that documents the procedures, roles and responsibilities for recording, reporting, and resolving operational and technology-related incidents affecting the SwapClear service (CCP Standard 16.7).

Where a new operational risk is identified, it is assessed and rated according to an impact and likelihood matrix that takes into account financial, reputational and regulatory criteria. When a risk is assessed to be outside or near LCH Group's risk appetite, a mitigation plan must be developed and implemented to bring the risk within the specified risk appetite. Each plan must include defined ownership responsibilities and due dates. The LCH Group Board is responsible for determining the LCH Group appetite for operational risk.

16.2 A central counterparty's board of directors should clearly define the roles and responsibilities for addressing operational risk and should endorse the central counterparty's operational risk management framework. Systems, operational policies, procedures and controls should be reviewed, audited and tested periodically and after significant changes.

The LCH Group Board determines the LCH Group operational risk appetite, and has ultimate responsibility for the operational risk management framework (CCP Standard 16.1).

The LCH Group operational risk appetite and Operational Risk Policy are reviewed annually by the Risk Resilience department, and any changes must be approved by the LCH Group Board. Changes to the Operational Risk Policy must also be approved by the boards and risk committees of each of LCH Group's subsidiaries, including LCH Ltd, as well as by the LCH Group Audit Committee and the ERCos. The LCH Ltd Board receives updates on operational risk at each meeting.

LCH Ltd's operational risk profile is subject to periodic internal and external reviews. LCH Ltd's Internal Audit department conducts regular audits of LCH Ltd's operational risk profile. Where issues are identified, a remediation plan is put in place and tracked by the Internal Audit department. The Internal Audit department also monitors compliance with the Operational Risk Policy and Manual, and reports to the LCH Ltd Audit Committee on these findings.

LCH Group has a Change Management Framework that sets out policies and processes for the assessment of potential changes to systems, including risk impact and analysis, quality assurance testing and implementation reviews. The objective of the framework is to ensure that projects and changes to systems are implemented effectively, and with regard to operational risk. The degree of governance and oversight is primarily determined by the complexity, potential impact on the LCH Group risk profile and the cost of the project, though LCH Ltd also considers other factors (including the priority and type of project). Changes and projects are prioritised based on their organisational importance, urgency and complexity, to ensure the highest priority changes are given adequate focus.

The LCH Group Projects team oversees the LCH Group portfolio of change and is also responsible for defining the governance and delivery framework for projects. LCH Ltd manages its own portfolio of projects; there are project management responsibilities embedded within each of the LCH Ltd clearing services (including SwapClear) and support functions. Where BSL projects affect LCH Group entities or BSL resources are used in LCH Group projects, these projects are reviewed by the joint LCH/BSL Monthly Portfolio Board and in service reviews of BSL (CCP Standard 16.4). Projects can therefore be managed by the Group Projects team, within LCH Ltd, or within BSL, and ownership is driven by the scope of the project.

LCH Ltd also uses a Test Framework that applies a standardised process for testing, quality control and documentation, and is intended to complement the Change Management Framework. The Test Framework is scalable depending on the priority of the change being tested. General guidelines for acceptance criteria are outlined in the Test Framework, and the SwapClear Service Level Agreement (SLA) defines the expected availability and performance of the SwapClear service (CCP Standard 16.3).

LCH Ltd have indicated to the Bank that the Operational Risk Policy and Manual are aligned with the Basel II requirements, EMIR and the CFTC's *Core Principles for Derivatives Clearing Organizations*. LCH Ltd's Test Framework is benchmarked against ISO 29119:2013 *Software and Systems Engineering – Software Testing*. In early October 2018, the LCH Ltd Board approved the LCH Group Information Security and Cyber Risk Policy. This policy is aligned with the NIST Cybersecurity Framework (CCP Standard 16.3). For LCH Group, this supersedes the LSEG Information Security Policy in force as at the end of the assessment period (30 September 2018). LCH Group policies relevant to business continuity management of the SwapClear service are benchmarked to ISO 22301:2012 *Societal Security – Business Continuity Management Systems* (CCP Standard 16.7).

16.3 A central counterparty should have clearly defined operational reliability objectives and should have policies in place that are designed to achieve those objectives. These policies include, but are not limited to, having: exacting targets for system availability; scalable capacity adequate to handle increasing stress volumes; and comprehensive physical and information security policies that address all potential vulnerabilities and threats.

Operational reliability and system availability

LCH Ltd documents operational reliability objectives through availability targets for the SwapClear service, which are formally defined in its SLA. LCH Ltd targets IT system availability for the SwapClear service equivalent to at least 99.7 per cent which, in effect, means that, system outages should last no more than 60 minutes in any one calendar month.⁸³ SwapClear met this target in 10 months in the assessment period, and IT system availability over the assessment period was 99.9 per cent.

Operational capacity

LCH Ltd targets a maximum capacity utilisation of 50 per cent for the SwapClear service. LCH Ltd deems its capacity utilisation target to be met if the service has the capacity to handle the greater of: (i) two times current daily peak throughput over the previous two years; or (ii) the projected daily average throughput in 12 months' time. This target was met in each month over the assessment period.

LCH Ltd monitors system capacity in accordance with the LCH Group Capacity Management Process. This document describes how LCH Ltd seeks to reduce the risk to performance of its clearing services due to potential changes in demand. The LCH Ltd IT department is responsible for collating weekly and monthly capacity and performance data, which are reported to senior IT management. Events of demand exceeding capacity targets, or risks that this may occur, are reported to the LCH Ltd LMC. Capacity targets are adjusted if surpassed by the most recent peak load. In accordance with the Change Management Framework and Test Framework, forecasts of the resulting capacity of the SwapClear service are required before a project or change is implemented.

Physical and information security

The objective of the LCH Group Information Security and Cyber Risk Policy (CCP Standard 16.2) is to articulate the standards governing information security and cyber risk; this is the risk to LCH Group due to the potential for unauthorised access, use, disclosure, disruption, modification or destruction of information and/or information systems.

⁸³ 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 losses of resilience (that is, when the service is still operating but, for example, an additional server used to share the load becomes unavailable).

All LCH Group employees, employees at each of LCH Group's CCPs, contractors, temporary staff members and third-party service providers are contractually required to comply with the LCH Group Information Security and Cyber Risk Policy and all supporting standards. The LCH Ltd Technology, Security and Resilience Board Committee assesses LCH Ltd's management of technical, security, operational and cyber risks, and assists the LCH Ltd Board in reviewing its policies in this area. LCH Ltd's approach to information security and implementation of relevant policies is overseen by the LCH Ltd LMC and Executive Information Security Committee. The executive in charge of information security at LCH Ltd chairs the Executive Information Security Committee. This executive also works in conjunction with their counterpart at LSEG, who provide direction on IT and cyber resilience issues.

LCH Ltd's approach to information security is intended to be sufficiently flexible to allow for continual adjustment to its cyber resilience by incorporating new information from internal and external risk-based threat assessments, as well as cross-industry collaboration and intelligence gathering. User access to LCH Ltd's IT and systems is restricted to prevent inappropriate or unauthorised access to application software, operating systems and underlying data. LCH Ltd maintains a suite of controls designed to identify, prevent, detect and respond to cyber attacks on its systems, such as denial-of-service attacks or malware threats. These include: steps to monitor suspicious internet traffic; the provision of spare network capacity in the event of a denial-of-service attack; and other access controls to regulate access to LCH Ltd's systems. LCH Ltd's systems are subjected to regular vulnerability analysis.

LCH Ltd implements physical security arrangements in accordance with the LSEG Physical Security Policy. Physical access to all LCH Ltd systems and infrastructure is controlled at the enterprise level. The key systems supporting LCH Ltd's clearing and settlement processes are operated within secure buildings. Physical security arrangements for the primary and backup data centres are broadly equivalent.

16.4 A central counterparty should ensure that it can reliably access and utilise well-trained and competent personnel, as well as technical and other resources. These arrangements should be designed to ensure that all key systems are operated securely and reliably in all circumstances, including where a related body becomes subject to external administration.

Access to resources

LCH Group has adopted the LSEG Global Group Vetting Policy and Principles which sets out pre-employment screening for all prospective LCH Group employees. The vetting process is carried out within industry benchmarks and according to the role that an employee performs. Employees of LCH Group, including LCH Ltd, are subject to an annual performance review. LCH Ltd's performance review process is also used to identify the training needs of staff. LCH Ltd employees also undergo ongoing mandatory training and regular performance discussions with their line manager.

LCH Group has adopted the LSEG Financial Crime Policy, which is designed to identify and manage potential sources of fraud. This policy includes mitigation techniques and procedures to be followed in the event that a fraud or potential fraud is reported to LCH Ltd. LCH Group also has a Code of Conduct that applies to employees of all LCH Group legal entities, including LCH Ltd. The Code of Conduct explicitly addresses unethical behaviour, including fraud against LCH Group and insider trading.

LCH Ltd ensures that it has adequate staff to manage operational incidents and disruptions alongside day-to-day business-as-usual processes through the establishment of dedicated Incident Management teams within the IT departments. Potential scenarios requiring the transfer of responsibilities to

alternative work area recovery locations are documented in the LCH Group Threat Assessment document (CCP Standard 16.7). As noted under CCP Standard 2.5, LCH Ltd has a talent management process in place, covering talent acquisition, succession planning and key person risk assessments.

The SwapClear SLA includes targets for system capacity and performance, to ensure that the CCP has sufficient technical and other resources to operate the service effectively (CCP Standard 16.3). Planned system changes must meet the requirements of the SLA prior to implementation.

Resources shared with a related body

BSL provides shared technology and support services across all LSEG entities, including LCH Ltd. These services include: helpdesks and third-party application support; data centre management; IT operations such as servers, databases, storage, licenses and project management; information security; and various workplace services. The relationship between BSL and LCH Ltd is governed by the Technology Services Agreement, the LCH Ltd Service Model, and SLAs. BSL's provision of services to LCH Ltd may only be terminated if a minimum period of notice is provided to LCH Ltd. LCH Ltd has informed the Bank that the outsourcing to BSL follows the LCH Group Outsourcing Policy (CCP Standard 16.9). LCH Ltd conducts regular service reviews of BSL.

Major projects

LCH Ltd conducts an annual planning process to determine its targets and budgeted resources for the following year, for both business-as-usual and change activities, based on the overall priorities for the CCP. Resource requirements for projects are estimated as part of the Change Management Framework, and additional resources factored into the project budget. In addition, workshops are held with each support function (for example, finance and IT) within LCH Ltd to review resource demands arising from projects, to ensure that sufficient resourcing has been factored into project budget forecasts. Plans and forecasts are formally reviewed on a quarterly basis as part of the formal LCH Ltd Quarterly Business Review process.

16.5 A central counterparty should identify, monitor and manage the risks that key participants, other FMIs and service and utility providers might pose to its operations. A central counterparty should inform the Reserve Bank of any critical dependencies on utilities or service providers. In addition, a central counterparty should identify, monitor and manage the risks its operations might pose to its participants and other FMIs. Where a central counterparty operates in multiple jurisdictions, managing these risks may require it to provide adequate operational support to participants during the market hours of each relevant jurisdiction.

LCH Ltd monitors, identifies and mitigates potential dependencies on clearing participants in a number of ways: by its general monitoring of risks under the risk management framework (CCP Standard 3.1); participation requirements related to operational capabilities (CCP Standard 16.6); and by requiring all clearing participants to take part in periodical LCH Ltd and LCH Group business continuity testing (CCP Standard 16.7).

LCH Ltd has policies and procedures in place to mitigate operational risks arising from the PPS banks, correspondent banks and concentration banks that comprise its PPS system (CCP Standard 9), and relationships with its custodian banks, CSDs and securities settlement systems (CCP Standard 15).

Dependencies on service providers

The LSEG Procurement Policy, its supporting frameworks and the LCH Group Outsourcing Policy collectively govern the selection of external service providers by LCH Ltd, and ongoing management of these relationships including the treatment for providers deemed critical, high risk or strategic in nature. This assessment is made during pre-selection due diligence. The LSEG Procurement Policy requires that all LCH Ltd contracts related to outsourcing must be reviewed and approved by the LCH Ltd Legal department. LSEG's due diligence process for suppliers also involves the engagement of specialist functions such as the LCH Group Business Continuity and Information Security departments.

LCH Ltd reviews its risk assessments of its outsourcing and critical service providers twice a year. LCH Ltd also gathers information on its critical service suppliers through an annual due diligence questionnaire. LCH Ltd has informed the Bank that it is continuing to review its approach regarding critical service providers.

Outsourcing

The LCH Group Outsourcing Policy applies to services provided to an LCH Group entity that:

- were previously carried out by that LCH Group entity and that is integral to the performance of its function as a clearing house or the LCH Group entity could reasonably be expected to be able to carry out itself; and
- where cessation of those services being provided would be likely to impair the LCH Group entity from providing its clearing services.

The external service provider may be another entity within LCH Group or LSEG.

The policies as they relate to the outsourced service require that LCH Ltd: retain appropriate expertise and adequate resources that are independent of the service provider to properly manage the service provider; review its own business continuity and disaster recovery plans in light of any new arrangements with a service provider; and put measures in place to support escalation and resolution of disputes with the service providers.

The LCH Group Outsourcing Policy further requires that, when a service provider is engaged, minimum contractual requirements are applied that take into account the identification and monitoring of operational risks to LCH Ltd. Minimum contractual requirements include: SLAs with defined standards of performance; notification provisions in relation to service-affecting incidents and service remediation mechanisms; appropriate exit clauses and handover provisions; protection of confidential information, including that the service provider implements appropriate information security requirements (as defined in the LCH Group Information Security and Cyber Risk Policy); and notification requirements in relation to planned changes to the service, including decisions by a service provider to outsource its services. Contractual agreements must also ensure adequate audit rights for LCH Ltd, including on-site access, and specify an audit program with a schedule of routine audits. The providers of outsourced services are required to implement business continuity arrangements equivalent to those of LCH Ltd (CCP Standard 16.9).

The LCH Ltd Board must be notified of all proposals to outsource any business function to a service provider, and of material changes to existing outsourcing arrangements. The LCH Ltd Board and the LCH Group Board must be notified of all operational incidents relating to existing service providers. For activities linked to the management of risks in relation to LCH Ltd's clearing business, new

arrangements with external service providers require the approval of LCH Ltd's regulators and the LCH Group Compliance department.

External service providers

LCH Ltd uses services from several external service providers:

- *Market data providers.* LCH Ltd maintains direct connectivity from each of its data centres to all of its data providers. In the event that one of LCH Ltd's data providers was unable to provide data to LCH Ltd, LCH Ltd would seek data from alternative sources or use proxy data.
- *Platform infrastructure provider.* The clearing platform infrastructure used for the SwapClear service is provided by a third-party vendor. All application support and development is performed by LCH Ltd. Where application support or development relies on core provider code, LCH Ltd would escalate this to the provider's support function. LCH Ltd maintains direct connectivity to the provider from each of its data centres. LCH Ltd has in place contractual rights with the provider to ensure that, in the event of its insolvency, LCH Ltd would continue to hold underlying source code.
- *Financial messaging provider.* LCH Ltd, its clearing participants and clearing participants' settlement banks use messaging infrastructure provided by a third-party vendor. LCH Ltd maintains a framework of operational risk controls relating to this provider, consisting of a number of specific requirements to be met in order to mitigate the impact of a failure of this provider's infrastructure.
- *IT support and data processing providers.* LCH Ltd outsources IT support and data processing services to BSL. Some services are also outsourced to a third-party supplier. Under these arrangements, the suppliers provide IT production services (to enable LCH Ltd to offer 24-hour coverage), IT support and information technology development resources, including testing. LCH Ltd considers these to be critical service providers, and has crisis management arrangements in place with regard to these entities (CCP Standard 16.9).
- *Utility providers.* Operational risks posed by utility providers are managed in the context of business continuity (CCP Standard 16.7). LCH Ltd's head office is supplied by multiple external electricity feeds, and has an uninterruptible power supply for critical business areas. Telecommunications services are provided without a single point of failure from LCH Ltd's telecommunication provider into LCH Ltd's data centres, and from LCH Ltd's data centres to LCH Ltd's systems.

Operational services provided by LCH Ltd

LCH Ltd provides the following services to SwapAgent (another wholly owned subsidiary of LCH Group): onboarding and sales; product management; valuation and risk analytics; platform development and other technology services; operations and product support; and compliance and audit. LCH Ltd's Risk Governance Framework states that the provision of such operational services should not impact CCP operations at LCH Ltd. LCH Ltd will ensure that it has sufficient operational, support and development resources to continue to support the SwapClear service. SwapAgent systems are predominantly separate from SwapClear to mitigate the risk that it will affect LCH Ltd operations.

Operational support to Australian clearing participants

The official SwapClear service operating hours are 6 am UK time to 7 pm New York time. However, LCH Ltd (at its discretion) opens one hour early. The operating hours are such that trades executed

during the early part of the Australian business day when the SwapClear service is closed are not novated to LCH Ltd until the Australian afternoon when the SwapClear service reopens. This leaves Australian banks and their counterparties with temporary bilateral credit risk exposures, which have to be managed via bilateral arrangements and result in greater operational complexity and uncertainty. Upon licensing of the SwapClear service in Australia, the Bank set a regulatory priority that LCH Ltd extend its operating hours and provide appropriate operational support to participants in the Australian time zone. The Bank expects LCH Ltd to continue to progress towards a stable and resilient extension of the operating hours of the SwapClear service.

Australian participants can seek operational support from LCH Ltd's Sydney-based staff or via LCH Ltd staff in London or New York. LCH Ltd's Sydney office includes regulatory compliance, operations, technology, risk management and sales functions.

16.6 A participant of a central counterparty should have complementary operational and business continuity arrangements that are appropriate to the nature and size of the business undertaken by that participant. The central counterparty's rules and procedures should clearly specify operational requirements for participants.

LCH Ltd's participation requirements seek to ensure that clearing participants have facilities, procedures and personnel that are adequate to meet the operational requirements of SwapClear (CCP Standard 17). A clearing participant's systems and equipment must be able to support a high volume of eligible SwapClear transactions, and its back office infrastructure must be remote from the trading floor. A clearing participant's staff must have a high standard of integrity and sufficient knowledge of the nature, risks and obligations of trading in the markets and contracts cleared by the SwapClear service. At least two staff must be fully conversant in LCH Ltd's clearing procedures. A prospective clearing participant must undertake connectivity testing prior to being admitted to the SwapClear service, and LCH Ltd also provides testing material to participants to facilitate their own testing prior to admittance.

Clearing participants must maintain up-to-date risk management procedures that address the risks they may pose to LCH Ltd. This should cover, among other things, a clearing participant's liquidity management and settlement procedures, and should include contingency arrangements to ensure that a clearing participant could continue to meet its margin obligations to LCH Ltd in the event of a failure of its nominated PPS banks. LCH Ltd requests information from prospective clearing participants regarding the disaster recovery arrangements that support their planned clearing business, but does not mandate specific business continuity requirements for clearing participants. The LCH Ltd Rulebook and Procedures require that all SwapClear clearing participants take part in periodic LCH Group business continuity testing (CCP Standard 16.8).

Business continuity arrangements

16.7 A central counterparty should have a business continuity plan that addresses events posing a significant risk of disrupting operations, including events that could cause a wide-scale or major disruption. The plan should incorporate the use of a secondary site and should be designed to ensure that critical information technology systems can resume operations within two hours following disruptive events. Business continuity arrangements should provide appropriate redundancy of critical systems and appropriate mitigants for data loss. The business continuity plan should be designed to enable the central counterparty to

facilitate settlement by the end of the day of the disruption, even in case of extreme circumstances. The central counterparty should regularly test these arrangements.

Business continuity management

LCH Ltd's business continuity management program is defined in the LSEG Business Continuity Management Policy, which has been adopted by LCH Ltd. This policy describes the LSEG business continuity model that all LSEG entities, including LCH Ltd, are required to follow. The program includes requirements for threat assessment and monitoring, and the key roles and responsibilities in relation to business continuity. The LCH Group Business Continuity Management team coordinates all policies and efforts across the LCH Group entities and acts in an advisory and training capacity on business continuity for each CCP. The Business Continuity Management team is accountable to the LCH Group Head of Risk Resilience.

The LSEG Business Continuity Management Policy and all supporting documents are reviewed at least annually and following the introduction of new services, major incidents, identification of new risks, organisational changes and major changes to the technical infrastructure. Within LCH Group, the review of the Business Continuity Management Policy is carried out by the LCH Ltd and LCH SA Business Continuity Management teams, and changes to the policy require the approval of the LCH Group Audit Committee and Board.

The LSEG Business Continuity Management Policy is supported by the LCH Group Incident Management Process, LCH Group CMT Plan ('Incident management'), and the LCH Ltd IT Disaster Recovery Plan, which detail procedures for ensuring continuity of service in a crisis. The IT Disaster Recovery Plan covers production services provided by LCH Ltd to LCH SA, services provided to LCH Ltd (and LCH SA) by BSL, and services provided by its third-party IT support and data processing provider (CCP Standards 16.5 and 16.9).

The LCH Ltd IT Disaster Recovery Plan defines LCH Ltd's business continuity plans in relation to IT infrastructure, and would generally be invoked in conjunction with the Group Major Incident Management Process. The IT Disaster Recovery Plan also covers business continuity with respect to cyber risk. The IT Disaster Recovery Plan is designed to ensure that under any major eventuality LCH Ltd's critical services could be recovered quickly from the point at which they were interrupted, for instance due to IT infrastructure or service failures and events disrupting LCH Ltd's physical infrastructure. Specifically, the objectives of this plan are: recovery of all clearing services, including SwapClear, within two hours of the point of failure; the ability to perform end-of-day settlement of transactions on the same business day; and complete recovery of data should critical IT systems fail. Changes to the IT Disaster Recovery Plan require the approval of the LCH Ltd Board.

LCH Ltd's IT disaster recovery objectives are supported by the maintenance of geographically separate data centres. The data centres use a combination of synchronous data replication (data are posted to the sites at the same time so that data remain current at the sites) and asynchronous data replication (data are posted with a minor delay, which necessitates reconciliation before production services could be run). LCH Ltd conducts fail-over testing of its production environment between its data centres (see below). Many services within each of LCH Ltd's data centres have resilience which would avoid fail-over between data centres for single component failures.

LCH Ltd's recovery objectives are also supported by the maintenance of business continuity plans that set out tailored recovery scenarios and procedures. LSEG commissions and coordinates a periodic threat assessment. This assessment considers a range of threats against key LSEG locations (including

offices, recovery sites and data centres) and the level of risk attributed to each location. LCH Group reviews the threat assessment alongside existing recovery strategies to identify if there are any potential gaps or new threats or risks that should be considered.

LCH Ltd has established a business continuity plan for its Australian operations. The plan sets out recovery strategies for IT disasters, operational incidents and physical damage or denial of access to LCH Ltd's premises in Australia, as well as communication arrangements tailored to LCH Ltd's Australian operations. The Australian business continuity plan is reviewed and updated on a quarterly basis, or as and when organisational or personnel changes occur. LCH Ltd periodically conducts CMT exercises for its Sydney office to test its ability to respond to a localised business continuity event. The Australia Country Head maintains the Australian business continuity plan.

LCH Ltd is required to notify the Bank of any material incidents relating to business continuity and operational risk. In addition, the Australian business continuity plan contains explicit provisions for communication arrangements between the Bank and staff in LCH Ltd's Australian operations.

LCH Group and LCH Ltd carry out regular tests of business continuity and disaster recovery arrangements, including: regular fail-over testing between its data centres (involving clearing participants and external service providers); work area recovery site testing; remote access testing; crisis management testing; and internal staff crisis notification testing.

Fail-over testing between LCH Ltd's data centres is conducted on at least an annual basis, to ensure that LCH Ltd could recover the SwapClear service within a period of two hours, this involves clearing participants and critical service providers. LCH Ltd currently has in place a number of work area recovery sites; these are tested for connectivity on a monthly basis. Complete work area recovery exercises are conducted quarterly. Staff members also have remote access (which is tested on a quarterly basis) to LCH Ltd's IT systems. All LCH Group staff are required to undertake business continuity management awareness training on an annual basis.

Incident management

LCH Group has developed an Incident Management Process which documents the procedures, roles and responsibilities for recording, reporting, and resolving operational and IT (including cyber) incidents. The Incident Management Process categorises incidents according to one of four levels of severity, and sets out how each category of incident should be resolved; for example, the Process provides for a faster response to address and resolve major incidents. LCH Group incidents are categorised based on their impact on LCH Group entities' ability to meet their financial, legal or regulatory obligations, or the availability of critical business services to participants or partners.

All IT incidents are handled by either the LCH Ltd Incident or BSL Incident Management team. LCH Ltd Service Management handles all incidents related to LCH Ltd's clearing services and associated shared services. Specific notification and escalation requirements are set out for each category of incident, including invocation of the Incident Management Process and CMT Plans for incidents in the two highest severity categories. The LCH Ltd IT Disaster Recovery Plan would also be invoked for particular types of incidents (discussed above). Post incident reviews (referred to as service incident reviews) are conducted on all material incidents in the two highest severity categories. Post-incident reviews are also carried out on some incidents in the third-highest severity category. These reviews identify actions to mitigate the root cause and to decrease the risk of repeated incidents.

In the event of a high-severity incident, the LCH Group Incident Management Process specifies procedures to invoke business continuity plans and to coordinate and resolve major incidents across all LCH Group entities. In the event that an incident was prolonged, escalated or could threaten the immediate safety of LCH Group staff or operations, the LCH Group CMT Plan would be invoked. The LCH Group CMT Plan aims to ensure that the response to, and management of, a crisis within LCH Group or one of the LCH Group entities would be coordinated and effective, to minimise the impact on staff and clearing participants. LCH Group has established a Global CMT as well as regional CMTs located in London, Paris, New York and Sydney. Membership of the London CMT comprises representatives from all critical LCH Ltd departments, including the LCH Ltd CEO and the heads of the clearing services (including SwapClear), as well as BSL. In the event of an LCH Group-wide crisis, the LCH Group CMT would be responsible for coordinating and managing the crisis response. In the event of a crisis which affected multiple entities across LSEG, the LSEG CMT would be invoked to coordinate the crisis response. The CMT plan specifies the regional CMTs responsibilities in the event of a crisis, and provides for the escalation of crisis management to the Group CMT. The CMT Plan is tested and reviewed on a quarterly basis; the regional CMTs undertake quarterly scenario-based exercises of possible threats, including one group-wide exercise that involves the LCH Group CMT. Changes to the Incident Management Process are approved by the IT Production Management team and the CMT plan is updated by staff with specified Crisis Management responsibilities, consisting of the Group CEO, Group CTO and the LCH Ltd Head of Operational Risk. Changes to the Incident Materiality Matrix (which classifies incidents according to impact and urgency) that would impact the Incident Management Process must be approved by the LCH Ltd ERCo and the LCH Ltd Risk Committee.

16.8 A central counterparty should consider making contingency testing compulsory for the largest participants to ensure they are operationally reliable and have in place tested contingency arrangements to deal with a range of operational stress scenarios that may include impaired access to the central counterparty.

As noted under CCP Standard 16.6, clearing participants must maintain up-to-date risk management procedures that address the risks they may pose to LCH Ltd.

The LCH Ltd Rulebook and Procedures require that all clearing participants, including those participating in the SwapClear service, take part in periodic LCH Ltd and LCH Group business continuity management testing. As noted under CCP Standards 16.6 and 16.7, LCH Ltd undertakes an annual disaster recovery exercise that involves all clearing participants and critical service providers. As part of this exercise, participants are invited to test their connectivity to any LCH Ltd asynchronous data centre following successful failover, within a window of around two hours. As discussed in CCP Standard 16.6, LCH Ltd does not mandate specific business continuity requirements for clearing participants.

Outsourcing and other dependencies

16.9 A central counterparty that relies upon, outsources some of its operations to, or has other dependencies with a related body, another FMI or a third-party service provider (for example, data processing and information systems management) should ensure that those operations meet the resilience, security and operational performance requirements of these CCP Standards and equivalent requirements of any other jurisdictions in which it operates.

A number of LSEG and LCH Group policies and procedures support LCH Ltd's scrutiny of critical service providers with respect to operational risks to its services, confidentiality and integrity of information and business continuity arrangements. These include the LCH Group Outsourcing Policy, LSEG

Procurement Policy and associated frameworks (CCP Standard 16.5), the LCH Group Information Security and Cyber Risk Policy (CCP Standard 16.2) and the LSEG Business Continuity Management Policy (CCP Standard 16.7).

All LCH Group critical service providers are required to implement business continuity arrangements equivalent to those of LCH Group, and are required to carry out testing of these arrangements periodically. As noted in CCP Standard 16.7, LCH Ltd also undertakes an annual disaster recovery exercise that involves clearing participants and critical service providers. The staff of the service providers also participate in testing during fail-over and work area recovery exercises, as these staff support these processes.

BSL, which provides shared technology and support services across all LSEG entities, is a critical service provider for LCH Ltd (CCP Standard 16.4). LCH Ltd has informed the Bank that the outsourcing of technology and support services to BSL is consistent with the requirements set out in the LCH Group Outsourcing Policy. Business continuity and disaster recovery arrangements for the services BSL provides for LCH Group are integrated into the IT Disaster Recovery Plan (CCP Standard 16.7).

LCH Ltd considers its IT support and data processing provider to be a critical service provider (CCP Standard 16.5). The staff of this external provider who provide support services to LCH Ltd from the provider's site are trained by LCH Ltd Management; control, responsibility and accountability for the operation of the service lie with LCH Ltd. LCH Ltd's arrangements with the provider ensure that LCH Ltd and its regulators have access to the provider's facilities, personnel and records. LCH Ltd's arrangements with its IT support provider are addressed in the IT Disaster Recovery Plan. The provider has an alternative work area recovery site that could be used if its primary site was affected. LCH Ltd and the provider have also established a contingency strategy for critical services to be provided from London if necessary. Tests of backup arrangements are undertaken annually and the results reported to LCH Ltd.

16.10 All of a central counterparty's outsourcing or critical service provision arrangements should provide rights of access to the Reserve Bank to obtain sufficient information regarding the service provider's operation of any critical functions provided. A central counterparty should consult with the Reserve Bank prior to entering into an outsourcing or service provision arrangement for critical functions.

The LCH Group Outsourcing Policy specifies that all arrangements with external service providers, irrespective of the critical importance of these arrangements, must provide appropriate access rights, including on-site access, for the regulators of LCH Group entities. LCH Ltd's arrangements with BSL and its third-party IT support and data processing provider are intended to ensure that LCH Ltd and its regulators have access to the providers' facilities, personnel and records. Since LCH Ltd is a UK-based CS facility, any actions in this regard would be led by LCH Ltd's primary regulator, the BoE (CCP Standard 16.11).

New arrangements with external service providers, for activities linked to the management of risks in relation to LCH Ltd's clearing business, require the approval of the BoE, the LCH Group Compliance department and the LCH Ltd Board. LCH Ltd is required to notify the Bank of material changes to its operational processes and arrangements, including any co-sourcing or outsourcing arrangements.

16.11 A central counterparty should organise its operations, including any outsourcing or critical service provision arrangements, in such a way as to ensure continuity of service in a crisis and to facilitate effective crisis management actions by the Reserve Bank or other relevant

authorities. These arrangements should be commensurate with the nature and scale of the central counterparty's operations.

Any crisis management actions with regards to LCH Ltd would be led by the BoE in its role as LCH Ltd's primary regulator and/or in its role as the UK resolution authority (CCP Standard 3.5). Clarification as to how a resolution scenario would work in practice, including with regard to LCH Ltd's critical service providers, is expected to develop in light of the UK Treasury's negotiations with the European Commission about the pending EU legislation relating to CCP recovery and resolution.

LCH Ltd has notification requirements with the BoE and the Bank when business continuity plans or procedures are activated. LCH Ltd is also subjected to event-specific reporting requirements in relation to certain operational incidents.

LCH Ltd's arrangements with related parties and external suppliers that provide services include requirements to ensure ongoing service provision in the event that one of these entities entered into resolution or external administration (CCP Standard 16.4).

Standard 17: Access and participation requirements

A central counterparty should have objective, risk-based and publicly disclosed criteria for participation, which permit fair and open access.

17.1 A central counterparty should allow for fair and open access to its services, including by direct and, where relevant, indirect participants and other FMIs, based on reasonable risk-related participation requirements.

LCH Ltd's participation requirements for the SwapClear service are transparent, objective, and are applied equally across existing clearing participants and clearing participant applicants.⁸⁴ All participation requirements are publicly disclosed in the LCH Ltd Rulebook, which is available on the LCH Group website.⁸⁵ The LCH Group and SwapClear websites contain dedicated pages outlining the participation requirements, application costs and the procedure for a Clearing Member Status application.

The LCH Group Credit team assesses prospective clearing participants and assigns an ICS to them, before recommending to the LCH Ltd ERCo that they are either approved or rejected. The LCH Ltd ERCo has the ultimate discretion to approve or reject the application of any prospective new clearing participant. In accordance with the LCH Ltd Rulebook, LCH Ltd retains the discretion to refuse an application for membership. In the event that LCH Ltd refuses an application, clear reasons for the rejection must be provided to the applicant in writing. A prospective clearing participant may appeal against a decision to decline to grant Clearing Member Status, in accordance with the appeal procedures set out in the LCH Ltd Rulebook.

At the end of September 2018, SwapClear had 111 participants, predominantly large banks and their subsidiaries. Six participants were domiciled in Australia.

17.2 A central counterparty's participation requirements should be justified in terms of the safety of the central counterparty and the markets it serves, be tailored to and commensurate with the central counterparty's specific risks, and be publicly disclosed. Subject to maintaining

⁸⁴ To clear in markets covered by other LCH Ltd services, SwapClear clearing participants must meet the specific requirements for each market and receive written approval.

⁸⁵ Available in section 1 of the procedures at <https://www.lch.com/resources/rules-and-regulations/ltd-rulebooks>.

acceptable risk control standards, a central counterparty should endeavour to set requirements that have the least restrictive impact on access that circumstances permit.

Overview of participation

LCH Ltd offers three main categories of clearing membership status for the SwapClear service:

- *SwapClear Clearing Member Status*, which enables a clearing participant to clear any of the products eligible for clearing through the SwapClear service. Clearing participants with Clearing Member Status can clear proprietary business and, with the prior approval of LCH Ltd, non-US-domiciled client business.
- *Futures Commission Merchant Clearing Member Status*, which enables a clearing participant that is an FCM to clear any of the products eligible for clearing through the SwapClear service. Clearing participants with FCM Clearing Member Status can clear proprietary business and, with the prior approval of LCH Ltd, US-domiciled client business and non-US-domiciled client business.⁸⁶
- *Special Clearing Member Status*, which would apply to (i) a CCP with which LCH Ltd has an interoperable link and (ii) in respect of supranational bodies that use one or more of the clearing services operated by LCH Ltd. There are currently no such members in SwapClear and no interoperable links between the SwapClear service and other CCPs.

LCH Ltd also maintains a SwapClear Dealer Status membership category, which enables a dealer in the product categories eligible for clearing through the SwapClear service to clear transactions on behalf of existing SwapClear clearing participants. Clearing participants remain responsible for all aspects of a contract that is registered in SwapClear by a dealer on their behalf.

Participation requirements

LCH Ltd's participation requirements for the SwapClear service are tailored to the specific activities of SwapClear, and include minimum capital and other financial requirements, operational requirements and legal requirements. All SwapClear clearing participants in all membership categories must meet these participation requirements, and LCH Ltd has the right to impose additional requirements on clearing participants.

LCH Ltd's financial participation requirements are intended to ensure that clearing participants have adequate financial resources to withstand unexpected losses. Financial requirements include minimum net capital requirements (US\$50 million) and default fund contributions (CCP Standard 4.4).⁸⁷ Prospective clearing participants must also meet a minimum ICS.

LCH Ltd's operational requirements seek to ensure that clearing participants are able to monitor the risks they pose to LCH Ltd, effect the settlement of their obligations with LCH Ltd, and engage in the default management process. Clearing participants must:

⁸⁶ Clients domiciled in the US are required to clear through entities registered with the CFTC as FCMs. A FCM is an entity certified by the CFTC that is permitted to solicit or accept orders for the purchase or sale of OTC and exchange-traded derivatives, and that accepts payment from, or extends credit to, those whose orders are accepted.

⁸⁷ For the purposes of LCH Ltd's participation requirements, net capital is defined as the sum of permanent capital and additional capital (minus intangible fixed assets). Permanent capital is defined as fully paid-up shares, fully paid-up preference shares, the share premium account and other reserves not available for distribution. Additional capital is defined as other equity reserves, redeemable shares and subordinated loans from a clearing participant's parent company.

- maintain adequate risk management arrangements, technical infrastructure and operational capacity (CCP Standard 16)
- open accounts with eligible PPS banks in each currency in which they incur settlements, and have contingency arrangements to meet their margin obligations (CCP Standard 9)
- participate in a 'driving' test prior to being admitted to SwapClear (CCP Standard 12.4)
- participate in SwapClear fire drills which are held twice a year (CCP Standard 12.1).

LCH Ltd's legal requirements provide for a high degree of legal certainty with respect to the material aspects of LCH Ltd's activities, and ensure that LCH Ltd's clearing participants are well regulated (CCP Standard 1.3). LCH Ltd must be satisfied that the prospective clearing participant (or a clearing participant's related entity in the same corporate group) is subject to prudential or securities regulation in their home jurisdiction that is at least as stringent as that applicable to credit institutions and investment firms within the EU. Before admitting a non-UK clearing participant, LCH Ltd obtains an independent legal opinion to ensure that the SwapClear Rulebook is enforceable in the clearing participant's home jurisdiction (CCP Standard 1.6).

In order to balance the objective of open access with the risk individual clearing participants bring to the CCP, the Credit team monitors SwapClear clearing participants' exposures and key credit risk indicators (CCP Standards 4.1 and 17.3). Further, LCH Ltd may apply risk management controls such as concentration limits and additional margin based on a clearing participant's ICS and a range of other financial indicators.

Client clearing

Client clearing in SwapClear is possible via SwapClear's client clearing service. In order to offer client clearing, a clearing participant must apply to LCH Ltd's Onboarding department, either as part of its initial application or as an extension of its activities. When considering applications for client clearing, LCH Ltd takes into account a clearing participant's proposed criteria and arrangements for the provision of client clearing services, and the potential concentration of risks arising from the provision of client clearing services (CCP Standard 18). Before authorising a non-UK clearing participant to offer client clearing, LCH Ltd obtains an independent legal opinion to gain comfort that SwapClear's client clearing arrangements will be enforceable in the clearing participant's jurisdiction (CCP Standard 13.2).

LCH Ltd does not impose restrictions on eligibility of clients; rather, client eligibility is at the discretion of the relevant clearing participant. Specific rules and regulations relating to the provision of client clearing are set out in the LCH Ltd Rulebook (CCP Standard 13.1).

17.3 A central counterparty should monitor compliance with its participation requirements on an ongoing basis and have clearly defined and publicly disclosed procedures for facilitating the suspension and orderly exit of a participant that breaches, or no longer meets, the participation requirements.

Monitoring compliance

As part of the Clearing Membership Agreement between a clearing participant and LCH Ltd, a clearing participant must notify LCH Ltd immediately if it:

- no longer meets any of LCH Ltd's participation requirements
- has insolvency or similar proceedings brought against it

- is granted, refused or has revoked a licence or authorisation to carry on investment, banking or insurance business in any country
- is being investigated by a statutory body or other regulatory authority, has disciplinary measures imposed on it, or is convicted of any offence in relation to its investment, banking or insurance businesses in any country.

In the event that a clearing participant notified LCH Ltd of any of these changes, the Credit team would assess the impact on the participant's ability to meet LCH Ltd's participation requirements and the risk the clearing participant presents to the SwapClear service. Recommended remedial action would be put forward for approval or escalation to the LCH Ltd ERCo where required.

LCH Ltd also carries out regular monitoring of clearing participants' compliance with the participation requirements. The Credit team assigns an ICS to each clearing participant, and their credit quality is monitored on an ongoing basis when relevant information becomes available (CCP Standard 4.2). Clearing participants are also required to provide their audited financial reports to LCH Ltd.

The LCH Group Counterparty Credit Risk Policy states that each clearing participant's compliance with all participation requirements is reviewed by the Credit team at least annually. Clearing participants with worse ICSs are subject to more frequent reviews. A significant deterioration in any of the inputs to a clearing participant's ICS would trigger an ad hoc review of their compliance with the participation requirements (CCP Standard 4.2).

Suspension and exit of a clearing participant

The LCH Ltd Rulebook allows LCH Ltd to impose conditions if there is an indication that a clearing participant may no longer meet the participation requirements. These conditions include: requiring prior authorisation for trades above a specified size; position reduction; position transfer to other participants; and trading for liquidation only.

In the event that a clearing participant is determined to be in breach of the participation requirements, the Credit team is responsible for imposing additional conditions on the participant and subsequently notifying the LCH Ltd ERCo. In accordance with the LCH Ltd Clearing Member Agreement, if a clearing participant is in breach of the participation requirements but has not defaulted on payments to LCH Ltd, a grace period of 30 days (or longer, as LCH Ltd sees fit) may be granted, giving the clearing participant an opportunity to remedy the breach.

If no other actions are feasible, or deemed sufficient, to reduce the risk a clearing participant brings to LCH Ltd, the Credit team can recommend to the LCH Ltd ERCo that a clearing participant be suspended, or its SwapClear membership terminated. Such actions would be taken in accordance with the Clearing Membership Agreement.

Under the default rules, the LCH Ltd CEO has the discretion to declare a member in default as soon as they believe a participation requirement is breached. Once a default notice has been issued, withdrawal of a clearing participant occurs in accordance with the Default Procedures (CCP Standard 12.1). The LCH Ltd Rulebook contains procedures for a clearing participant to appeal against a decision to suspend or terminate its Clearing Member Status, but these appeal procedures do not apply to termination decisions made in accordance with the Default Rules and Procedures.

In case of voluntary withdrawal by a clearing participant, notice of at least three months is required. A clearing participant must terminate all open contracts registered with LCH Ltd within the three-month period. If after three months the portfolio has not been closed out, LCH Ltd may liquidate the portfolio

or require a clearing participant to remain in the SwapClear service until there are no remaining contracts.

Standard 18: Tiered participation arrangements

A central counterparty should identify, monitor and manage the material risks to the central counterparty arising from tiered participation arrangements.

18.1 A central counterparty should ensure that its rules, procedures and agreements allow it to gather basic information about indirect participation in order to identify, monitor and manage any material risks to the central counterparty arising from such tiered participation arrangements.

LCH Ltd has in place rules, procedures and agreements with clearing participants (direct participants) that allow it to gather basic information about clearing participants' direct clients and indirect clients (that is, clients of clients). For the purposes of CCP Standard 18, the term 'indirect participants' is used to refer to both direct clients and indirect clients. LCH Ltd can collect information about tiered participation through direct participants and by using its own systems. The LCH Ltd Rulebook also specifies that the CCP may request additional information from clearing participants regarding their client clearing services.

Direct participants must be approved by the LCH Ltd ERCo before they can facilitate indirect participation through SwapClear's client clearing arrangements. Direct clients enter into principal-to-principal relationships with their clearing participant (for FCM clients, this is also known as the 'agency model'). LCH Ltd has no principal relationships with any indirect participants, other than with those that use CSAs (CCP Standard 13.2). LCH Ltd has no direct credit exposures to any indirect participants, whether or not they use CSAs. LCH Ltd has informed the Bank that it therefore considers one of the key risks associated with tiered participation to be effecting porting in the event of a clearing participant default (CCP Standard 13). LCH Ltd also faces risks arising from material dependencies between large indirect participants and direct participants (CCP Standard 18.2).

To access the SwapClear Client Clearing Service, LCH Ltd requires direct clients to submit a range of documents to the clearing participant during the on-boarding process. Key information about direct clients must then be sent by the clearing participant to LCH Ltd. For clients of FCMs and SwapClear Clearing Members, this includes:

- the legal name of the client (SwapClear Client identifier)
- legal entity identifier of the client
- jurisdiction of incorporation of the client
- client contact details (including the details of at least one individual to contact in the case of default of the direct participant)
- the client account type
- the client account used to clear trades (SwapClear Client account identifier).

For clients of SwapClear Clearing Members, LCH Ltd also receives:

- immediate and ultimate parent names and country of incorporation

- categorisation
- registered address

LCH Ltd requires clearing participants to immediately contact the LCH Ltd Onboarding department if client contact details change, and also asks clearing participants for an update of client information annually.

LCH Ltd's principal-to-principal model of tiered participation means that it only faces direct credit exposures to direct participants; LCH Ltd's key concern is the ability of each direct participant to meet its obligations across all its accounts. In monitoring its exposures, LCH Ltd therefore focuses on its total exposure to each direct participant. Indirect participant exposures are not routinely monitored separately; rather, they are identified in the daily account-level monitoring of LCH Ltd's total exposure to each direct participant. LCH Ltd produces daily reports that monitor positions and associated cash flows across all of a direct participant's accounts. Using this information, the SwapClear and Group-level risk management teams can determine the relative shares of house and client activity, allowing them to monitor any material risks to the CCP arising from indirect participant exposures. To manage any material risks that may arise from such exposures, LCH Ltd can impose activity restrictions or additional controls, including calls for additional margin (CCP Standard 4.3).

Although the focus of its routine monitoring is on its total exposure to each direct participant, LCH Ltd also conducts some monitoring of exposures to individual indirect participants. Specifically, LCH Ltd identifies the largest individual indirect participants in a service and monitors their total exposures across each direct participant they use to access the service.

18.2 A central counterparty should identify material dependencies between direct and indirect participants that might affect the central counterparty.

LCH Ltd collects information to identify material dependencies between direct and indirect participants using its own systems and from information provided by direct participants. Using its own systems, LCH Ltd can determine the size of direct and indirect participant positions, and identify and monitor the proportion of direct participant activity attributable to a particular indirect participant.

Information provided during the on-boarding process allows LCH Ltd to identify its direct clients. LCH Ltd does not collect information on the identity of indirect clients, beyond identifying the direct client with which they are associated.

This information allows LCH Ltd to assess the degree to which indirect participants may rely on their direct participant and any risks that may arise from such dependencies. Similarly, this information also allows LCH Ltd to assess the dependencies of direct participants on indirect participants, so LCH Ltd has information on how it may be affected by problems at an indirect participant.

LCH Ltd assesses whether these dependencies are material on a case-by-case basis. Should a dependency be identified as material, LCH Ltd would assess whether the total resources it holds for a direct participant's positions (including accounts of its indirect participants) would be adequate if these positions were treated as a single combined account.

18.3 A central counterparty should identify indirect participants responsible for a significant proportion of transactions processed by the central counterparty and indirect participants whose transaction volumes or values are large relative to the capacity of the direct

participants through which they access the central counterparty in order to manage the risks arising from these transactions.

LCH Ltd monitors the positions of its indirect participants (CCP Standard 18.1). LCH Ltd has processes in place to monitor an indirect participant's total exposure (based on its margin requirements) across all direct participants in order to identify indirect participants that account for a significant proportion of total positions held at the CCP. LCH Ltd also mitigates indirect participant exposures by requiring direct participants to call margin from their clients at least at the level called from the direct participant by LCH Ltd.

Although LCH Ltd has no direct credit exposure to indirect participants in the principal-to-principal model, an indirect participant may present a material risk to LCH Ltd if it disrupts or adversely affects its direct clearing participant (for example, due to its own default). As discussed in CCP Standard 18.1, to mitigate such risks LCH Ltd's focus is to ensure that a direct participant can meet its obligations, including those arising from any indirect participants to which it provides services. In the event that LCH Ltd has concerns regarding the total level of a direct participant's exposures, it could: engage in discussions with the clearing participant; increase the clearing participant's net capital requirements; tighten credit-risk-related limits; or apply higher margin requirements (CCP Standard 4.3). The application of additional margin requirements is reviewed by LCH Ltd on a case-by-case basis and also takes into account a direct participant's porting arrangements.

Although LCH Ltd does not actively encourage an indirect participant to transition to direct participation where that indirect participant accounts for a material proportion of the transactions processed by the SwapClear service, LCH Ltd is receptive to increasing the number of SwapClear direct participants, assuming participation requirements can be met (CCP Standard 17). LCH Ltd imposes no restrictions on the eligibility of indirect participants, which is instead a matter for the direct participant.

18.4 A central counterparty should regularly review risks arising from tiered participation arrangements and should take mitigating action when appropriate.

LCH Ltd monitors and manages tiering participation risks as part of its daily monitoring of direct participation exposures. LCH Ltd primarily seeks to manage risks from tiered exposures by imposing additional margin requirements.

LCH Ltd's initial margin and margin add-on standards set out how the CCP monitors and manages, on a daily basis, the credit and liquidity exposures that arise from tiered participation arrangements (CCP Standard 6). Concentration, liquidity and counterparty credit risks, arising from both direct and indirect participant activity, are addressed in LCH Ltd's standards for margin add-ons. These standards are set out in the Group Financial Resource Adequacy Policy, supplemented by the Group Counterparty Credit Risk Policy, and reviewed at least annually. LCH Ltd also has the capacity to investigate further and take certain actions when concerns are raised around direct and indirect participant positions (See CCP Standard 18.1 and CCP Standard 18.3).

In the event of a direct participant default, LCH Ltd's management of porting of indirect participant positions and collateral, and any potential credit exposures to an indirect participant, is governed by the Group Default Management Policy (CCP Standard 12 and CCP Standard 13). This policy is reviewed at least annually.

To mitigate legal or operational risks that could arise in a default scenario, LCH Ltd obtains an independent legal opinion to gain comfort regarding the enforceability of SwapClear's client clearing arrangements in the direct participant's jurisdiction. This is conducted prior to allowing non-UK direct

participants to offer client clearing. LCH Ltd conducts due diligence on the ability of its direct participants to offer client clearing in new jurisdictions by commissioning a legal opinion outlining, among other things, that such client clearing would introduce no impediment to LCH Ltd's usual activities, including default management. On receiving the opinion, LCH Ltd reviews whether any additional risks must be mitigated within its Rulebook.

Standard 19: FMI links

A central counterparty that establishes a link with one or more FMIs should identify, monitor and manage link-related risks.

19.1 Before entering into a link arrangement, and on an ongoing basis once the link is established, a central counterparty should identify, monitor and manage all potential sources of risk arising from the link arrangement. Link arrangements should be designed such that the central counterparty is able to comply with these CCP Standards.

Identifying link-related risks

A link for the purposes of this standard is any connection that is made with another FMI according to a set of contractual and operational arrangements, irrespective of the complexity or otherwise of the link and whether it is directly with the FMI or through an intermediary.⁸⁸

LCH Ltd maintains links with multiple CSDs/SSFs and trade repositories with respect to its SwapClear service.⁸⁹

LCH Ltd does not operate any interoperable links with any other CCPs in relation to the SwapClear service.

LCH Ltd links with trade repositories for the purpose of reporting cleared OTC derivatives transaction data. LCH Ltd does not rely on trade repositories for the provision or maintenance of any data for its own operations. These links do not give rise to material operational or financial risks or interdependencies. However, such links could give rise to reputational or regulatory and compliance risks. LCH Ltd mitigates these risks via: selection of trade repositories in accordance with the LSEG Procurement Policy (where allowed under regulatory requirements); monitoring of each trade repository's operational performance; review of proposed regulatory changes; and mandatory inclusion of the Regulatory Reporting team for all projects under LCH Ltd's change management process, which seeks to ensure a targeted assessment of regulatory risk.

With respect to the SwapClear service, LCH Ltd's links with CSDs provide for the transfer and lodgement of acceptable non-cash collateral from participants, and investment of its own assets (CCP Standards 5.1 and 15.1). LCH Ltd also uses custodians for the transfer and lodgement of non-cash collateral. Custodians are subject to the same due diligence processes as CSDs (CCP Standard 15).

LCH Ltd has a link with Austraclear to support its Australian operations, including to manage its AUD liquidity needs and to operate its ESA (CCP Standard 7 and CCP Standard 9). The link also allows its clearing participants to lodge eligible AUD-denominated securities to cover margin obligations

⁸⁸ Links to payment systems are addressed in CCP Standard 9.

⁸⁹ The CSDs used to hold LCH Ltd's non-cash collateral and investments in relation to the SwapClear service also provide securities transfer and settlement functions, and will be referred to simply as CSDs for the remainder of the standard.

(CCP Standard 6.8). Participants may also lodge AUD-denominated securities with Euroclear Bank and Clearstream.

The LCH Group Settlement, Payment and Custody Risk Policy identifies legal, operational and liquidity risks arising from LCH Ltd's links to CSDs; this policy also governs LCH Ltd's use and choice of CSDs. LCH Ltd requests detailed information from CSDs it is considering establishing a link with before entering into any contractual arrangements. Information requested includes financial data, details of service availability, business continuity, default management arrangements and internal controls (CCP Standard 15.2). The LCH Ltd Operations department, in conjunction with the Ltd Legal department, performs due diligence prior to establishing a link to a CSD. The LCH Ltd ERCo is responsible for final approval upon request from CaLM, Operations or Clearing Services (CCP Standard 15.2).

LCH Ltd's process for reviewing prospective and existing CSD links aims to mitigate risks associated with such links (including operational and custody risks), ensuring that its link arrangements do not compromise LCH Ltd's continued ability to observe the CCP Standards. LCH Ltd's Settlement Finality Regulations seek to ensure that the transfer of securities for collateral purposes within its linked CSDs is final at the time specified by the CSD (CCP Standard 8.1).

Managing operational risk

Operational risks arising from LCH Ltd's links with FMIs are identified and managed in accordance with the Operational Risk Policy (CCP Standard 16.1). Operational incidents related to LCH Ltd's interaction with its CSDs would be dealt with as per the LCH Ltd Incident Management Process (CCP Standard 16.2). Changes to LCH Ltd's operations that may impact its links with CSDs are assessed in accordance with LCH Ltd's Change Management Framework (CCP Standard 16.2).

As required under the Group Settlement, Payment and Custody Risk Policy, LCH Ltd performs operational due diligence on all CSDs prior to establishing a link. It also performs due diligence at least every two years, and sooner if there are significant changes (CCP Standard 15.2). This due diligence covers matters including business continuity and level of service availability. The Collateral Operations team is responsible for addressing any issues (identified through LCH Ltd's due diligence) regarding the level of service availability provided by a CSD; where necessary, these issues are escalated to the LCH Ltd ERCo. LCH Ltd senior management may engage with CSDs if any shortcomings are identified.

LCH Ltd must also have at least two formalised and regularly tested backup arrangements for securities settlement; contingency plans must be maintained if a backup system is not in place. LCH Ltd's link with Austraclear is also subject to these requirements.

Managing financial risk

LCH Ltd is exposed to potential financial risks, including liquidity and custody risks, as a result of its links with CSDs. LCH Ltd requests information from each of its CSDs to enable it to calculate ICSs in accordance with the LCH Group Counterparty Credit Risk Policy (CCP Standard 15.3). Overnight unsecured cash balances with CSDs are monitored, and CSDs used in the securities settlement or custody process with regard to a particular participant cannot belong to the same group as that participant. As noted in 'Managing operational risk' above and CCP Standard 19.2, LCH Ltd conducts operational and legal due diligence to mitigate potential financial risks, by seeking to ensure that LCH Ltd has prompt access to its own and its participants' collateral in the event of a CSD default (CCP Standards 1.2, 15.2). Settlement finality within securities settlement systems is supported by

LCH Ltd's designation under the UK *Financial Markets and Insolvency (Settlement Finality) Regulations 1999* (CCP Standard 8.1).

LCH Ltd's Recovery Plan involves analysis of the potential impact upon itself or its linked FMIs in the event either party enters a recovery scenario. This analysis considers, among other things, the impact from operational failures, liquidity issues and a reduction in overall creditworthiness (CCP Standard 3.5).

19.2 A link should have a well-founded legal basis, in all relevant jurisdictions, that supports its design and provides adequate protection to the central counterparty and other FMIs involved in the link.

LCH Ltd's arrangements with its linked CSDs are governed by contractual agreements, which specify the law governing the agreement. LCH Ltd conducts legal due diligence prior to and at least every two years following entry into such arrangements, to ensure that the assets belonging to LCH Ltd or its clearing participants are fully segregated, identifiable and accessible promptly in the event of a clearing participant default or the insolvency of a linked CSD (CCP Standards 1.2 and 15.2). When conducting due diligence on a non-UK domiciled custodian or CSD, LCH Ltd also seeks legal advice on that jurisdiction. LCH Ltd's arrangements with its linked trade repositories are also governed by contractual agreements, which specify the law governing the agreement.

19.3 Where relevant to its operations in Australia, a central counterparty should consult with the Reserve Bank prior to entering into a link arrangement with another FMI.

LCH Ltd is a Special Purpose (Exchange) Participant of Austraclear (CCP Standard 19.1). LCH Ltd consulted with the Bank throughout the establishment of its link with Austraclear.

19.4 Before entering into a link with another central counterparty, a central counterparty should identify and manage the potential spillover effects from the default of the linked central counterparty. If a link has three or more central counterparties, a central counterparty should identify, assess and manage the risks of the collective link arrangement.

LCH Ltd does not currently operate any interoperable links with any other CCPs in relation to the SwapClear service.

19.5 A central counterparty in a central counterparty link arrangement should be able to cover, at least on a daily basis, its current and potential future exposures to the linked central counterparty and its participants, if any, fully with a high degree of confidence without reducing the central counterparty's ability to fulfil its obligations to its own participants at any time.

LCH Ltd does not currently operate any interoperable links with any other CCPs in relation to the SwapClear service.

Standard 20: Disclosure of rules, key policies and procedures, and market data

A central counterparty should have clear and comprehensive rules, policies and procedures and should provide sufficient information and data to enable participants to have an accurate understanding of the risks they incur by participating in the central counterparty. All relevant rules and key policies and procedures should be publicly disclosed.

20.1 A central counterparty should adopt clear and comprehensive rules, policies and procedures that are fully disclosed to participants. Relevant rules and key policies and procedures should also be publicly disclosed (including specific requirements relating to CCP Standards 1.4, 2.2, 12.3, 13.4, 15.4, 17.2 and 17.3).

The LCH Ltd Rulebook governs the rights and responsibilities of LCH Ltd and its participants in respect of the clearing services provided by LCH Ltd, and sets out the day-to-day operation of the business. LCH Ltd's key policies are reflected in information available in its Rulebook and Procedures, which are publicly available on the LCH Group website.⁹⁰ This includes information on the expected coverage of initial and variation margin requirements, the process for managing a clearing participant default, acceptable collateral and haircuts, governance arrangements, participation requirements, and segregation and portability arrangements.

To assist participants in their understanding of the risks of participating in LCH Ltd's clearing services, and for the information of other interested stakeholders, a range of additional material is published on the LCH Group public website. Information specific to LCH Ltd includes details of the LCH Ltd risk management framework, such as the PAIRS margin methodology, PPS arrangements, collateral requirements, default management process and default waterfalls. Information on LCH Ltd's participation requirements (including those specific to the SwapClear service), the membership application process and membership fees is also available on the LCH Group website.

The LCH Group website contains detailed information specific to the SwapClear service, including the products that are eligible to be cleared through the SwapClear service, and additional service offerings such as trade compression. Additional information also available includes the details of the SwapClear clearing process, different types of client account segregation and the details of regulations affecting the SwapClear service. The LCH Group website also contains a 'members only' section, allowing LCH Ltd to disseminate additional information to clearing participants in a secure manner.

Specific disclosure requirements are discussed under CCP Standards 1.4, 2.2, 12.3, 13.4, 15.4, 17.2, and 17.3.

20.2 A central counterparty's rules, policies and procedures should clearly identify the nature and scope of the risk exposure assumed by the central counterparty, such as by novation, open offer or other similar legal devices. A central counterparty's rules, policies and procedures should clearly identify the point in the clearing process at which the central counterparty assumes the risk exposure.

The LCH Ltd Rulebook outlines the nature and scope of novation for those services to which novation applies (CCP Standard 1.2).⁹¹ Specifically, upon registration of a contract, LCH Ltd replaces this contract with two open contracts on the same terms as the original contract (one between the seller participant and LCH Ltd as the buyer; and one between the buyer participant and LCH Ltd as the seller). Each party contracts as principal to these contracts, irrespective of whether the clearing participant is transacting on its own behalf or on behalf of a client. As a result of novation, LCH Ltd becomes counterparty to each open contract and it is obliged under the LCH Ltd Rulebook to perform its obligations under the terms of such open contracts as principal.

⁹⁰ Available at <http://www.lch.com/rules-regulations/rulebooks/ltd>.

⁹¹ See Regulations 12 (Novation) and 16 (Registration), LCH Ltd General Regulations. Available at https://www.lch.com/system/files/media_root/General%20Regulations%20-%2016%20July%202018.pdf.

20.3 A central counterparty should disclose clear descriptions of the system’s design and operations, as well as the central counterparty’s and participants’ rights and obligations, so that participants can assess the risks they would incur by participating in the central counterparty (CCP Standards 2.8 and 9.5).

LCH Ltd’s Rulebook details LCH Ltd’s and its participants’ rights and obligations, including the degree of discretion that relevant parties are able to exercise under certain circumstances. LCH Ltd’s Rulebook and Procedures also set out LCH Ltd’s and its participants’ rights and obligations relating to specific events, including the default management process (CCP Standard 12) and invocation of the business continuity arrangements (CCP Standard 16.7).⁹² These documents describe which parties are to be notified of specific events, and timetables for decision-making and notification. Additional information is available on the LCH Group website, including the structure of LCH Ltd’s default waterfalls, an explanation of LCH Ltd’s PPS arrangements, and the list of current PPS banks and PPS bank requirements.

LCH Ltd also provides each SwapClear participant with additional plain language documents that provide overviews of the SwapClear and Listed Rates services. LCH Ltd provides participants with the SwapClear and Listed Rates Risk Management Framework, which describes detailed descriptions of risk models, recovery tools and replenishment arrangements, and the SwapClear Service Description, which covers key aspects such as: trade validation and registration; SwapClear clearing fees; margining; default management; LCH Ltd’s PPS; and SwapClear’s daily operational timeline.

SwapClear provides its participants with access to a margin calculation tool that allows them to estimate initial margin obligations.

20.4 A central counterparty should provide all necessary and appropriate documentation and training to facilitate participants’ understanding of the central counterparty’s rules, policies and procedures and the risks they face from participating in the central counterparty.

LCH Ltd runs an introductory training course on demand for clearing participants, in addition to providing the service description discussed under CCP Standard 20.3. This course is designed as a comprehensive guide to the mechanics of cleared markets and products for new entrants and clearing participant staff not directly involved in derivatives. Refresher operational training is provided for any existing member on an ad hoc basis, as required, and additional training courses offered by LCH Ltd focus on specific exchanges and markets for which LCH Ltd acts as CCP.

In the event that a clearing participant’s actions demonstrated a lack of understanding of applicable rules, policies and procedures, that participant may be required to undertake additional training. When a clearing participant requires additional training, the LCH Ltd Member Training team will liaise with the relevant relationship manager and clearing participant to organise a tailored training course. Outside of formal training, dedicated LCH Ltd staff are available to assist clearing participants where necessary.

LCH Ltd also provides regular information to clearing participants to assist them in understanding and managing the potential financial risks from participating in SwapClear, including a quarterly Payments Risk Committee disclosure report and initial margin backtesting results. LCH Ltd also provides stress testing reports of clearing participant and client accounts through the SMART tool. Clearing participants

⁹² See the Default Rules and Business Continuity Procedures. Both available at <https://www.lch.com/resources/rules-and-regulations/ltd-rulebooks>.

are informed of relevant aspects of LCH Ltd's business continuity arrangements through high-level disclosures available on the LCH Group website and through regular testing of these arrangements.⁹³

20.5 A central counterparty should complete regularly and disclose publicly responses to the CPSS-IOSCO *Disclosure Framework for Financial Market Infrastructures*.⁹⁴ A central counterparty also should, at a minimum, disclose basic risk and activity data, as directed by the Reserve Bank from time to time.

LCH Ltd publishes an annual qualitative disclosure document that provides responses to the CPMI-IOSCO *Disclosure Framework for Financial Market Infrastructures* and describes its approach to meeting the PFMI.⁹⁵

LCH Ltd publishes risk and activity data in accordance with the CPMI-IOSCO quantitative disclosure standards for CCPs on a quarterly basis. Basic data, including the names of LCH Ltd's direct clearing participants, LCH Ltd's financial statements and transaction volumes and values, are made publicly available on the LCH Group website.⁹⁶

Standard 21: Regulatory reporting

A central counterparty should inform the Reserve Bank in a timely manner of any events or changes to its operations or circumstances that may materially impact its management of risks or ability to continue operations. A central counterparty should also regularly provide information to the Reserve Bank regarding its financial position and risk controls on a timely basis.

21.1 A central counterparty should inform the Reserve Bank as soon as reasonably practicable if:

- (a) it breaches, or has reason to believe that it will breach:**
 - (i) a CCP Standard; or**
 - (ii) its broader legislative obligation to do, to the extent that it is reasonably practicable to do so, all things necessary to reduce systemic risk;**
- (b) it becomes subject to external administration, or has reasonable grounds for suspecting that it will become subject to external administration;**
- (c) a related body to the central counterparty becomes subject to external administration, or if the central counterparty has reasonable grounds for suspecting that a related body will become subject to external administration;**
- (d) a participant becomes subject to external administration, or if the central counterparty has reasonable grounds for suspecting that a participant will become subject to external administration;**

93 Available at <https://www.lch.com/about-us/structure-and-governance/business-continuity>.

94 The CPSS was renamed the CPMI in September 2014.

95 Available at

https://www.lch.com/sites/default/files/media/files/CPMI%20IOSCO%20Qualitative%20Assessment%20of%20LCH%20Limited%202017_0.pdf.

96 Membership information is available at <https://www.lch.com/membership/member-search>.

Financial statements are available at <http://www.lch.com/about-us/annual-reports-statements>.

Volumes data are available at <http://www.lch.com/asset-classes/otc-interest-rate-derivatives/volumes>.

- (e) a participant fails to meet its obligations under the central counterparty's risk control requirements or has its participation suspended or cancelled because of a failure to meet the central counterparty's risk control requirements;
- (f) it fails to enforce any of its own risk control requirements;
- (g) it plans to make significant changes to its risk control requirements or its rules, policies and procedures;
- (h) it or a service it relies on from a third party or outsourced provider experiences a significant operational disruption, including providing the conclusions of its post-incident review;
- (i) any internal audits or independent external expert reviews are undertaken of its operations, risk management processes or internal control mechanisms, including providing the conclusions of such audits or reviews;
- (j) its operations or risk controls are affected, or are likely to be affected, by distress in financial markets;
- (k) it has critical dependencies on utilities or service providers, including providing a description of the dependency and an update if the nature of this relationship changes;
- (l) it proposes to grant a security interest over its assets (other than a lien, right of retention or statutory charge that arises in the ordinary course of business);
- (m) it proposes to incur or permit to subsist any loans from participants or members unless such loans are subordinated to the claims of all other creditors of the central counterparty; or
- (n) any other matter arises which has or is likely to have a significant impact on its risk control arrangements (see also CCP Standards 1.6, 16.10 and 19.3).

The Bank and LCH Ltd schedule a business and regulatory developments meeting each quarter to discuss progress towards the Bank's regulatory priorities, and any changes to LCH Ltd's business or operations which may affect LCH Ltd's compliance with the CCP Standards. This meeting involves relevant members from LCH Ltd's management team. ASIC staff members also routinely attend.

This meeting provides a forum for the discussion of material developments, both in LCH Ltd's Australian operations and its business and approach to risk management more broadly. Matters discussed in the scheduled meetings are followed up, as appropriate, in more focused sessions. The Bank and LCH also liaise quarterly to discuss data submitted to the Bank by LCH Ltd under CCP Standard 21.2. The Bank's questions are sent to LCH Ltd staff members responsible for clearing risk policy and implementation of risk management arrangements. The Bank and LCH Ltd also hold ad hoc meetings to discuss relevant matters as required.

The Bank expects to be notified immediately of any significant developments in LCH Ltd's risk exposure as set out in this sub-standard; for example, if LCH Ltd has reason to believe that a participant default may be imminent or there was evidence of distress in markets cleared by SwapClear.

In addition, LCH Ltd and the Bank have a Cooperation Arrangement in place, a function of which is to complement the notification obligations under this sub-standard.⁹⁷

During the 2017/18 assessment period, LCH Ltd kept the Bank up to date regarding changes to its governance arrangements and current issues in risk management, including its management of operational incidents, the status of important projects and its progress towards addressing the Bank's regulatory priorities.

21.2 A central counterparty should also provide to the Reserve Bank, on a timely basis:

- (a) audited annual accounts;**
- (b) management accounts on a regular basis, and at least quarterly;**
- (c) risk management reports, including detailed information on margining and stress testing, on a regular basis, and at least quarterly;**
- (d) periodic activity, risk and operational data, as agreed with the Reserve Bank; and**
- (e) any other information as specified by the Reserve Bank from time to time.**

As noted in CCP Standard 21.1, the Bank and LCH Ltd have a Cooperation Arrangement in place, which, among other things, specifies LCH Ltd's reporting requirements to the Bank under this sub-standard.

Audited annual reports are published on the LCH Group public website, and LCH Ltd provides the Bank with monthly management accounts including balance sheet, income, and collateral information for each of its service lines.⁹⁸

LCH Ltd provides a monthly risk management report to the Bank, including information on backtesting results, adequacy of financial resources, and current issues in risk management. Data provided quarterly to the Bank include changes to participants' ICSs, initial margin held, stress test results, collateral holdings and summaries of operational incidents. From time to time, the Bank will request additional information from LCH Ltd on topics of interest, particularly in regard to any operational incidents or the status of projects with significant risk implications.

⁹⁷ Under section 824B(2) of the *Corporations Act 2001*, the Minister may grant an overseas CS facility an Australian CS facility licence if, among other things, he or she is satisfied that the applicant undertakes to cooperate with the Bank by sharing information and in other ways. The Cooperation Arrangement formalises this undertaking and complements the notification obligations under CCP Standards 21.1 and 21.2.

⁹⁸ Audited annual reports are available at <http://www.lch.com/about-us/annual-reports-statements>.

Abbreviations

ASIC	Australian Securities and Investments Commissions
BaFin	Federal Financial Supervisory Authority
Bank	Reserve Bank of Australia
BCBS	Basel Committee on Banking Supervision
BoE	Bank of England
BSL	Business Services Ltd
CaLM	Collateral and Liquidity Management
CaLRM	Collateral and Liquidity Risk Management
CCO	Chief Compliance Officer
CCP	Central counterparty
CCP Resilience Guidance	Resilience of Central Counterparties: Further guidance on the Principles for financial market infrastructures
CCP Standards	Financial Stability Standards for Central Counterparties
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CFTC	Commodity Futures Trading Commission
CMG	Crisis management group
CMT	Crisis Management Team
COO	Chief Operating Officer
CPMI	Committee on Payments and Market Infrastructures
CPSS	Committee on Payment and Settlement Systems
CRO	Chief Risk Officer
CS	Clearing and settlement
CSA	Custodial Segregated Account
CSD	central securities depository
CTO	Chief Technology Officer
Cyber Guidance	Guidance on cyber resilience for financial market infrastructures
Cybersecurity Framework	Framework for Improving Critical Infrastructure Cybersecurity
DAT	Derivatives Assessment Team
DCMT	Default Crisis Management Team
DCO	Derivatives Clearing Organization
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
ESA	Exchange settlement account
FCM	Futures Commission Merchant
FSB	Financial Stability Board
FMI	Financial market infrastructure
GCHOC	General Counsel and Head of COmpliance
Global College	Multilateral Arrangement for Regulatory, Supervisory and Oversight Cooperation on LCH Ltd
GMRA	Global Master Repurchase Agreement
ICS	internal credit score
ICSD	International central securities depository
IOSCO	International Organization of Securities Commissions
ISA	Individual Segregated Account
LCH Group	LCH Group Holdings Limited
LCH LLC	LCH.Clearent LLC
LCH Ltd	LCH Limited
LCR	Liquidity coverage ratio
LMC	Local Management Committee
LSEG	London Stock Exchange Group plc
LSOC	Legally segregated operationally commingled
NIST	National Institute of Standards and Technology
OIS	Overnight index swap
OSA	Omnibus Segregated Account
OTC	Over-the-counter
PAIRS	Portfolio Approach to Interest Rate Scenarios
PFMI	Principles for Financial Market Infrastructures
PPS	Protected Payments System
PSNA	Payment Systems and Netting Act 1998
Recovery Guidance	Recovery of financial market infrastructures
RTTR	Real-time trade registration
SLA	Service Level Agreement
SSF	Securities settlement facility
STLOIM	Stress-test losses over initial margin
VMGH	Variation margin gains haircuts