

2015/16 Assessment of LCH.Clearnet Limited's SwapClear Service

December 2016

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ISSN 2204-3152 (Online)

Executive Summary

Purpose	This report presents the Reserve Bank of Australia's (the Bank's) annual Assessment of LCH.Clearnet Limited's (LCH's) SwapClear service, which operates in Australia under an overseas clearing and settlement facility licence. The report details LCH's compliance with the <i>Financial Stability Standards for Central Counterparties</i> (CCP Standards) and with the obligation to do all other things necessary to reduce systemic risk. The report covers the 12 months ending 30 September 2016.
Conclusion	In the assessment period LCH has met the CCP Standards and has either met or made progress towards meeting the regulatory priorities identified by the Bank in its 2014/15 Assessment. The Bank therefore concludes that LCH has conducted its affairs in a manner that causes, or promotes, overall stability in the Australian financial system.
Progress Towards 2015/16 Priorities	<p>In line with the Bank's regulatory priority, LCH's Australian Protected Payments System (PPS) commenced operating in the assessment period. LCH is awaiting regulatory approval to begin accepting Australian Dollar (AUD) cash as initial margin. LCH has plans to upgrade its trade registration and margining system, which will provide the capability to extend SwapClear's operating hours, while ensuring the safety and resilience of its operations.</p> <p>LCH has also made progress in implementing key recommendations from a number of previous reviews of operational risk management (as well as focused cyber risk reviews). It has also engaged in productive discussions with the Bank around other key priorities where LCH is working on further enhancements, including client clearing arrangements and disclosures to clearing participants.</p>
Other Material Developments	<p>Other material developments relevant to the oversight of LCH that occurred during the assessment period include:</p> <ul style="list-style-type: none">• The launch of Spider, LCH's portfolio margining service, which required material changes to the SwapClear default management process (DMP).• A default management fire drill timed to coincide with a similar exercise at another CCP to test the operational readiness of the CCPs and their participants to participate in DMPs at two CCPs simultaneously.• Reviews of the application of LCH's governance framework and of its Recovery Plan, which were led by the Bank of England and incorporated input from other members of the Multilateral Arrangement for Regulatory, Supervisory and Oversight Cooperation on LCH.Clearnet Ltd (Global College), including the Bank.
Priorities for 2016/17	<p>The Bank's practice is to set regulatory priorities where it expects LCH to conduct additional work to enhance its observance of the requirements under particular CCP Standards, including those specific to LCH's provision of services to the Australian market.</p> <p>In the coming year the focus of the regulatory priorities is completion of the outstanding domestic priorities. The Bank also expects LCH to consider any implications of the recently released CPMI-IOSCO <i>Guidance on Cyber Resilience for Financial Market Infrastructures</i> and the forthcoming CPMI-IOSCO <i>Guidance on Resilience and Recovery of Central Counterparties</i>, and intends to discuss this with LCH in the next assessment period.</p>

1. Summary of Regulatory Priorities

This section summarises actions taken by LCH.Clearnet Limited (LCH) over 2015/16 to meet the Reserve Bank of Australia's (the Bank's) regulatory priorities identified in the 2014/15 Assessment of LCH's SwapClear service against the *Financial Stability Standards for Central Counterparties* (CCP Standards), and summarises the priorities identified by the Bank for the 2016/17 assessment period.

1.1 Progress Against 2015/16 Regulatory Priorities

The Bank's 2014/15 Assessment set out a number of priorities for LCH, reflecting both Australian-specific matters, given SwapClear's systemic importance in Australia, and issues that applied to the wider SwapClear service. LCH's actions to meet these regulatory priorities are summarised in Table 1 and are discussed in more detail in Section 2.1.

Table 1: LCH Regulatory Priorities for 2015/16

Standard	Priority	Comment
<i>Regulatory Priorities Specifically Related to LCH's Provision of Services to the Australian Market</i>		
6. Margin 16. Operational risk	The Bank expects LCH to continue its work to extend the operating hours of the SwapClear service, while ensuring the safety and resilience of its operations.	<i>Partly Addressed. The Bank expects work to extend operating hours to continue in the 2016/17 assessment period.</i> LCH intends to upgrade its trade registration and margining system in 2017, which would provide the capability to implement close to 24x5 clearing in the SwapClear service. In the interim, LCH is exploring other measures to extend operating hours, including moving the service opening time forward.
9. Money settlements	LCH should complete its implementation of Protected Payments System (PPS) arrangements in Australia.	<i>Mostly Addressed. Expected to be fully addressed in the 2016/17 assessment period.</i> LCH executed Australian Dollar (AUD) PPS Agreements with four Australian clearing participants during the assessment period. It also made the required changes to its Rulebook to establish AUD PPS arrangements. One Australian clearing participant began using the AUD PPS to settle its AUD obligations via its exchange settlement account (ESA) during the assessment period. Three more Australian clearing participants are expected to begin using the new system in the 2016/17 assessment period.
5. Collateral	LCH should proceed with its plans to accept AUD cash as initial margin, subject to approval by the relevant regulators.	<i>Ongoing. Expected to be fully addressed in the 2016/17 assessment period.</i> LCH is awaiting regulatory approval from relevant regulators to implement this priority.

Other Regulatory Priorities

16. Operational risk	<p>LCH should continue work to enhance its operational resilience and operational risk management. LCH should continue to implement recommendations arising from recent internal and external operational risk reviews.</p> <p>The Bank of England (BoE) has also identified operational risk as a supervisory priority across all of the Financial Market Infrastructures (FMIs) it supervises. The Bank therefore expects to engage actively with the BoE on this priority.</p>	<p><i>Ongoing.</i></p> <p>LCH has continued to phase in its new comprehensive operational risk management framework in the assessment period, with initial implementation expected to be completed by the end of 2016.</p>
16. Operational risk	<p>LCH is encouraged to continue its dialogue with the Bank on its cyber risk management arrangements. LCH is also encouraged to review its cyber risk management arrangements in light of forthcoming CPMI-IOSCO guidance on cyber resilience for FMIs.</p> <p>The BoE has also identified cyber risk as a supervisory priority across all the FMIs it supervises. The Bank therefore expects to engage actively with the BoE on this priority.</p>	<p><i>Ongoing.</i></p> <p>CPMI-IOSCO published guidance on cyber resilience for FMIs in June 2016. The Bank will primarily monitor LCH's compliance with this guidance through the Multilateral Arrangement for Regulatory, Supervisory and Oversight Cooperation on LCH.Clearnet Ltd (Global College).</p>
4. Credit risk	<p>LCH is encouraged to continue to review its interpretation of 'extreme but plausible' market conditions in designing its stress-test scenarios. This work should be undertaken in light of evolving international best practice, including outcomes of CPMI-IOSCO work on stress testing.</p>	<p><i>Ongoing.</i></p> <p>CPMI-IOSCO published a consultative report providing additional guidance on how CCPs are expected to implement key parts of the PFMI, with the aim of improving resilience and recovery planning (including on stress testing). Final guidance is expected to be published in early 2017.</p>
4. Credit risk	<p>LCH is encouraged to continue its dialogue with the Bank about its arrangements to replenish the SwapClear default fund in the event of a drawdown following the default of a SwapClear clearing participant. LCH should demonstrate that its current arrangements for returning to the full level of cover required under CCP Standard 4.4 minimise the potential for procyclicality, to the extent practicable and prudent.</p>	<p><i>Fully Addressed</i></p> <p>The Bank has reviewed LCH's policies for replenishing the SwapClear default fund (now the Joint Rates default fund – see Box A). Following discussions with LCH, the Bank has come to the view that the current replenishment arrangements are reasonable, but that there remains some scope to increase clearing participants' awareness of replenishment arrangements. LCH has committed to making additional disclosures to clearing participants to enable them to better understand their potential exposures after a participant default, starting in the 2016/17 assessment period.</p>

13. Segregation and portability 18. Tiered participation arrangements	LCH began to implement client clearing in Australia in November 2015. LCH is encouraged to continue its dialogue with the Bank on its broader client clearing arrangements, including its approach to monitoring risks from tiered participation and its ongoing testing and review of arrangements to support the porting of client positions in the event of a participant default.	<i>Fully Addressed</i> LCH has continued to review its client clearing arrangements during the assessment period and is exploring changes to porting arrangements that may streamline the transfer of client positions following the default of a clearing participant.
20. Disclosure of rules, key policies and procedures, and market data 4. Credit risk 15. Custody and investment risks	LCH should carry out its plans to regularly publish risk and activity data in accordance with the CPMI-IOSCO quantitative disclosure standards for CCPs. In addition, the Bank will discuss with LCH the development of additional disclosures to assist participants in understanding their contingent exposure to the use of loss allocation tools. The Bank will also discuss with LCH the adequacy of its disclosure of investment risks to participants in light of its arrangements to allocate investment losses in excess of €15 million to participants.	<i>Fully Addressed</i> LCH began publishing risk and activity data each quarter in accordance with the CPMI-IOSCO quantitative disclosure standards for CCPs in January. Discussions with LCH have confirmed that clearing participants have sufficient information to determine their contingent exposure to the use of loss allocation tools. The Bank has discussed with LCH its disclosure of investment risks to participants and considers that the current level of disclosure is adequate.

1.2 2016/17 Regulatory Priorities

1.2.1 Bank of England supervisory focus

The BoE is the primary supervisor of LCH. The BoE outlines its supervisory focus in the *Supervision of Financial Market Infrastructure – Annual Report*; the key priorities for the period from March 2016 to March 2017 are summarised in Table 2.¹

Table 2: BoE Supervisory Focus for 2016/17

Standard	Priority
2. Governance 4. Credit risk 6. Margin 7. Liquidity risk	The BoE will begin to assess the extent to which CCPs' practices align with CPMI-IOSCO additional guidance on CCP recovery and resilience (expected to be published in early 2017).
12. Participant-default rules and procedures	The BoE will continue to assess the adequacy of recovery plans. An EU legislative proposal on FMI recovery and resolution is also expected in 2016.
16. Operational risk	The BoE will continue to progress the work on cyber resilience that has already been initiated. Further default management fire drills (managing a clearing participant's default) will also be conducted.

¹ BoE (2016), *The Bank of England's Supervision of Financial Market Infrastructures – Annual Report*. Available at <http://www.bankofengland.co.uk/publications/Documents/fmi/annualreport2016.pdf>

Standard	Priority
2. Governance	The BoE will continue to focus on the quality of governance at UK FMIs, focusing on the effectiveness of boards and firm culture. The BoE will also follow up previous work on the effectiveness of CCP margin model governance. A cross-firm analysis of CCPs' business models is also planned to further understand emerging risks and to support early supervisory intervention.

The Bank intends to engage with LCH on these priorities (and to monitor progress) by its active 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's business. The BoE refreshed the Memorandum of Understanding (MOU) for the Global College in the assessment period to reflect the broader scope of services covered and to enable more comprehensive information sharing.

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

1.2.2 RBA regulatory priorities

The Bank's regulatory priorities for LCH for 2016/17 are summarised in Table 3. All three priorities relate to LCH's provision of services to the Australian market and are carried over from 2015/16. Two of the priorities have progressed substantially over the 2015/16 assessment period and are expected to be fully addressed in the next assessment period. The Bank has not set any new regulatory priorities.

Table 3: RBA Regulatory Priorities for LCH for 2016/17

Standard	Priority
6. Margin 16. Operational risk	The Bank expects LCH to continue its work to extend the operating hours of the SwapClear service, while ensuring the safety and resilience of its operations.
9. Money settlements	LCH should continue to engage with the remaining clearing participants that are obliged to settle their AUD obligations using the AUD PPS and encourage them to begin doing so. The Bank will also engage with clearing participants as appropriate to promote the use of the AUD PPS.
5. Collateral	LCH should proceed with its plans to accept AUD cash as initial margin, subject to approval by the relevant regulators.

2. Material Developments

LCH 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 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 Regulatory Priorities

This section provides more details about LCH's progress towards addressing the regulatory priorities established in the 2014/15 Assessment outlined in section 1.1.

2.1.1 Operating hours extension

In line with the Bank's 2015/16 regulatory priority, LCH still plans to extend its operating hours. Current operating hours (6.00 am London time to 7.00 pm New York time) mean that the Australian banks must manage temporary bilateral credit risk exposures during much of the Australian business day (which can introduce operational complexity and uncertainty) until the SwapClear service opens. However, consistent with the emphasis on extending operating hours in a way that ensures robust service function, LCH only plans to implement a permanent extension following the completion of an upgrade to its trade registration and margining system scheduled for 2017. Once this upgrade is completed, LCH will have the capability to operate the SwapClear service at or close to 24 hours a day, five days a week.

In the interim, LCH continues to consider other options to extend operating hours and will engage with its regulators and consult with clearing participants as appropriate.

The Bank encourages LCH to continue to work towards permanently extending operating hours in the next assessment period in a way that is consistent with the ongoing resilience of the SwapClear service. Service resilience should also be a key consideration if any other measures to extend operating hours are implemented.

2.1.2 Australian PPS

Consistent with the Bank's 2015/16 regulatory priority, LCH implemented its Australian PPS infrastructure in the assessment period. All of the major Australian banks have signed the Australian PPS Agreement with LCH. At the end of September, one of the Australian clearing participants had completed testing and started to use the system; the other three major Australian banks are expected to do the same during the 2016/17 assessment period. The local PPS arrangements, which allow Australian participants to settle AUD obligations directly with LCH via their ESAs at the Bank (that is, to self-PPS), have been reflected in the appropriate sections of the LCH Rulebook. The new arrangements simplify the settlement process and remove those participants' reliance on commercial settlement banks for settling AUD obligations. In the coming assessment period the Bank expects LCH to work in conjunction with the remaining three major Australian banks to begin settling their AUD

obligations through the Australian PPS. The Bank will also engage with clearing participants as appropriate to encourage the use of the AUD PPS.

2.1.3 Acceptance of AUD cash as initial margin

The Bank recommended that LCH proceed with its plans to accept AUD cash as initial margin. This would support effective access by accommodating local market practices as contemplated by the Council of Financial Regulators (CFR) in July 2012 in its policy 'Ensuring Appropriate Influence for Australian Regulators over Cross-border Clearing and Settlement Facilities'.² It would also contribute to LCH's compliance with CCP Standard 5.2, which requires that a CCP 'consider allowing the use of collateral commonly accepted in the relevant jurisdictions in which it operates'.

LCH is awaiting regulatory approval from relevant regulators. LCH has received approval from its internal risk governance process, which included review and approval by its Asset and Liability Committee, the Executive Risk Committee and the LCH Risk Committee. LCH has also already implemented the necessary technical changes needed to accept AUD cash as initial margin.

LCH's acceptance of AUD cash as initial margin is contingent on the establishment of the Australian PPS arrangements, the infrastructure for which was implemented during the 2015/16 assessment period (see section 2.1.2).

2.1.4 Operational and cyber risk reviews

In the assessment period LCH carried out a number of work streams to address outstanding recommendations of earlier operational risk reviews. The BoE has also engaged with LCH on operational risk and cyber risk as part of its annual priorities for all FMIs.

2.1.5 Review of stress-test scenarios

CPMI-IOSCO published a consultative (that is, draft) report in August containing additional guidance on how CCPs are expected to implement key parts of the PFMIs to further improve their resilience and recovery planning (including on stress testing). The Bank will discuss how LCH would implement any recommendations coming out of the final version of the report with LCH and the Global College when it is published (likely early 2017).

2.1.6 Replenishment

The Bank has reviewed LCH's policies for replenishing the SwapClear default fund (now the Joint Rates default fund – see Box A for further context to this change). Following discussions with LCH, the Bank has come to the view that the current replenishment arrangements are reasonable, but that there remains some scope to increase clearing participants' awareness of replenishment arrangements via the disclosure of potential worst case exposures.

LCH has committed to making additional disclosures to clearing participants in order for them to better understand their potential exposures after a participant default, starting in the 2016/17 assessment period. LCH will provide additional plain-language guidance to participants about the various scenarios that could occur after such a default. LCH will also make data that participants need

2 The CFR Regulatory Influence Policy is available at <http://www.treasury.gov.au/ConsultationsandReviews/Consultations/2012/cross-border-clearing>.

to understand their exposures more easily accessible. For instance, LCH will make each participant's daily exposures from stress testing available to it through LCH's SMART tool (currently, participants' stress-test exposures are available on request).

2.1.7 Client clearing

In the 2014/15 Assessment LCH was encouraged to continue its dialogue with the Bank on its broader client clearing arrangements, including its approach to monitoring risks from tiered participation and its ongoing testing and review of arrangements to support the porting of client positions in the event of a participant default. LCH has conducted a series of workshops with clearing participants and their clients to review the porting process and is considering making changes – including seeking pre-approval from clients to share information and to port positions to a designated back-up clearing participant in the event of a default – to reduce the amount of client interaction required to facilitate porting of positions.

2.1.8 Disclosure

In January, LCH began making quarterly quantitative disclosures on its website consistent with the CPMI-IOSCO *Public Quantitative Disclosure Standards for Central Counterparties*. These disclosures include high-level information about its investment policies and its actual investments as part of the CPMI-IOSCO qualitative and quantitative disclosures, respectively. LCH discloses to clearing participants their proportional exposure to potential non-default losses each month, and data about the capital LCH holds against investment risk and the largest unsecured investment each quarter. LCH also makes disclosures under the Payments Risk Committee (PRC) framework to PRC members; these disclosures are also available to non-PRC members on request.³ The Bank considers that the current disclosures are adequate for participants to understand their exposure to investment risks.

Discussions with LCH have confirmed that clearing participants have sufficient information to determine their contingent exposure to the use of loss allocation tools. Each stage of the Joint Rates service default waterfall that requires participants to make contributions continues to be either directly related to clearing participants' most recent default fund contribution (the size of which is already known to them) or is subject to a value cap.

2.2 Other Material Developments

2.2.1 Portfolio margining

In May this year LCH launched the Spider service, which allows portfolio margining (also called cross-margining) between over-the-counter (OTC) interest rate derivatives (IRDs) cleared via SwapClear and short-term interest rate (STIR) futures traded on the Nasdaq NLX (NLX) market and cleared via LCH's Listed Rates clearing service.⁴ At present the service is limited to STIR futures in two currencies – EUR and GBP – with clearing participants required to opt in to take advantage of

3 The PRC is a group of major US banks that analyses risks in payment, clearing and settlement systems. The PRC is sponsored by the Federal Reserve Bank of New York. A link to the PRC disclosure framework is at https://www.newyorkfed.org/medialibrary/microsites/prc/files/report_130205.pdf

4 Trading volumes on NLX are very low across all products at present, with three-month Euribor futures (the most heavily traded product) accounting for less than 1 per cent of the total market. The value of trades cleared via the Listed Rates Service is immaterial compared to those cleared via SwapClear.

(potential) margin reductions. One participant was actively using Spider as of September 2016. Although the service is not currently offered to Australian clearing participants, it required changes to the way the SwapClear service would manage a participant default and has implications for all clearing participants of the SwapClear service, including those who do not opt in to portfolio margining.

LCH has already outlined plans to extend the Spider service in future, to include STIR futures traded on other exchanges for which LCH provides clearing, such as the recently launched CurveGlobal (which is owned and operated by the LCH Group's majority owner, the London Stock Exchange Group (LSEG)). It has also outlined plans to expand the range of eligible exchange-traded instruments that could be cross-margined (to include STIR futures in USD, deliverable swap futures and government bond futures).

Box A: Portfolio Margining

A CCP may offer portfolio margining (PM) to recognise offsetting risks across multiple asset classes to reduce participants' margin requirements. Under the newly launched LCH cross-margining service, offsets can be recognised across cleared positions for OTC IRDs and cleared positions for STIR futures. To utilise these offsets, a participant must transfer eligible STIR futures from one LCH clearing service (Listed Rates) to another (SwapClear) so that the positions are subject to a single margining process. To ensure that the STIR futures that are transferred to the SwapClear service deliver the largest achievable margin reduction, and to automate the transfer process, LCH has integrated an optimisation technology, 'Portfolio Balancer', into its existing end-of-day processes.

In many respects the introduction of PM between these products is conceptually the same as introducing a new product – interest rate futures – to the SwapClear service. In recognition of the similarity in characteristics (and hence margining treatment) between the transferred STIR futures and the OTC IRDs cleared via SwapClear, the new combined portfolio is grouped as a specific margin class and labelled 'OTC Rates'. Non-transferred STIR futures are grouped in a separate margin class labelled 'Listed Rates'. In order to ensure that calculated margins for the combined portfolio are robust and sufficient to meet current regulatory requirements, there are a number of margin add-ons. Isolating participants' activities into discrete categories (margin classes) is important to ensure that participants' initial margin and default fund contributions reflect the risk they bring to the service and that any losses in the event of a default are fairly attributed.

Any European CCP that offers PM across services is encouraged by the European Market Infrastructure Regulations (EMIR) to use a common default fund and default management process (DMP) for these services rather than maintaining separate default funds and processes.⁵ Consistent with this, LCH established a common default fund – the 'Joint Rates' default fund – made up of separate contributions for each margin class. An integrated default management group (DMG) was also formed from the existing SwapClear and Listed Rates DMGs to operate across the Joint Rates service and ensure that required actions are coordinated should a default occur.

For participants of one or both of the services who do not opt in to PM (and who do not benefit from margin reductions) but are still exposed to risks associated with the combined service, LCH has revised the structure of the combined default waterfall. The default fund contributions of non-PM participants are used further down the default waterfall (and hence less likely to be used) than those of PM participants in the event of a portfolio margining participant default.⁶

5 See EMIR Regulatory Technical Standards Article 27(3).

6 Similar mechanisms have been added around loss allocation including changes to the way the Auction Incentive Pools are constituted, to ensure that all participants have sufficient incentive to participate in the hedging and auction process (see CCP Standard 12.1).

2.2.2 Board and senior executive changes

There were a number of personnel changes within LCH Group and LCH during the assessment period.

- Graham Wright was appointed to the LCH Board as an independent non-executive director in July 2016. Mr Wright has a background in technology, operations and operational risk and is currently Chief Information Security Officer and Global Head of Digital Risk for National Grid (a UK and US electricity and gas company).
- In April 2016, Daniel Maguire (Head of SwapClear and Listed Rates) took on the role of Head of the ForexClear service. Reflecting his additional responsibilities, Mr Maguire's new title is Global Head of Rates and FX Derivatives. At the same time, Paddy Boyle was appointed as Head of FX Product. Edward Hughes, who was acting Head of ForexClear between February and April, will continue in his role as the Chief Operating Officer of the ForexClear business, attending the Local Management Committee and reporting to Mr Maguire.
- Diane Bouwmeester took on the role of LCH General Counsel following the departure of Geraint Rogers in February. This role is in addition to Ms Bouwmeester's existing duties as Group General Counsel and Head of Compliance.
- Laurent Curtat was appointed Global Product Head (LCH Group) in June and is responsible for identifying and establishing Global product priorities. He also acts as an advisor to the Group CEO (to whom he reports), and is a member of the Executive Committee.

2.2.3 Review of Recovery and Wind-down Plans

LCH updated its Recovery and Wind-down Plans during the assessment period to, among other things, reflect the CPMI-IOSCO report on *Recovery of Financial Market Infrastructures*. The major changes to the Recovery Plan are that it may now be triggered at an earlier stage in a clearing participant default (or for a smaller default than before) and that there is a new set of qualitative recovery triggers to cover additional non-default recovery scenarios.

The Bank has also taken part in a review of LCH's Recovery and Wind-down Plans undertaken by the Global College during the assessment period. The review was undertaken using a framework drawn from recovery-related requirements in the CPMI-IOSCO *Principles for Financial Market Infrastructures* and associated guidance in the report on *Recovery of Financial Market Infrastructures*.

2.2.4 Combined fire drill

LCH conducted its annual default management fire drill in parallel with a similar exercise at another large European CCP in the assessment period. The combined exercise, which was coordinated by the BoE and a number of other European regulators, focused on operational readiness, including testing the availability of key personnel and capacity of CCP participants to participate simultaneously in two DMPs.

2.2.5 Outsourcing of IT services

LCH Group outsourced various IT services to LSEG Business Services Ltd (BSL) during the assessment period. BSL is a limited liability company incorporated in the UK and is a wholly owned subsidiary within LSEG. The rationale for this proposal was to create a deeper and broader body of technology skills within LSEG and to reduce costs by pooling IT resources across LSEG-related entities. LCH Group outsourced IT services to BSL in two stages. The first stage occurred in January – LCH Group

outsourced corporate technology services such as helpdesks, third party applications support, some data centre management services, various workplace services (email, telephone, printers) and LCH's information security services. The second stage occurred in April – LCH Group outsourced additional IT operations, such as servers, databases, storage, licences and project management. LCH has committed to provide a post-implementation review to the BoE in late 2016.

2.2.6 Timing of intraday margin calls

In September SwapClear made changes to the times of its Market Data Refreshes (MDR), which is the intraday assessment of the value of all SwapClear contracts and, if necessary, triggers a subsequent call for collateral. The main change was to bring the timing of the third MDR forward two hours, from 2.05 pm New York time (typically 7.05 pm London time) to 5.00 pm London time. This change was made so that LCH receive cash collateral earlier in the day and is better able to reinvest those funds according to its investment policies (see CCP Standard 15). The timing of the first MDR was also amended, from 8.20 am London time to 9.00 am London time.

2.2.7 Acceptance of AUD securities in Austraclear

LCH allowed clearing participants to lodge AUD securities in Austraclear from mid April. Before that, LCH accepted AUD-denominated government securities only in Euroclear and Clearstream. As at the end of the assessment period, no clearing participants had provided AUD securities lodged in Austraclear as collateral.

2.2.8 New AUD products

SwapClear started clearing two new products in AUD during the assessment period – AUD overnight index swaps (OIS) in January and AUD variable notional swaps (VNS) in September (see Appendix A for more details).

Appendix A: Activity in SwapClear

A.1 Global Activity in SwapClear

There were 105 direct clearing participants in the SwapClear service as at 30 September 2016, up from 98 clearing participants at the start of the assessment period. The SwapClear service has direct participants domiciled in the UK, many other Western European countries, the United States (US), Canada, Australia and Hong Kong.

SwapClear clears a variety of OTC IRD denominated in 17 different currencies.⁷ A few major currencies comprise the vast majority of activity in SwapClear (Graph 1). Of the notional value outstanding in SwapClear at the end of September 2016, around 30 per cent was denominated in EUR, 38 per cent in USD and 12 per cent in GBP. Around 5 per cent was denominated in AUD.

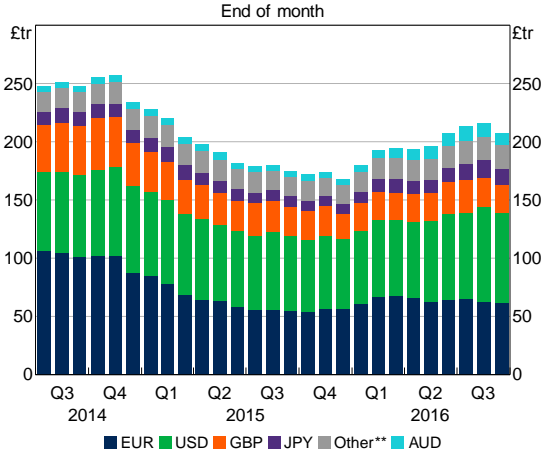
The notional value outstanding at SwapClear at the end of September 2016 was around £200 trillion, up moderately from the end of September 2015 but down considerably from the end of 2014. The decline in notional value outstanding through 2015 largely reflected trade compression activity (Graph 1 and Graph 4). Compression involves identifying offsetting trades in participants' portfolios and terminating them, while leaving those participants' market-facing exposures unchanged or within a predefined tolerance. Compression reduces the operational overhead and operational risk of managing a large volume of redundant trades. It also simplifies default management processes, reducing the volume of trades that would need to be priced and auctioned in the event of a participant default.⁸ During 2015/16, £261 trillion of notional value outstanding was compressed in the SwapClear service.

⁷ SwapClear began clearing trades denominated in an eighteenth currency – the Mexican Peso – in October 2016.

⁸ For more information about the compression process including the different types of compression available to SwapClear participants see *Box A: Compression* in the 2014/15 Assessment of LCH.Clearnet Ltd's SwapClear Service.

Graph 1

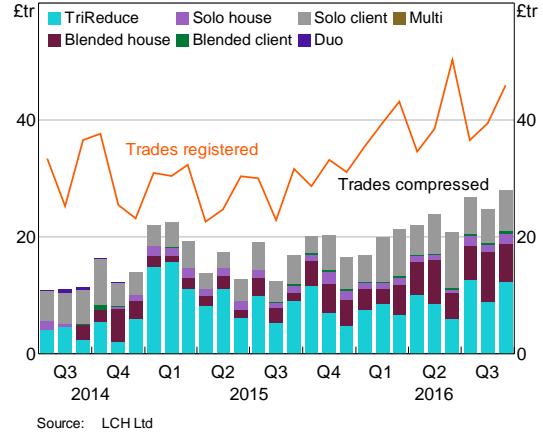
SwapClear: Notional Value Outstanding, by Currency (Stock)*



* Data counts two sides of each trade
 ** Includes CAD, CHF, CZK, DKK, HKD, HUF, NOK, NZD, PLN, SEK, SGD, ZAR
 Source: LCH Ltd

Graph 2

SwapClear: Notional Value Registered and Compressed (Flows)

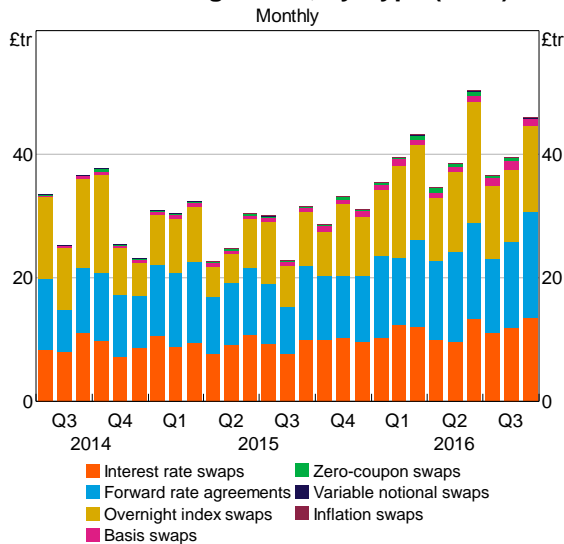


Source: LCH Ltd

SwapClear clears six types of IRD product: interest rate swaps; zero-coupon swaps; basis swaps; forward rate agreements; OISs; and variable notional swaps, as well as inflation swaps. Graph 3 and Graph 4 show a product level breakdown of the notional value registered and notional value outstanding at SwapClear. Interest rate swaps account for the largest fraction of the outstanding value of open trades. These products make up a larger proportion of the stock than the flow because they have longer tenors than OIS and forward rate agreements.

Graph 3

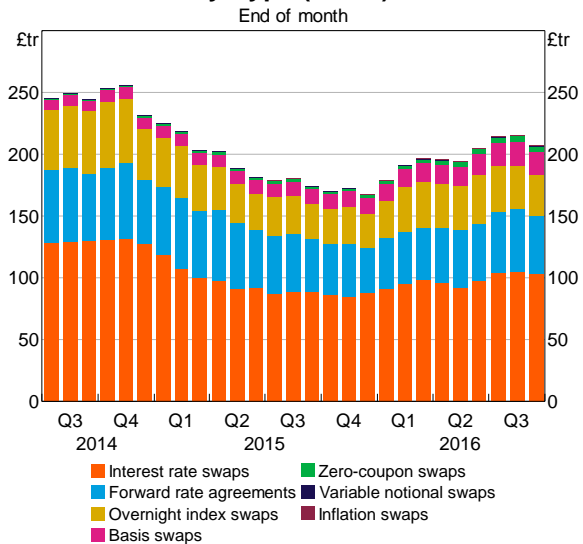
SwapClear: Notional Value of Trades Registered, by Type (Flow)*



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

Graph 4

SwapClear: Notional Value Outstanding, by Type (Stock)*

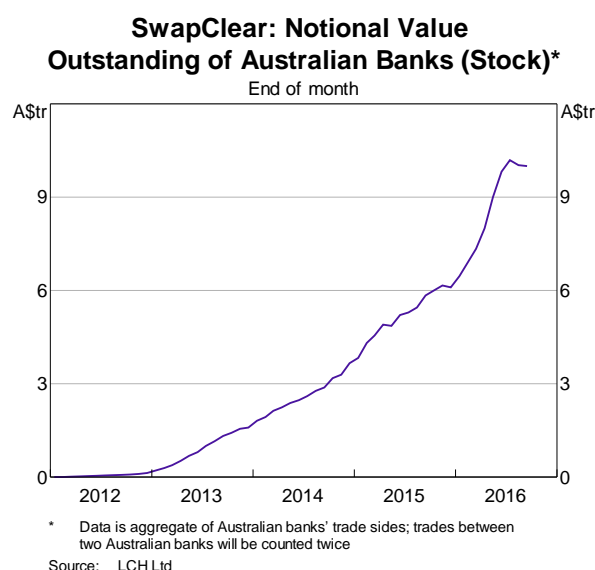


* Data counts two sides of each trade
 Source: LCH Ltd

A.2 Australian Activity in SwapClear

At the end of September, SwapClear had five Australian direct clearing participants. The four major Australian banks all became direct participants between September 2013 and November 2014, while an Australian subsidiary of Goldman Sachs joined the SwapClear service in March 2016. The major Australian banks have also centrally cleared OTC IRD trades indirectly, as clients of other clearing participants, since early 2012, and continue to do so for some currencies. The total notional value outstanding of IRDs that Australian banks cleared via SwapClear grew from A\$5.8 trillion to A\$10.0 trillion over the assessment period (Graph 5). This increase occurred despite regular trade compression cycles, which were facilitated by the TriOptima triReduce service.⁹

Graph 5

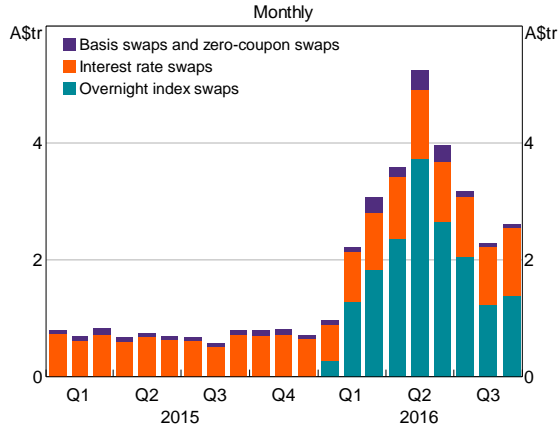


An estimated 88 per cent of the notional value outstanding of all centrally cleared AUD-denominated OTC IRD trades are cleared via SwapClear. AUD activity at LCH Ltd increased significantly after it began clearing AUD OIS in January 2016. In September, AUD OIS accounted for around one half, by value, of LCH Ltd's total AUD IRD registered (Graph 6). However, the longer average tenor of IRS compared with OIS, meant that AUD OIS only accounted for around one quarter of LCH Ltd's total stock of AUD IRD outstanding by notional value (Graph 7). The notional value of AUD-denominated zero-coupon and basis swaps registered also increased substantially in the middle of the assessment period, although registration of these products dropped back again in later months (Graph 6). Liaison with industry participants suggests that these products are used as a centrally cleared substitute for AUD forward rate agreements (which are not currently cleared by SwapClear).

9 The frequency of AUD compression cycles is driven by participant demand.

Graph 6

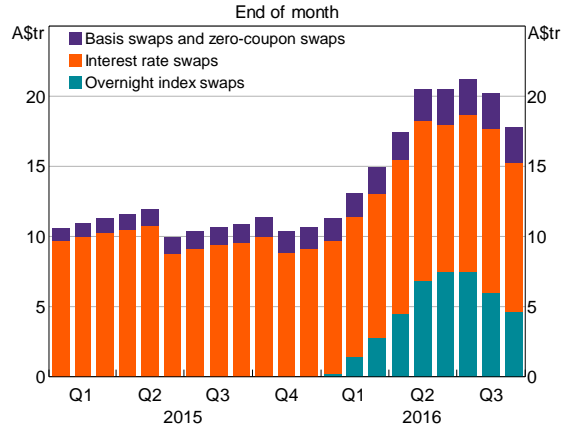
SwapClear: Notional Value of AUD Interest Rate Derivatives Registered (Flow)*



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

Graph 7

SwapClear: Notional Value Outstanding of AUD Interest Rate Derivatives (Stock)*



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

AUD OIS were included in the clearing mandate from October. AUD OIS were not included within the original scope of the Australian OTC derivatives clearing obligation because at the time the clearing obligation was announced in December only one CCP – ASX Clear (Futures) – was offering a clearing service for these products.

SwapClear started clearing AUD variable notional swaps (VNS) in mid September. As at the end of September, no AUD VNS had been cleared.

A.3 Operational Performance

LCH Ltd manages operational risk in accordance with the LCH Group Operational Risk Policy, which has been developed in accordance with the LCH Group Risk Governance Framework. LCH Ltd targets IT system availability for the SwapClear service equivalent to at least 99.7 per cent (that is, system outages should last no more than 60 minutes in any one calendar month).¹⁰ SwapClear met this target in the assessment period – over the period IT system availability averaged 99.84 per cent.

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: two times current daily average throughput; or the projected daily average throughput in 12 months' time. This target was met in each month over the period.

A.4 UK Referendum on EU Membership

The announcement of the results of the United Kingdom referendum on EU membership in June caused a short period of heightened financial market volatility. There were significant price changes in interest rate markets that triggered large and extensive intraday margin calls at the CCPs that serve

¹⁰ LCH Ltd applies a weighting system when calculating service unavailability: a weight of 1 is applied to minutes for which there is full service outage; a weight of 0.5 or 0.25 is applied for partial outages, depending on the nature of the incident; and a weight of 0 is applied 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).

Australian markets, including LCH Ltd. All margin calls were met on time by participants.¹¹ LCH Ltd was in close contact with its primary regulator, the BoE, during this time to provide updates on the effect on activity at LCH Ltd, and these updates were in turn communicated to the Multilateral Arrangement for Regulatory, Supervisory and Oversight Cooperation on LCH.Clearnet Ltd (Global College), of which the Bank is a member.

11 The Council of Financial Regulators (CFR) published a 'Report on the Implications of Brexit' in July that discusses, at a high level, the performance of CCPs serving Australian markets. See <<http://www.cfr.gov.au/publications/cfr-publications/2016/report-on-the-implications-of-brexit/pdf/report.pdf>>

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

B.1 Risk Management

A central counterparty (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. At the same time, however, they 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.Clearnet Limited (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 banking 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 DMPs, 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.

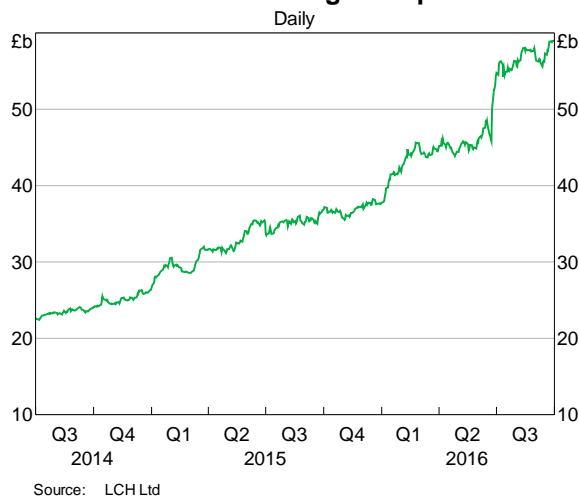
- *Variation margin.* All SwapClear positions are marked-to-market at end-of-day and three times intraday. Variation margin is collected from participants with loss-making positions and paid to those with profit-making positions. This practice ensures that uncovered losses on SwapClear participants' 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. LCH Ltd will only register trades 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 component of the default fund (see Section 3.3.3) to cover the potential future exposure of the trade.

- *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 credit, liquidity, concentration and sovereign risks not captured by the base initial margin model. This includes, for example, daily or monthly 'default fund additional margin' (DFAM), which is called from participants with large exposures identified through stress testing (see Section 3.3.3).

LCH Ltd calculates initial margin requirements for SwapClear using its Portfolio Approach to Interest Rate Scenarios 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 look-back 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.¹² LCH Ltd assesses the performance of its margin model through daily and monthly backtesting (described in CCP Standard 6.6); in addition, the adequacy of the model assumptions is assessed using quarterly sensitivity analysis (see CCP Standard 6.6).

Graph 8 shows the total initial margin requirement for the OTC Rates margin class, which includes initial margin relating to all SwapClear positions and STIR futures that have been transferred as part of the portfolio optimisation process of the Spider service (see Box A). The value of initial margin in GBP increased dramatically after the announcement of the results of the United Kingdom referendum on EU membership in late June. LCH has attributed about half of this increase to movements in the value of GBP, about a quarter to increased volatility scaling and about a quarter to new positions.

Graph 8
OTC Rates: Initial Margin Requirement



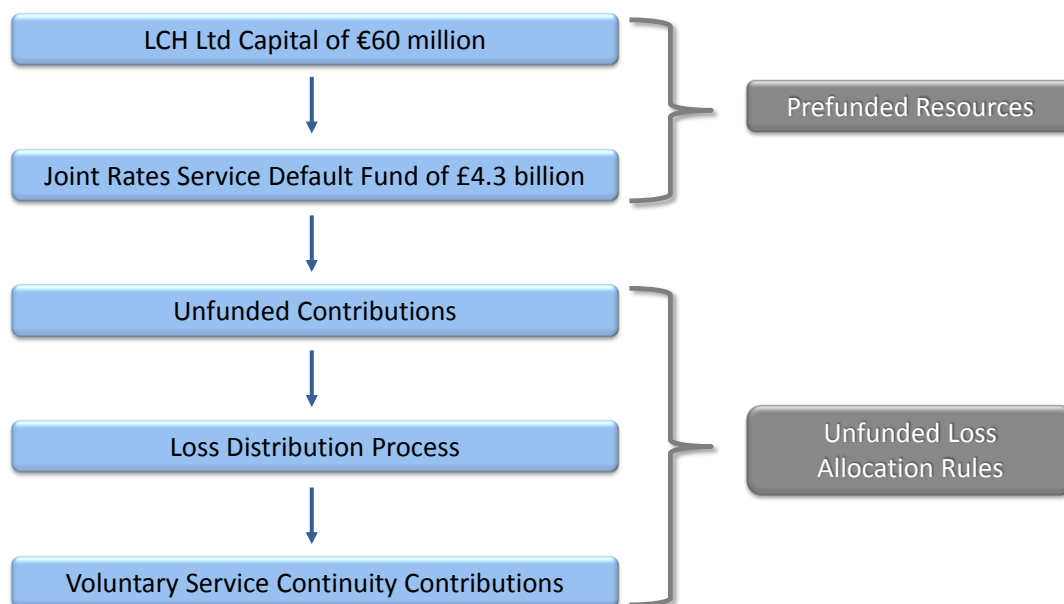
¹² The additional two-day holding period for client positions allows time for clients to decide whether to seek to port their portfolio to another clearing participant, as well as time to carry out any such transfer.

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.¹³ Should these resources prove insufficient to meet LCH Ltd's obligations, LCH Ltd may draw on other resources in the Joint Rates service default waterfall. The Joint Rates service default fund was created during the assessment period to replace the separate default funds of the SwapClear and Listed Rates services. The creation of a single default fund reflected the introduction of LCH Ltd's portfolio margining service (Spider), which allows for margin offsets between its SwapClear and Listed Rates services (see Box A for more details).¹⁴ 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 2016.

Figure 1

Joint Rates Service Default Waterfall after the Defaulter's Collateral as at 30 September 2016



Source: LCH Ltd

Prefunded resources

In the event that all of the defaulting clearing participant's margin and other collateral (including its contribution to the Joint Rates service default fund) were exhausted, LCH Ltd would seek to allocate remaining losses arising from the default to the Joint Rates service default fund. The Joint Rates

¹³ 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.

¹⁴ 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 Joint 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 Joint Rates service).

service default fund is a pool of mutualised resources, prefunded by clearing participants. The Joint Rates service default fund comprises two components: a core component (£4.3 billion at the end of September 2016) and an additional component that supports the intraday provision of credit needed to facilitate 'real-time' trade registration (£400 million as at September 2016). Both components are available to cover losses from participant defaults. Both SwapClear and Listed Rates participants contribute to the core component, but only SwapClear participants contribute to the real-time trade registration component (discussed below). LCH Ltd would use a slice of its own capital (€60 million as at September 2016) before allocating losses to the default fund contributions of non-defaulting participants.

Default fund core component

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 DFAM. This is intended to meet the 'cover two' requirement under CCP Standard 4.4 and its equivalent under the European Market Infrastructure Regulation (EMIR) (The European regulatory regime for CCPs is discussed in Appendix B.3).

The core component is resized on the first business day of each month. LCH Ltd sums the largest two participant stress-test losses over initial margin (STLOIM) over a 60-day look-back period, adds a buffer, and then subtracts the amount of monthly DFAM called by LCH Ltd.¹⁵

LCH Ltd calls monthly DFAM from the participant with the largest STLOIM used in the prior calculation. LCH Ltd uses monthly DFAM to balance between defaulter pays and mutualised resources, ensuring that a participant with a large exposure relative to other Joint Rates service members provides a larger contribution to the resources required to cover those exposures. Monthly DFAM is not mutualised; it can only be used to cover losses from the participant that posted it. Since October 2014 it has been calculated as that participant's largest STLOIM under any scenario in the look-back period less 45 per cent of the combined stressed exposure value and buffer.¹⁶

LCH Ltd calls daily DFAM from those participants and affiliates with STLOIM that exceed a predefined proportion of the default fund.¹⁷ The relevant default fund proportion is based on those participants' internal credit scores (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 paid).¹⁸ Like monthly DFAM, daily DFAM is not mutualised; it can only be used to cover losses from the participant that posted it.

Graph 9 demonstrates how the combination of default fund resizing based on stress-test exposures and the collection of additional margin on concentrated risk positions via the daily DFAM mechanism ensure that, in aggregate, LCH Ltd maintains sufficient financial resources to meet the cover two requirement. The dotted line reflects stress-test losses minus the value of applicable resources held

¹⁵ 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.

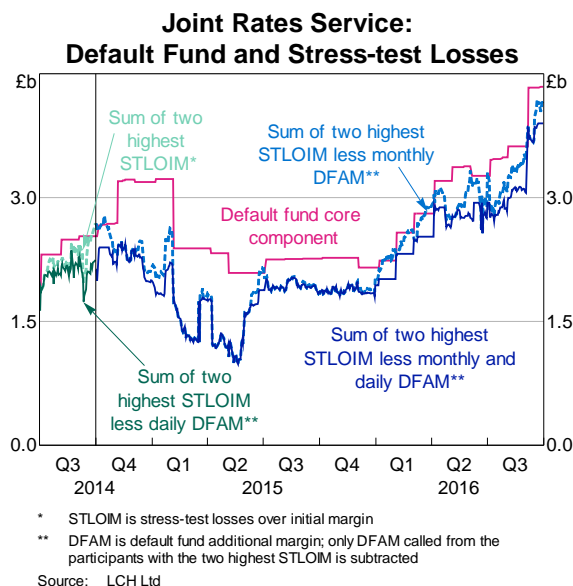
¹⁶ Prior to this, monthly DFAM was called from the SwapClear participant with the largest STLOIM if that STLOIM was determined to be 'outsized' relative to that of other participants.

¹⁷ From September 2016, clearing participants can request that LCH Ltd require additional collateral in respect to a clearing participant's client in order to reduce the exposure generated by that client account.

¹⁸ Prior to October 2014, a participant's daily DFAM obligations did not take into account any monthly DFAM already held from the participant.

by LCH Ltd (initial margin and, after October 2014, monthly DFAM); the solid line reflects also the value of daily DFAM levied from participants, which is only received by LCH Ltd the morning following the day on which stress-test exposures are based (see CCP Standard 4.7 for further detail).¹⁹

Graph 9



The proportion of the core component that each SwapClear participant is obliged to contribute is calculated according to the average initial margin requirement on its house positions for the previous month as a share of SwapClear participants' total house initial margin requirements. Contributions are subject to a minimum of £10 million for SwapClear clearing participants and £500 000 for Listed Rates clearing participants. Contributions are rebalanced each month.

Default fund real-time trade registration component

To meet US regulatory requirements, SwapClear must novate or reject new trades within 10 or 60 seconds (depending on execution venue). 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 real-time trade registration 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. Participant contributions to the additional component are rebalanced on the same time line as those to the core

19 Prior to Q4 2014, Graph shows: the default fund core component; the two highest STLOIM for the same scenario, net of daily DFAM (solid line); and the two highest STLOIM for the same scenario, without adjusting for daily DFAM (dotted line). From Q4 2014, Graph shows: the default fund core component; the two highest STLOIM for the same scenario, net of daily and monthly DFAM (solid line); and the two highest STLOIM for the same scenario, less only monthly DFAM (dotted line).

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.

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, up to a cap, to the variation margin payments owed to non-defaulting SwapClear participants whose positions make gains (this is commonly known as variation margin gains haircutting). Participants in the Listed Rates service would be allocated losses in proportion to their default fund contributions.
- *Voluntary service continuity contributions.* Should losses remain, LCH Ltd would ask non-defaulting participants to make voluntary contributions.
- *Service closure.* If insufficient voluntary payments were made to cover the remaining credit losses, the Joint Rates service default management group (DMG) would make an Insufficient Resources Determination and close the SwapClear and Listed Rates services (see 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 Joint Rates service DMG would calculate a sum owing between it and each non-defaulting clearing participant (see CCP Standard 4.8 for further details).

B.2 Governance

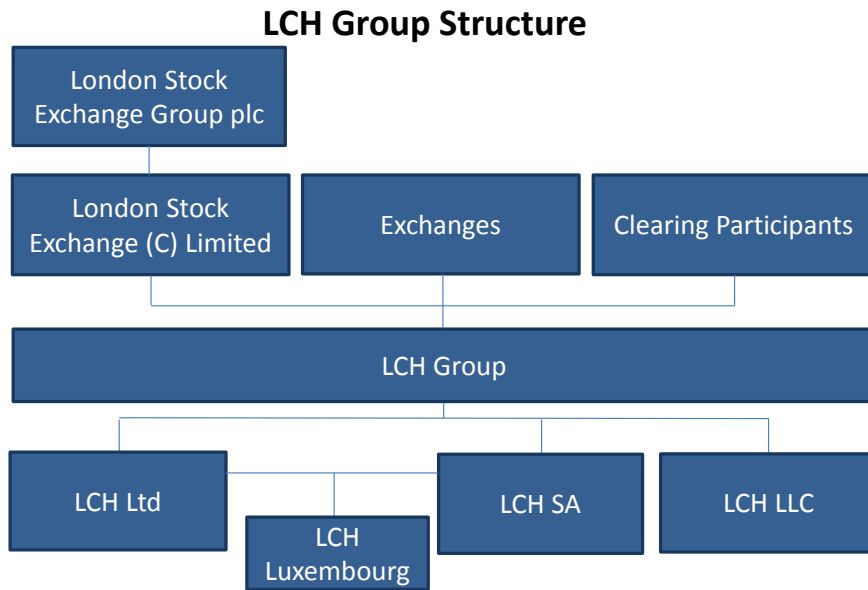
LCH.Clearnet Group Structure

LCH Limited (LCH Ltd) is a wholly owned subsidiary of LCH Group Limited (LCH Group) (Figure 2). LCH Group is 57.8 per cent owned by the London Stock Exchange (C) Limited, a wholly owned subsidiary of London Stock Exchange Group plc (LSEG); 9.3 per cent owned by exchanges; and 32.9 per cent owned by clearing participants.

The LCH Group is a holding company incorporated in the United Kingdom. In addition to LCH Ltd, the LCH Group has two other wholly owned subsidiaries that operate central clearing services: LCH.Clearnet SA (LCH SA) and LCH.Clearnet LLC (LCH LLC).²⁰ The three CCPs are legally separate entities. LCH Ltd and LCH SA jointly own LCH Luxembourg, which holds intellectual property licences used by CCPs in the LCH Group.

²⁰ LCH LLC closed its SwapClear US service in June 2016. Nonetheless, it will remain a derivatives clearing organisation registered with the CFTC until June 2017.

Figure 2: LCH Group Structure

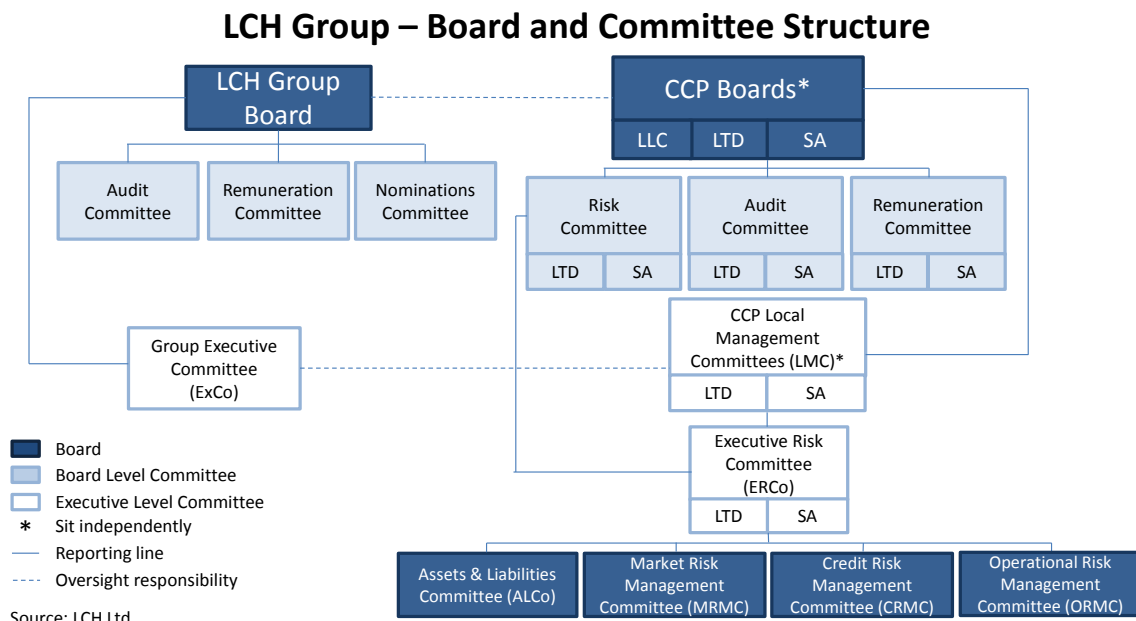


Source: LCH Ltd

LCH Group and LCH Ltd Governance Arrangements

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

Figure 3: LCH Group Board and Committee Structure



Although LCH Ltd, LCH Group and the other LCH CCPs each operate under independent governance arrangements, there is close coordination between each entity. To promote consistency and to avoid

duplication, a number of the CCP and LCH Group board-level and executive-level committees have overlapping memberships and routinely sit together. 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 CCPs in coordination, and apply across each of the CCPs. LCH Group policies must be approved by the LCH Ltd Board to be applicable to LCH Ltd. LCH Ltd also coordinates closely with LCH Group and the other LCH CCPs in day-to-day processes; some processes, such as the assignment of internal credit scores and model validations are performed at the LCH Group level, rather than the individual CCP level (see *Financial Stability Standards for Central Counterparties* 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 2016, the LCH Group Board has 17 members, including five independent directors. The LCH Group Board meets at least five times a year and on an ad hoc basis, as required. Six members of the LCH Group Board, including four of the independent directors and the Chief Executive Officer (CEO) of the 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 (see CCP Standard 2.3). Where there is overlap in the matters reserved for the LCH Group and LCH Ltd Boards, the LCH Ltd Board is not bound by decisions made by the LCH Group Board. However, the LCH Ltd Board is required to consider any views expressed by the LCH Group Board when making decisions on recommendation from the LCH Ltd Risk Committee. As at 30 September 2016, the LCH Ltd Board has 12 directors, including six independent directors, the CEOs of LCH Group and LCH Ltd, the LCH Group Chief Risk Officer (CRO), and one director from the LSEG Board.

Group-level, board-level and executive-level committees

The LCH Group CCPs have identical board-level and executive-level committee structures. With the exception of the Local Management Committees (LMCs), these committees have overlapping (although not identical) memberships and routinely sit together. This facilitates cooperation and coordination across the CCPs and reduces repetition. The CCPs' Audit and Remuneration Committees also sit together with the equivalent Group-level committees. Issues specific to a particular CCP can be considered at combined meetings.

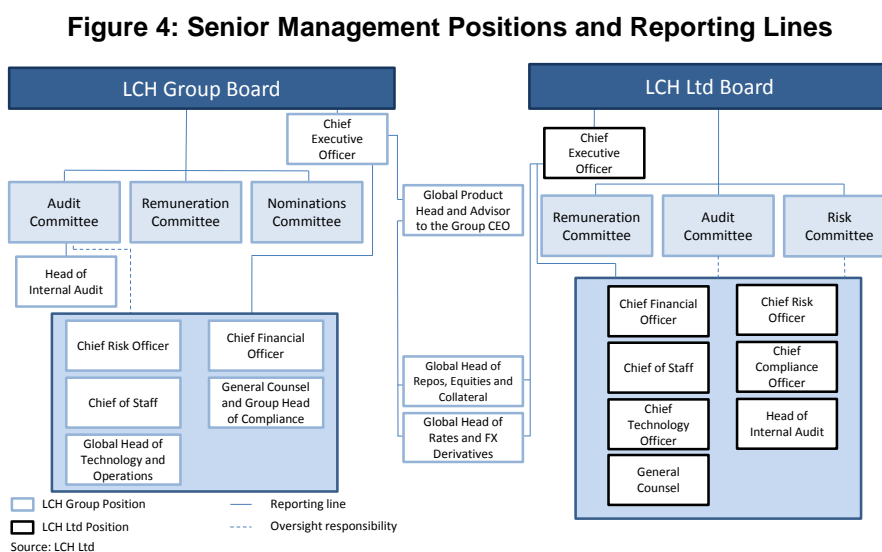
Key LCH Group and LCH Ltd board-level and executive-level committees include:

- *The LCH Ltd Risk Committee.* The LCH Ltd Risk Committee is responsible for 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 (see CCP Standard 2.6). The terms of reference for the Risk Committee of each of the LCH Group CCPs require that the Committee consider proposals for harmonisation of policies or procedures between the LCH Group CCPs.

- *The Group Executive Committee.* The LCH Group Executive Committee (ExCo) is the most senior LCH Group management committee. ExCo is an advisory body, which provides advice and recommendations to the Group CEO and the CEOs of the Group’s CCPs. ExCo is made up of: the Group CEO, who acts as the Chairman; and the CEOs of each of the Group CCPs, the business line heads and the Group functional heads.
- *Local Management Committees.* Each of the Group CCPs has a LMC. Unlike 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: the LCH Ltd CEO, Chief of Staff, CRO, Chief Financial Officer, Chief Compliance Officer, Chief Technology Officer, General Counsel, Head of Operational Risk, Global Head of SwapClear and ForexClear, Global Head of Equities and Commodities, Global Head of Fixed Income, LCH Group Head of Technology and Operations, LCH Group Head of Human Resources (HR) and Head of CaLM. LMC members are allowed to nominate delegates to attend in their place.
- *Executive Risk Committees.* Each of the Group CCPs, including LCH Ltd, has 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 LCH CCPs. The LCH Ltd ERCo reports directly to the LCH Ltd Risk Committee and the LCH Ltd LMC.
- *Other key committees.* Various committees support decision-making within LCH Ltd. These include (among others), at a Group level, the Asset and Liability Committee, Market Risk Management Committee (MRMC), Credit Risk Management Committee (CRMC), Operational Risk Management Committee (ORMC) and the New Product Approval Committee; and at a CCP level, the Change Management Committee and Rule Change Committee. The roles of each of these committees are discussed further throughout Appendix C.

Senior management

LCH Group and each of the LCH CCPs have similar senior management structures and reporting lines (Figure 4).



Departments

LCH Ltd is organised into departments based on its core functions and the products it offers. The 'functional' departments include: Audit, CaLM, Compliance, Finance, HR, Information Technology, Legal, Operations and Risk. The various departments are further divided by function; for example, the Risk department includes, among others, teams with responsibility for credit risk, default management, reporting, collateral and liquidity risk, as well as 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 expanded upon 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 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.

Governance of SwapClear

The Global Head of Rates and FX Derivatives, 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 and FX Derivatives also has responsibility for the ForexClear service. The Global Head of Rates and FX Derivatives reports directly to the CEO of LCH Ltd and to the Global Product Head and Advisor to the Group CEO. LCH Ltd also maintains regional representation for SwapClear in Australia. The Asia Pacific Head of Rates and FX Derivatives, who reports directly to the Global Head of Rates and FX Derivatives, is responsible for overseeing the strategy and business operations of the SwapClear service 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.²¹ 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 SwapClear risk management team's responsibilities include determining stress-test scenarios and sizing the SwapClear 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 SwapClear risk team reports to the MRMC and CRMC, both of which report to the LCH Ltd ERCo. The Group level risk department performs the second line of defence including the maintenance of risk policies aligned to the 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 an alternative licensing route for an overseas-based CS facility subject to requirements and supervision in

²¹ Until June 2016 the SwapClear service was offered by both LCH Ltd and LCH LLC, but LCH LLC has been closed since that time and the SwapClear service is now solely offered by LCH Ltd.

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 (MoU) in place with the BoE regarding supervision of CS facilities.²² The MoU 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 Multilateral Arrangement for Regulatory, Supervisory and Oversight Cooperation on LCH.Clearnet 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 a harmonised framework for the regulation of FMIs, including CCPs, incorporated in the region: EMIR and its associated technical standards largely implement the Principles in the EU. Under EMIR, primary regulatory authority of a CCP is given to the national competent authority (NCA) 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 <i>Financial Services and Markets Act 2000</i> (FSMA). FSMA 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.
Regulation in other jurisdictions	LCH Ltd's operations span several jurisdictions. Outside the EU, LCH Ltd has been formally licensed or granted an exemption in the US, Norway, Switzerland, Japan, the Canadian provinces of Ontario and Quebec, Hong Kong and Singapore, allowing it to offer a range of clearing services in those jurisdictions.

B.3.2 The EMIR College and the Global College

EMIR establishes 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 (EMIR College) for LCH Ltd is chaired by the BoE and plays a role in the ongoing supervision of LCH Ltd, including when LCH Ltd applies to the BoE to expand its services or make significant changes to its risk model. For example, EMIR College review and approval was required before LCH Ltd could offer portfolio margining between the SwapClear and Listed Rates services (see Section 3.6.7). 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.

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

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 Bank aims to ensure FMIs are 'managed in a manner that is consistent with the public interest including reducing systemic risk'.²³ The BoE takes a risk-based approach to oversight, prioritising its supervisory effort 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 FMIs. The latest report, published in March 2016, summarises the BoE's supervisory priorities during the period from March 2015 to March 2016, as they apply across all FMIs, and FMIs' progress against them.²⁴ These priorities, focusing on their relevance to the UK CCPs, were:

- *Credit and liquidity risk.* The BoE noted progress towards embedding procyclicality considerations into CCPs' risk frameworks. To improve liquidity arrangements, a number of CCPs applied for Sterling Monetary Framework (SMF) access, after access to the facility was widened in November 2014. The BoE also extended its swap line with the ECB to facilitate the provision of multi-currency liquidity.
- *Recovery and resolution.* FMIs are required to have recovery plans in place to address threats to their viability. The BoE assessed CCP and Payment System recovery plans in 2015/16, with a number requiring updates to address aspects of CPMI-IOSCO guidance.
- *Operational risk.* A key focus of the BoE's work on FMI operational resilience has been management of cyber risk and increasing the resilience of FMIs to cyber attacks. The BoE initiated a cross-firm assessment of FMI's management of cyber risks to make an assessment of cyber resilience in addition to CBEST cyber security tests. Several FMIs are in the process of implementing recommendations from the CBEST program tests; other FMIs commenced testing in 2016. Other initiatives completed over the year included: assessing UK CCPs' ability to manage a clearing participant default ('fire drill'), introducing Term Delivery by Value settlement for LCH Ltd's clearing participants' gilt repurchase business and a review of internal audit functions.
- *Governance.* The BoE carried out a review of initial margin model governance at CCPs and their key clearing participants, identifying four areas where effectiveness could be improved: sharing model information between CCP and clearing participants; clearing participant due diligence on models; communication of the results of due diligence; and board consideration of due diligence in their decision-making. The BoE assessed changes to boards of several payment systems, following reviews in 2014, noting an increase in independent board members. The Bank also found board effectiveness should be enhanced in a number of areas, with appropriate work currently being undertaken.

23 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>.

24 BoE (2016), *The Bank of England's Supervision of Financial Market Infrastructures — Annual Report*. Available at <http://www.bankofengland.co.uk/publications/Documents/fmi/annualreport2016.pdf>

- *International regulations.* The BoE is taking an active role in shaping and delivering several elements of the FSB, BCBS and CPMI-IOSCO CCP Workplan, designed to address CCP resilience, recovery, resolvability and interdependencies.

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.²⁵ The BoE is the resolution authority for UK CCPs.

25 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 *Financial Stability Standards for Central Counterparties* (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 Reserve Bank (the Bank) takes into account associated guidance.²⁶

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.

LCH.Clearnet Limited (LCH Ltd) is a separate legal entity within LCH Group Limited (LCH Group) that solely provides central counterparty (CCP) clearing services (CCP Standard 1.1). LCH Ltd's legal basis is founded on rules that operate within the framework of relevant laws and regulations (CCP Standards 1.2, 1.3). LCH Ltd publishes key information about its regulatory status on its website and in its annual report, and has provided the Bank with certain legal opinions regarding its legal basis (CCP Standard 1.4). The LCH Ltd Rulebook and Clearing Membership Agreement are governed by English law and form the legal basis for LCH Ltd's operations (CCP Standard 1.5). The LCH Ltd Futures Commission Merchant (FCM) Rulebook is governed by New York law. 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 conflicts of law issues (see CCP Standard 1.6).

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, limited by shares, incorporated in the United Kingdom (UK). LCH Group is 57.8 per cent owned by the London Stock Exchange (C) Limited, a wholly owned subsidiary of London Stock Exchange Group plc (LSEG), and 42.2 per cent owned by clearing participants and other exchanges.

The LCH Group has one other wholly owned subsidiary that operates clearing services: LCH.Clearnet SA (LCH SA). It also has a United States (US) CCP, LCH LLC, which holds a US Derivatives Clearing Organization (DCO) licence but is proceeding towards dormancy. The CCPs are legally separate entities, each with separate financial resources. LCH Ltd's activities are also separate to those of LSEG.

²⁶ The guidance is available at <http://www.rba.gov.au/payments-and-infrastructure/financial-market-infrastructure/clearing-and-settlement-facilities/standards/central-counterparties/2012/>.

Nonetheless, during the assessment period LSEG launched LSEG Business Services Ltd, which provides shared technology and support services across all LSEG entities, including LCH Ltd.

LCH Ltd acts as a CCP for a number of exchange-traded and over-the-counter (OTC) products. LCH Ltd provides clearing services for two UK derivatives trading platforms and a number of equities trading platforms. In OTC markets, LCH Ltd offers CCP services for interest rate swaps through its SwapClear service, purchase and repurchase agreements for European government and supranational bonds through RepoClear, non-deliverable foreign exchange forwards through ForexClear, and cash-settled OTC freight forwards through EnClear.

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.

In May 2016, the Parliament of Australia passed the *Financial Legislation Amendment (Resilience and Collateral Protection) Act (2016)* (Resilience Act). Among other things, this Act amended the *Payment Systems and Netting Act (1998)* (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 (CCP Standard 1.5).

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.²⁷ 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 Bank of England (BoE) as a 'recognised central counterparty'. This designation arises from the UK *Financial Services and Markets Act 2000*, and the harmonised European regulatory framework for CCPs, *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* (commonly known as EMIR). EMIR and its associated technical standards largely implement the Principles within the Committee on Payments and Market Infrastructures (CPMI) and International Organization of Securities Commissions (IOSCO) *Principles for Financial Market Infrastructures* (the Principles) in the European Union (EU).²⁸ LCH Ltd's operations span several jurisdictions. LCH Ltd is also registered as a DCO under the US Commodity Exchange Act, and therefore it and its provision of the SwapClear service (as well as the ForexClear service) are directly regulated by the US Commodity Futures Trading Commission (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 Quebec, Japan, Norway, Singapore and Switzerland, as well as Australia.

In Australia, LCH Ltd holds a clearing and settlement (CS) facility licence, under Part 7.3 of the *Corporations Act 2001*. This licence is administered by the Australian Securities and Investments

27 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.

28 Prior to 1 September 2014, CPMI was known as the Committee on Payment and Settlement Systems (CPSS).

Commission (ASIC) in consultation with the Bank, with the Minister acting 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 (IRDs) and inflation rate derivatives through the SwapClear service.

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

The LCH Ltd Rulebook, which consists of general regulations, default rules, settlement finality regulations and various procedures, is governed by English law. The Rulebook was extensively updated in 2014 as part of LCH Ltd's reauthorisation under EMIR. LCH Ltd maintains a separate FCM Rulebook for its US-domiciled FCM clearing participants, which includes a set of regulations, procedures and default rules (see CCP Standard 17.2).²⁹ The FCM Rulebook is primarily governed by New York law.

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 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 (see 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.

²⁹ 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.

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 (Charge Agreement) (see 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.³⁰ 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.³¹

LCH Ltd relies upon contractual arrangements with custodians and central securities depositories (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 (see 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 (see 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.

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 (see 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 (DMP) (see CCP Standard 20.1).

The LCH Ltd Rule Change Committee oversees all amendments to the LCH Ltd Rulebooks. Material changes to the LCH Ltd Rulebook must be unanimously approved by the Rule 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 Chief Executive Officer (CEO)). The Rule Change Committee has the ability to make non-material amendments to the LCH Ltd Rulebook by providing

³⁰ These opinions, which also cover a range of other issues (see CCP Standard 1.5), are made available on the LCH Group website at <http://www.lch.com/members-clients/members/fees-ltd/annual-account-structure-fees>.

³¹ 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* (PPSA), in order to protect the enforceability and priority of LCH Ltd's security interests. LCH Ltd has since advised the Bank that PPSA registrations have been effected for three of the five Australian clearing participants of SwapClear.

notice to affected clearing participants, unless explicit provisions stating otherwise are included in the LCH Ltd Rulebook or Clearing Membership Agreement.³² If the Rule Change Committee deems a change to be material, clearing participants are consulted on the change, for a period determined by the Rule Change Committee.

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 (see 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 (see 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.

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 Principles (see CCP Standard 20.5).³³

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 enact its default rules, as they relate to client clearing, in the event of a default of an Australian clearing participant. 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.

32 See Regulation 44 (Alteration of Regulations and the Procedures), LCH Ltd General Regulations, p. 126. Available at <http://www.lch.com/documents/731485/762691/general-regulations-230516.pdf/Ob53bce9-1488-4d0f-8159-411353c16ee3>.

33 Available at http://www.lch.com/documents/731485/762558/CPMI_IOSCO_Assessment_of_LCH+ClearnetLtd+2014.pdf.

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 (see 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 (see 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 (see 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 (the Settlement Finality Directive). The Settlement Finality 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.³⁴ In 2014, LCH Ltd obtained an updated legal opinion stating that an Australian court should uphold the choice of English law governing LCH Ltd's netting arrangements.³⁵

LCH Ltd has provided the Bank with a legal opinion to the effect that the 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 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.

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

34 This legal opinion is available at <http://www.lch.com/documents/731485/762833/LCH+Ltd+Legal+Opinion+Questionnaire+Response+-+England+and+Wales.pdf>.

35 This legal opinion is available at http://www.lch.com/documents/731485/762528/231058088_1_lch+Ltd-legal-opinion-emir-august2014-signed.pdf.

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* (Companies Act) 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 the Companies Act, it is permitted to exercise its rights in respect of contracts registered with SwapClear consistent with its DMP, 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 for 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 Banking Act (as amended by the UK *Financial Services Act 2012*), which provides for a special resolution regime (SRR) for CCPs. The UK Treasury's Special Resolution Regime Code of Practice supports the legal framework of the SRR. Under the SRR, 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 maintains a Policy for Identification of Conflicts of Law Issues. 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 (see CCP Standard 1.5), the enforceability of LCH Ltd's contracts and the jurisdiction of English courts over its clearing participants.

LCH Ltd's Policy for Identification of Conflicts of Law Issues also requires that LCH Ltd refresh its legal opinions relating to cross-border clearing participants every three years. In accordance with this policy, LCH Ltd must also refresh its legal opinions if material changes occur to either the relevant laws of a foreign jurisdiction or the LCH Ltd Rulebook that could impact the outcome of its legal opinions.

To date, LCH Ltd has obtained legal advice for Australia, Austria, Belgium, Canada (Ontario and Quebec), 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 the 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. LCH Ltd updated this legal opinion following the implementation of changes to its Rulebook as part of its EMIR reauthorisation (see CCP Standard 1.2); it has informed the Bank that the revised opinion did not materially change the outcome of the opinion provided at the time of licensing.

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.

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.

LCH Ltd has objectives that prioritise the safety of the CCP (CCP Standard 2.1). LCH Ltd's governance arrangements are documented and publicly disclosed. These arrangements establish direct lines of responsibility and accountability, and also include procedures to identify, address and manage member conflicts of interest. The performance of the LCH Ltd Board and its individual board members is reviewed at least annually (CCP Standards 2.2, 2.3). Membership of the LCH Ltd Board includes independent non-executive directors, and the LCH Ltd Board has implemented processes that seek to ensure that its membership has appropriate skills and incentives (CCP Standard 2.4). LCH Ltd has documented the roles and responsibilities of senior management. Remuneration is determined

according to the LCH Ltd Remuneration Policy, and is structured to provide incentives for sound and effective risk management (CCP Standard 2.5). LCH Ltd has a documented risk management framework that is reviewed at least annually by the Audit Committee and endorsed by the board-level Risk Committee and LCH Ltd Board (CCP Standard 2.6). Key processes and internal control systems are subject to review by LCH Ltd's Internal Audit department, which itself is subject to periodic external independent reviews (CCP Standard 2.7). LCH Ltd has sought to establish governance arrangements that allow it to take account of the interests of its direct and indirect participants and other relevant stakeholders. Governance arrangements also provide for consultation and stakeholder engagement through appropriate forums. LCH Ltd discloses material decisions to stakeholders, and where relevant, the public (CCP Standard 2.8). LCH Ltd's formal governance structure is independent of the LCH Group, LCH SA and LCH LLC, in order to address potential conflicts of interest that may arise as a result of its group structure (CCP Standard 2.9).

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 Ltd are publicly available on the LCH Group website, and in LCH Ltd's financial statements. LCH Ltd's objectives include, among other things, the reduction of risk and safeguarding of the financial infrastructure in the markets it serves. 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 (see 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 (see 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 (see CCP Standard 1.1 and Appendix B.2). There is significant coordination in the governance of the LCH Group and the two active group CCPs, including LCH Ltd; however, the LCH Ltd Board has ultimate responsibility for LCH Ltd. The SwapClear service operates as a business unit within LCH Ltd (see Appendix B.2).

The governance arrangements of LCH Ltd are documented on the LCH Group website. 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.

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 (see CCP Standard 2.3). The Board has established an Audit Committee, Remuneration Committee and, as an advisory body, a Risk Committee. The composition and terms of 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 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 Remuneration Committee is responsible for determining the Board's remuneration policy.

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 and Duty 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 CCO and/or General Counsel, 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 CCO and/or General Counsel.

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 Chairman, 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).

The LCH Ltd Board has 12 directors, including: four independent non-executive directors; one LSEG director; two representatives of members and one representative of a venue (that is, exchanges or trading venues); the CEOs of LCH Group and LCH Ltd; and the LCH Group Chief Risk Officer (CRO); as well as the Board's Chairman, who is also considered to be independent and is also the Chairman of the LCH Group Board. There is some overlap in membership between the LCH Ltd Board and the LCH Group, LCH LLC and LCH SA Boards: of the six independent members, four (including the Chairman) sit on all four Boards.

Appointments to the LCH Ltd Board are made by the Board, on advice from the 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. A profile of each director and their relevant experience is made available on the LCH Group website.

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 is 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 Nominations 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 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. User directors 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 regularly 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.

LCH Ltd has established direct reporting lines between senior management and the boards (see Appendix B.2). 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 (COS), Chief Technology Officer (CTO), Chief Financial Officer (CFO), and Head of Internal Audit – have direct reporting lines to the board-level Audit Committee. The CRO also reports directly to the board-level Risk Committee.

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. Risks identified in the key person risk assessment are managed through various initiatives. 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. When determining remuneration policies, the Remuneration Committee terms of reference requires 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 Ltd Remuneration Policy, remuneration for employees in control functions (Internal Audit, Risk and Compliance) is determined by the relevant division head and CEO, and is subject to

separate review by the LCH Ltd Remuneration Committee. 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 LCH Ltd 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 actioning each risk type; and provides guidelines for risk reporting (see CCP Standard 3). The LCH Ltd Risk Governance Framework is owned by the LCH Ltd CRO, reviewed at least annually and approved by the LCH Ltd board.

The LCH Ltd Board retains overall responsibility for the establishment and oversight of risk 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
- LCH Ltd's Risk Governance Framework, which states the Board's Risk Appetite
- LCH Ltd's Financial Resource Adequacy Policy, Liquidity Risk Policy, Operational Risk Policy, Investment Risk Policy, Collateral Risk Policy, Counterparty Credit Risk Policy, Contract & Market Acceptability Policy, Default Management Policy, Settlement Payment & Custody Risk Policy, Model Governance Validation & Review Policy, Procyclicality Policy and any significant changes to these policies, following review by and recommendation from the LCH Ltd Risk Committee.
- LCH Ltd's Business Continuity Management Policy and Disaster Recovery Plan.

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 Executive Risk Committee (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 5 days of the Board meeting.

The LCH Ltd Risk Committee currently has six voting members, including one independent LCH Ltd Board director and one independent LCH Group Board director. The Committee's terms of reference require that the Chairman be an independent director. The remaining four 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 who fulfil the criteria of Users (as defined in CCP Standard 2.8) may also attend meetings of the LCH Ltd Risk Committee in a non-voting capacity. LCH Ltd's Risk Committee currently has five non-voting risk expert user members. Voting rights are rotated periodically (at least once a year) among User representatives. It is the responsibility of the Chairman, Vice Chairman 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 Risk, the Group Head of Collateral and Liquidity Management Risk and the Group Head of Operational Risk to manage the risk appetite of LCH Ltd and ensure appropriate risk policies are defined, established and developed. Implementation of these policies typically occurs by the risk management teams located within each service (see 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 (see 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 (see CCP Standard 2.7). The Head of Internal Audit reports directly to the Chairman of the LCH Ltd Audit Committee. 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 (see CCP Standard 2.5).

Model Validation

The LCH Group Model Governance, Validation and Review Policy – which applies to margin models, models used for pricing financial products guaranteed by LCH Ltd or received as collateral, and models used for assigning internal credit scores (ICSs; see CCP Standard 4.2) – defines the governance arrangements around the adoption, use, change and validation of models by LCH Ltd. 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 may include: peer review by quantitative experts through the Model Working Group; clearing participation consultation; approval of the Market Risk Management Committee (MRMC), or Credit Risk Management Committee (CRMC) as appropriate; 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. The exact process applied to a particular model or change in model depends on the importance of the

model and type of change – for example, independent model validation is required when adopting a new model or making a material change to an existing model. The Independent Model Validation Team is a team within LCH Group that is not involved in building or testing the model. The team reports to the Group CFO and is independent of the Group Risk function (Group Risk). The policy allows for model validation by an external party, although this is not required.

Model validation makes an evaluation of the conceptual and practical soundness of a particular model. 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.³⁶

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 audit. The internal audit department aims to meet professional standards and benchmarks against the Institute of Internal Auditors 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 Chairman of the Audit Committee. In addition, Internal Audit has a direct reporting line to the LCH Ltd CEO. The adequacy of the resourcing of the internal audit function is reviewed 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

³⁶ The last independent model validation for SwapClear was completed in June 2015.

LCH Ltd's internal audit function is conducted at least every three 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 (published by the Institute of Internal Auditors).

LCH Ltd's operations and controls are also subject to a programme of external audit. The external audit programme is determined by the external auditors in consultation with the Finance department and is presented to the Audit Committee for approval. 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 (see CCP Standard 2.4). The terms of reference of the Nominations Committee require that the LCH Ltd Board have 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 also has representation on the Board.

Direct and indirect participants are represented on each of LCH Ltd's board-level committees, and on the LCH Ltd Risk Committee in both a voting and non-voting capacity (see 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 these services.

LCH Ltd has an agreement in place for a group of 14 of the largest global banks to provide expertise, financial resources and strategic direction to LCH Ltd's SwapClear service (the SwapClear banks).³⁷

LCH Ltd must also consult with the SwapClear banks prior to LCH Ltd implementing material changes in certain pre-agreed areas. Prior to April 2014 the SwapClear Banks' role was directive, rather than consultative. 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.

LCH Ltd established an Australian Member User Group (AMUG) for Australian direct clearing participants in March 2014. The AMUG 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. The AMUG also provides an opportunity for Australian participants to propose to LCH Ltd policy changes that they

37 The SwapClear Banks are as follows: Bank of America Securities 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).

believe should be developed or prioritised. The AMUG 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 Twitter account.

LCH Ltd has also established arrangements to facilitate engagement with the banks that participate in its PPS. LCH Ltd holds regular PPS Working Group meetings 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 LCH Group is 57.8 per cent owned by the LSEG (see 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. As noted in CCP Standard 1.1, LSEG launched BSL during the assessment period which 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 these specific matters. 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 General Counsel (see 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. A register of conflicts is held and updated on an annual cycle by the Compliance department. LCH Ltd may take actions including avoidance measures or information barriers to avoid or mitigate potential or actual conflicts of interest. Conflicts which LCH Ltd cannot sufficiently avoid or mitigate are disclosed to the affected parties.

The LCH Group has one other wholly owned subsidiary that operates clearing services: LCH SA. It also has a US CCP, LCH LLC, that holds a CFTC DCO licence but no longer clears trades (the licence is proceeding towards dormancy). The three CCPs are legally separate entities, each with separate financial resources (see CCP Standard 1.1 and 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 (see Appendix B.2). Five of the 18 LCH Group Board members, including the Chairman, 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 the LCH Group and LCH Ltd Boards have overlapping responsibility, the LCH Ltd Board is not bound by decisions made by the LCH Group Board. 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 a conflict or potential conflict to arise in relation to a director's role on the LCH Group Board and the LCH Ltd Board, the conflicted members 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 General Counsel, 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.

LCH Ltd's Risk Governance Framework aims to comprehensively identify the risks facing the CCP. This framework is given effect by more detailed LCH Group policies (which are adopted and annually reviewed by the LCH Ltd Board) that specify governance arrangements, procedures and controls (CCP Standard 3.1). LCH Ltd imposes risk-based obligations on SwapClear clearing participants, such as margin and contributions to pooled resources that are proportional to the scale and nature of individual participants' activities (CCP Standard 3.2). These obligations also provide incentives for participants to control the risks they pose to LCH Ltd (CCP Standards 3.3). LCH Ltd has adopted policies that set out how LCH Ltd reviews and manages the risks it faces from other entities, both prior to entering into an arrangement with the entity and on a regular basis thereafter (CCP Standard 3.4). LCH Ltd's Recovery and Wind-down Plans identify the scenarios which may trigger the activation of these plans, and outline the detailed steps that LCH Ltd could take and the tools available to implement these plans (CCP Standard 3.5).

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 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. 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; default management; 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 (see CCP Standard 14.1 for some additional detail). The LCH Ltd Risk Governance Framework specifies the LCH Ltd Board's tolerance and expected minimum standards for each type of risk, as well as the roles and responsibilities regarding the management of these risks (see below).

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; minimum standards expected by the Board with respect to each type of risk; roles and responsibilities for measuring, monitoring and addressing each type of risk; and requirements regarding the performance of a self-assessment of the CCP against the Board's minimum standards at least annually. LCH Ltd's stated risk appetite is broadly described as 'low'.

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

The LCH Ltd Risk Governance Framework assigns specific responsibilities within LCH Ltd, including to the: LCH Ltd CEO, CRO, CTO and CFO; 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 LCH Ltd Service Heads 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 (see CCP Standard 2.6).
- *The LCH Ltd Risk Committee.* The Risk Committee is a board sub-committee which considers and comments on LCH Ltd's risk appetite, tolerance and strategy, and assists the Board in fulfilling its risk management responsibilities (see CCP Standard 2.6).
- *The 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 (see CCP Standard 2.7).
- *The 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 (see 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 other LCH Group CCPs.

- *The LCH Ltd Executive Risk Committee.* The LCH Ltd ERCo, in conjunction with the other Group CCPs' ERCos, are responsible for the management, monitoring and oversight of all material risks faced by the LCH Group CCPs. The LCH Ltd ERCo reports directly to the LCH Ltd Risk Committee and the LCH Ltd LMC (see Appendix B.2).
- *The LCH Ltd Default Crisis Management Team (DCMT).* 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 (see below).
- *The LCH Ltd Default Management Groups.* LCH Ltd maintains a DMG for each of its clearing services. As a result of the adoption of portfolio margining between the SwapClear and Listed Rates services in the assessment period the existing DMGs for the two services were combined to form the Joint Rates service DMG. The DMGs, within constraints set by the DCMT, would be responsible for oversight of the DMP as it relates to their service. The Joint Rates service DMG is composed of a combination of individuals from the previous SwapClear and Listed Rates DMGs and includes the SwapClear Head of Business Risk and traders seconded from clearing participants (see CCP Standard 12.1).

The Group level Credit Risk Management Committee (CRMC), Market Risk Management Committee (MRMC), Operational Risk Management Committee (ORMC) and the Asset and Liability Committee (ALCo) support decision-making relating to risk management at LCH Ltd and report to the LCH Ltd ERCo (see Appendix B.2).

LCH Ltd has implemented an 'Enterprise Risk Management' framework to measure, monitor and address the risks identified in the Risk Governance Framework 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 Risk team monitors inputs to counterparties' ICS assessments daily where applicable, and as soon as possible when new information becomes available (see 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 default fund additional margin (DFAM; see CCP Standard 4.4).
- *Margining.* SwapClear uses the Portfolio Approach to Interest Rate Scenarios (PAIRS) model to set initial margin requirements (see 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 (see CCP Standard 7.2).

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 the initial margin requirement that would result from user-specified hypothetical portfolios. Participants may then 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 the risk management framework. These indicators include: backtesting of initial margins, counterparty credit scores, and default fund sizing to meet 'cover two' (see CCP Standards 4 and 6); aggregate exposure measures (see above); liquidity ratios (see CCP Standard 7); and operational assessments (see CCP Standard 16). These indicators are included in the CRO's presentations to the LCH Ltd Board regarding compliance with the 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 (see CCP Standard 6.7), stress testing (see CCP Standard 4.5), collateral haircuts (see CCP Standard 5.3) and liquidity arrangements (see CCP Standard 7.1) are independently reviewed 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 on 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 programme of internal reviews and topic-specific external reviews (see 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. These obligations are generally 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 (see CCP Standard 6.3). Additional margin can be called from a participant if its positions become more concentrated, illiquid, or are more exposed to basis risk (CCP Standard 6.1).

Prefunded default fund contributions are called from participants in proportion to their initial margin requirements (subject to a minimum contribution of £10 million per clearing participant), and therefore in proportion to the scale and nature of their activities (see CCP Standard 4.4). DFAM is

called on participants with stress-test losses over initial margin (STLOIM) that exceed thresholds based on the participant's creditworthiness. Consequently, participants that bring disproportionate risk to the CCP collateralise more of that risk on a 'defaulter-pays' basis. Both Unfunded Contributions (to meet uncovered losses if the default fund was depleted) and Supplementary Contributions (to replenish the default fund once the Joint Rates service DMP 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 (AIPs) in the Joint Rates service DMP is based on each participant's market risk for each currency and product in the defaulting participant's portfolio. 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, variation margin gains haircutting (VMGH) could be used (see CCP Standard 4.8). A clearing participant's potential obligations under VMGH are related to the size and nature of its positions.

SwapClear clearing participants must meet certain operational requirements (see CCP Standards 16.6 and 17.2). All SwapClear participants are required to meet certain base operational standards. 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 currencies in which the participant has cleared positions.

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 to 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 (see CCP Standard 1), credit (see CCP Standard 4), liquidity (see CCP Standard 7), general business (See CCP Standard 14), custody and investment (see CCP Standard 15) and operational risks (see 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 used by LCH Ltd include annual formal credit risk assessments of money settlement agents, investment counterparties and custodians (see CCP Standard 4.2), and (at least) biennial operational and legal due diligence on CSDs, PPS and concentration banks, with operational performance monitored on a quarterly basis (see CCP Standards 9.3, 15.2 and 19).

LCH Ltd has also established business continuity plans (BCPs) to allow for recovery and resumption of critical services. These plans are outlined in the LCH Group Business Continuity Management (BCM)

Policy (see CCP Standard 16.7 for details). All LCH Ltd service providers are required to implement business continuity arrangements equivalent to those of LCH Ltd (see CCP Standards 16.5 and 16.9). LCH Ltd has also established a Recovery Plan and a Wind-down Plan (see 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 updated its Recovery Plan and its Wind-down Plan in the assessment period. The 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.

LCH Ltd has identified two broad classes of scenario that could potentially trigger these plans: exposure to losses arising from clearing participant defaults; and exposure to non-clearing-participant-default losses arising from, for example, fraud or treasury investment losses. The Recovery and Wind-down plans are reviewed at least annually, or more frequently if there is a material change to LCH Ltd's business model.

The Recovery Plan identifies the circumstances in which it would be triggered and the recovery tools that would be available. In the event of a clearing participant default, the Recovery Plan would be triggered when CCP skin-in-the-game has been utilised (see CCP Standards 4.8 and 12.1).³⁸ In the event of a non-clearing-participant-default loss, the Recovery Plan would be triggered by treasury investment losses greater than €15 million (see CCP Standard 14.3), or operational or general business risk losses that were forecast to reduce LCH Ltd's capital below 110 per cent of the regulatory minimum LCH (see CCP Standard 14.2). The Recovery Plan would also be triggered by liquidity shortfalls that arose from a clearing participant default or non-clearing-participant-default loss (see CCP Standard 7.9). LCH.C Ltd added two new qualitative triggers to the Recovery Plan in the current assessment period. These triggers recognise the potential impact of a loss of key personnel (on the provision of critical services) as well as reputational damage due to an incident generating negative publicity. A breach of the triggers above for either default or non-default losses 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 CMPI-IOSCO guidance around the *Recovery of Financial Market Infrastructures*. That is, they are: comprehensive, effective and transparent; provide appropriate incentives; and minimise negative

³⁸ The trigger event was brought forward in the default waterfall as part of the most recent review. Previously, the member default trigger was activated when mutualised default fund contributions had been consumed.

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, are generally tested as part of annual fire drills (see CCP Standard 12.4). In addition, SwapClear 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 (see CCP Standard 14.5). LCH Ltd also has rules and procedures in place to replenish the Joint Rates default fund once the DMP is complete (see CCP Standard 4.8).

The Wind-down Plan sets out how LCH Ltd would cease its operations in the event of a clearing participant default, 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 (see 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 (see Section 3.5.2).

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. Clarification as to how such a scenario would work in practice is expected to develop in light of pending legislation relating to CCP recovery and resolution. The BoE has established a crisis management group (CMG) for LCH Ltd, of which the Bank is a member. The CMG will discuss and facilitate development of the resolution plan for LCH Ltd, taking into account the cross-border nature of LCH Ltd's business. It is expected that 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.

LCH Ltd maintains a comprehensive framework for managing its credit exposures to its clearing participants, which applies to all services, including SwapClear (CCP Standard 4.1). Under this framework, LCH Ltd regularly monitors its credit exposures, including information on participants' credit standing (CCP Standard 4.2). In responding to any issues identified through monitoring, LCH Ltd is able to impose activity restrictions or additional controls, including calls for additional margin (CCP Standard 4.3).

LCH Ltd also monitors and manages the magnitude of its exposures to its clearing participants through both daily and intraday initial and variation margin calculations (CCP Standard 4.2), and through daily stress tests that estimate the effects of extreme but plausible scenarios on exposures (CCP Standard 4.5). LCH Ltd calibrates the size of its financial resources to cover its largest potential credit exposure to any two participants and their affiliates in the extreme but plausible scenarios covered in its stress tests, consistent with obligations for a facility that is systemically important in multiple jurisdictions. As a result of the introduction of its Spider portfolio margining service (Spider) in the assessment period (see Box A for more details), LCH Ltd now maintains a Joint Rates service default fund to meet obligations arising from the default of clearing participants in the SwapClear and Listed Rates services, which is segregated from the default funds of other services (CCP Standards 4.4, 4.6). LCH Ltd calls daily and monthly DFAM from participants with very large STLOIM (CCP Standard 4.7). LCH Ltd has rules and procedures that set out how it would address uncovered credit losses from participant defaults (CCP Standard 4.8).

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 (see CCP Standards 4.5 to 4.7); the use of variation margin to mark positions to market (see CCP Standard 6); and the maintenance of prefunded financial resources. These financial resources comprise initial margin and additional margin (see CCP Standard 6), and a pool of prefunded mutualised resources (see CCP Standard 4.4). LCH Ltd also has rules and procedures that set out how it would address any uncovered credit losses it may face as a result of a clearing participant default (CCP Standard 4.8).

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:

- clearing participants (see the remainder of CCP Standard 4)
- PPS banks and concentration banks (see CCP Standard 9)
- custodians (see CCP Standard 15)
- investment counterparties and issuers of securities held by LCH Ltd as investments (see CCP Standard 15).

The CRMC is responsible for managing and monitoring credit risk across LCH Group, including credit risk from clearing participants. The CRMC is chaired by the Group Head of Credit Risk, and its members include representatives from various teams within LCH Group including the CRO of each LCH Group CCP. Any decision made by the CRMC that the Group Head of Credit Risk views as having a material impact on risk is escalated to the LCH Ltd ERCo. Applications from prospective clearing

participants must be approved by the CRMC and LCH Ltd ERCo. LCH Ltd's Rulebook sets out a variety of participation requirements (see CCP Standard 17).

The LCH Group Counterparty Credit Risk Policy sets out the standards for ongoing monitoring of the credit standing of clearing participants across the LCH Group CCPs, including LCH Ltd.³⁹ LCH Group maintains a Group Credit Risk team, which is responsible for setting the methodology and 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 LCH Group's Credit Risk team considers analysis of the counterparty's financial ratios and operational capability. In addition to the ICS factors, the Group Credit Risk team conducts ongoing monitoring of available data including external and Market Implied Ratings (MIR), share prices and other information that may impact the credit worthiness of the counterparty. Each counterparty's ICS is formally reviewed at least once a year, and clearing participants and other counterparties with an ICS above a predefined threshold are reviewed at least once every six months.

The Group Credit Risk team monitors a counterparty's credit worthiness on an ongoing basis; any breaches of limits, areas of concern (including our 'Watch List' members) and action being taken which could also have an impact on the ICS is sent to the CMRC in a daily report. The Group Head of Credit Risk or a delegate may recommend to the Group CRO to approve an ICS downgrade 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. It would then be subject to additional monitoring, including regular reporting on the participant to the CRMC, which any additional action would be discussed if required.

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 Joint Rates service Risk team monitors LCH Ltd's 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 exposures to clearing participants across all services. LCH Ltd can monitor 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 whenever LCH Ltd receives updated price data. This occurs multiple times per 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 Group Credit Risk team monitors a number of credit-risk-related limits, including the ratio of a participant's stress-test losses over additional margin plus default fund contribution to net capital, which participants must keep below a given threshold. It also monitors the ratio of a participant's initial margin to net capital, which participants must keep below the limit specified for its ICS. Breaches of these or other credit-risk-related limits are escalated to the CRMC, which would decide on the most appropriate action to take.

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

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 (see 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 Group Credit Risk team monitors the inputs into each clearing participant's ICS and other indicators of their creditworthiness. If the Group Credit Risk team had concerns about a participant, it would escalate the issue to the CRMC. The CRMC would decide on whether to downgrade the participant's ICS, and on any other actions to take. These could include:

- Tightening the credit-risk-related limits, as described in the Group Counterparty Credit Risk Policy (see CCP Standard 4.2). For example, the participant's maximum permitted ratio of its initial margin to its net capital range may be lowered.
- Applying higher margin requirements, as described in various LCH Ltd and SwapClear 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 real-time trade registration (RTTR) component tolerance to zero (CCP Standard 4.4).
- Reviewing the non-clearing functions of the counterparty.
- In extreme cases, asking the LCH Ltd ERCo to decide whether to suspend or terminate the participant.

A participant with an ICS at a level that required CRMC action 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 made various changes during the assessment period to the way it manages exposures to its clearing participants. These changes reflect the introduction of its portfolio margining service (Spider), which is an optional service allowing eligible participants and clients to benefit from margin offsets between their contracts cleared in the SwapClear and Listed Rates services. In particular, LCH Ltd has

created a single DMG – the Joint Rates service DMG – that would manage a default of any clearing participant of the SwapClear or Listed Rates services (see CCP Standard 12.1). LCH Ltd now maintains a single default fund – the Joint Rates service default fund – for the SwapClear and Listed Rates services.

LCH Ltd aims to hold prefunded financial resources for the SwapClear and Listed Rates services 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 so-called cover two standard). LCH Ltd calibrates the size of these resources based on daily stress tests (see CCP Standards 4.5-4.7).

The LCH Ltd Rulebook provides for the segregation of the Joint 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 Joint Rates service close (and vice-versa).

The Joint Rates service default fund consists of two components: a 'core component' (£4.3 billion at the end of September 2016), which is sized by stress testing, and a RTTR component (£400 million), which is intended to support the intraday provision of credit needed to facilitate 'real-time' trade registration. Clearing participants from both services contribute to the core component, but only SwapClear participants contribute to 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 the LCH Ltd Board.

Core component

The size of the core component of the Joint Rates service default fund is derived from the sum of the two largest participant STLOIM from the same scenario on any one day during the previous 60 business days.⁴⁰ 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 uses monthly DFAM to ensure that the participants with large STLOIMs (used in calculating the size of the default fund) collateralise more of their own risk. If such a participant's largest STLOIM under any scenario in the 60-day look-back period exceeds a specified threshold between 0 and 45 per cent, determined by its ICS, of the sum of the combined stressed exposure value and buffer, that participant may be required to post monthly DFAM to cover the amount its STLOIM exceeds that threshold.⁴¹ By reducing the size of the default fund core component by the value of monthly DFAM,

40 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.

41 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.

LCH Ltd shifts the balance between ‘defaulter pays’ and mutualised resources used to meet the cover two requirement. 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. 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 (see CCP Standard 4.7).⁴²

The core component of the 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. The proportion of the core component that each SwapClear and Listed Rates participant is obliged to contribute is calculated according to the participant’s average initial margin requirement for the previous month (based on its house positions only, as opposed to both house and client positions) as a share of SwapClear and Listed Rates participants’ total initial margin requirements. Additional margin (see CCP Standard 6.1) is ignored for this calculation. Contributions are subject to a minimum of £10 million per SwapClear clearing participant and £500 000 for Listed Rates clearing participants. 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 is a pool of mutualised resources that is intended to support the intraday provision of credit needed to facilitate ‘real-time’ trade registration. During the SwapClear service’s operating hours, trades are novated to the CCP within 10 or 60 seconds of being submitted (depending on the execution venue), in accordance with CFTC requirements. A trade is only novated if each participant’s incremental initial margin requirement is covered by collateral held by LCH Ltd or is within its RTTR component tolerance. By extending 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, and participants are not required to fully prefund all trades. LCH Ltd assigns RTTR component tolerances to participants based on their ICSs, with higher tolerances assigned to higher-rated participants based on their ICS.

The RTTR component is currently sized at £400 million. 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 (ExCo) 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.

Client buffer

LCH Ltd offers an optional client buffer account for its clearing participants as part of its SwapClear Client Clearing Service (SCCS). The client buffer can be used to cover intraday liabilities arising from new trade registrations by clients and intraday margin liabilities on existing positions. A single client

⁴² From September 2016, clearing participants can request that LCH Ltd require additional collateral in respect to a clearing participant’s client in order to reduce the exposure generated by that client account.

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 trade registration fund 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 Joint Rates service's stress-testing methodology uses 231 stress scenarios. Each scenario is a set of movements in yield curves, inflation curves and exchange rates (see 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.⁴³ To calculate the STLOIM of a participant on a particular day, the Joint Rates service takes the participant's worst STLOIM from the 231 scenarios.

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

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 Joint Rates service, and the comprehensiveness of the Joint Rates service's stress scenarios. The comprehensiveness of stress scenarios is assessed using qualitative analysis and a 'distribution led tool'. This tool 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 a scenario with similar plausibility that could result in larger losses. If the Joint Rates service internal working group found that a new scenario was required, this would need to be approved through SwapClear and

⁴³ If the participant has clients, LCH Ltd assumes the default of any clients whose default would increase the STLOIM. That is, each client whose profit-and-loss plus initial from that scenario is negative is assumed to default.

Listed Rate's internal governance procedures, with the LCH Ltd ERCo making the final decision on the adoption of the proposed scenario.

The annual validation of the Joint 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 most recent independent validation was conducted in July 2015. The validation did not find any reason to conclude that the reviewed stress scenarios were unsatisfactory, though it did specify a few required actions, which the Joint 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 Joint Rates service's set of 231 stress scenarios comprises 139 'historical' scenarios and 92 '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 Joint Rates service's dataset. The historical scenarios used by the Joint Rates service were generated in a variety of different ways, such as:

- identifying the largest historical 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.

The theoretical scenarios are hypothetical movements that are judged to be extreme but plausible by LCH Ltd. Almost all of the Joint 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 Joint Rates service includes three 'forward-looking' scenarios, which are scenarios generated by assuming a macroeconomic or financial event and then estimating the movements in yield curves that might occur as a result. The Joint Rates services' current forward-looking scenarios include a

hypothetical break-up of the Eurozone as well as a hypothetical devaluation of the Mexican Peso and a sovereign credit crisis.

The Joint 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 Joint Rates service's current financial resources. To do this, the Joint 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 Joint Rates service's stress testing. This is done by generating a set of 'perturbed' stress scenarios that would exhaust all of the Joint Rates service's prefunded default resources in the event of the default of the two participants with the largest aggregate exposure. The Joint 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 Joint Rates service are included in a daily report that is distributed to members of the ExCo. Furthermore, large STLOIM are discussed by each service 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 Joint Rates service calls monthly DFAM from any participant for which the largest STLOIM in the past 60 business days are large relative to the default fund (see 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.⁴⁴ A participant's PPS bank must provide LCH Ltd with

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

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 Joint 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 services
- LCH Ltd's own resources (€60 million)
- non-defaulting clearing participants' default fund contributions (as of the end of September 2016, £4.3 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 Joint Rates service would have powers to call non-defaulting clearing participants for Unfunded Contributions if the default fund was reduced, or if the Joint Rates service determined that it would be likely to be reduced, by 25 per cent or more. The value of Unfunded Contributions for 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 Joint Rates service would have powers to invoke its Loss Distribution Process if uncovered losses remained unallocated. Under this process, SwapClear and Listed Rates would allocate uncovered credit losses by not paying the full amount that non-defaulting clearing participants with cumulative net gains since the default (where applicable from variation margin, coupons, fees and price alignment interest) were due (this is commonly 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. VMGH would continue each day until the defaulting clearing participant's trades were successfully closed out or auctioned and transferred under the SwapClear DMP. VMGH would end if the loss applied to a single non-defaulting clearing participant reached the higher of £100 million or the value of its previous default fund contribution, although this cap could be increased by the agreement of all non-defaulting clearing participants.

- Third, the Joint Rates service could request that non-defaulting clearing participants make voluntary payments if the Loss Distribution Process had ended and uncovered losses remained unallocated. The voluntary payments stage 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 Joint Rates service would make an Insufficient Resources Determination and close the Joint Rates service (see CCP Standard 3.5). If the Joint Rates service were wound down, all outstanding SwapClear and Listed Rates contracts would be closed. The Joint 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 Joint Rates service has rules and procedures to replenish the default fund once the Joint Rates service DMP had been completed. If the value of the remaining Joint Rates service default fund was lower than the Joint Rates service Fund Floor (that is, the minimum size of the default fund – currently set at £1 billion) at the time that the Joint Rates service DMP was completed, the Joint Rates service would call non-defaulting clearing participants for Supplementary Contributions in order to bring the Joint Rates service default fund up to no less than the Joint Rates service Fund Floor. Non-defaulting clearing participants would need to meet these calls within two business days. During this period, the Joint Rates service would continue to meet cover two by calling daily DFAM from its participants.⁴⁵ The determination of the Joint Rates service default fund contributions would revert to the usual

⁴⁵ If the Joint Rates service default fund was at the floor (at £1 billion), the core component of that fund would be £600 million; any daily DFAM obligations to meet cover two would be determined using the core component amount.

resizing method 30 days after the Joint Rates service DMP was completed. The default fund would therefore be fully replenished with fixed mutualised resources in one to two months.⁴⁶

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.

LCH Ltd accepts only high-quality, liquid assets as collateral (CCP Standard 5.1). LCH Ltd accepts a range of currencies and traded securities, and notifies participants of changes in collateral eligibility in advance where possible (CCP Standard 5.2). Collateral is marked to market daily, and base haircuts are applied to all non-cash collateral to cover market risk over a three-day holding period. Additional haircuts are applied to cover credit, wrong-way, concentration, liquidity, and foreign exchange risk (CCP Standards 5.3, 5.4). LCH Ltd may also use concentration limits to manage concentration or liquidity risks (CCP Standard 5.5). Collateral haircuts, concentration limits and additional buffers are reviewed quarterly. LCH Ltd takes legal, operational and foreign exchange risk into account when accepting cross-border collateral (CCP Standard 5.6). LCH Ltd operates its own online proprietary collateral management system (CMS) (CCP Standard 5.7).

In its 2014/15 Assessment, the Bank set a regulatory priority that LCH Ltd should proceed with its plans to accept AUD cash as initial margin, subject to approval by the relevant regulators, in accordance with CCP Standard 5.2. A proposal to do so has since been approved under LCH Ltd's internal governance processes.

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

The LCH Group Collateral Risk Policy 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. At a high level, the policy restricts eligible collateral to that which has low credit, liquidity and market risk. To further mitigate risk, LCH Ltd monitors the market value, credit quality and liquidity of collateral lodged on a daily basis.

Acceptable collateral

LCH Ltd accepts the following collateral from SwapClear participants:⁴⁷

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

46 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 DMP.

47 FCM members may only post cash collateral in USD. No additional restrictions apply to securities posted by FCM.

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

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; government guaranteed debt of Australia, Austria, France, Germany, the Netherlands and Sweden; 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 accept commercial or central bank guarantees.

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 Group Risk. The appropriateness of the Collateral Risk Policy is reviewed by the LCH Ltd ALCo, 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).

Collateral and Liquidity Management (CaLM) Risk 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 (see CCP Standard 5.1). LCH Ltd maintains on its website a list of collateral eligible for use in its SwapClear service.⁴⁸ Where possible, LCH Ltd notifies participants of changes to collateral eligibility in advance, to minimise any disruption from such changes. A process exists for participants to request LCH Ltd to consider accepting additional forms of collateral.

48 See <http://www.swapclear.com/service/acceptable-collateral.html>.

Consistent with the regulatory priority included in the Bank's 2014/15 Assessment, LCH Ltd has internally approved a proposal to begin accepting AUD cash as initial margin, in accordance with CCP Standard 5.2. The Bank expects LCH Ltd to proceed with its plans to accept AUD cash as initial margin, subject to approval by the relevant regulators.

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 an early warning indicator report that is run daily to monitor key risk indicators that affect funding liquidity. 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 (see CCP Standard 5.5).

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.

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 look-back 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 look-back 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.

Additional haircuts are applied to cover credit, wrong-way, concentration and liquidity, and foreign exchange risks. 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. Additional haircuts applied to cover wrong-way, concentration and liquidity, and foreign exchange risks are discussed under CCP Standards 5.1, 5.5 and 5.6, respectively.

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 on recommendation from the ALCo. LCH Ltd's collateral haircut models are subject to independent review on an annual basis (see CCP Standard 2.6).⁴⁹

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. As discussed in CCP Standard 5.3, LCH Ltd calibrates haircuts to cover 99.7 per cent of historical price moves, using a 10-year look-back period. As noted, the look-back period ensures that

⁴⁹ The independent review is conducted by the Independent Model Validation Team that sits within the LCH Group Finance Department.

stressed market and liquidity conditions, such as the euro area crisis in 2011–12, are factored into the haircuts. LCH Ltd considers the potential procyclical effects of changing haircuts, if it is considering doing so, as part of the quarterly review process, and has the discretion to prevent haircuts from being lowered. Moreover, collateral haircuts must comply with the Group Procyclicality Policy.

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 across a range of categories. LCH Ltd's Collateral Concentration Risk Procedure document identifies limits and thresholds for internal monitoring under a number of categories. 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.

Legal risk. 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.⁵⁰

Operational risk. For a currency or security to be accepted, LCH Ltd must have the operational capability to convert the currency into the relevant currency (that is, the currency used to settle liabilities in the event of a default), or realise the value of the security in the event of a default. To reduce the impact of any operational issue at a CSD, LCH Ltd maintains accounts with multiple CSDs and international CSDs (ICSDs).

Foreign exchange risk. LCH Ltd calculates all initial margin requirements in its base currency, GBP, using stressed foreign exchange rates. An additional foreign exchange haircut is applied to all collateral posted.

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

50 LCH Ltd is in the process of updating legal opinions for all non-EU jurisdictions.

Collateral management system

LCH Ltd operates its own online proprietary CMS. Participants are able to input collateral proposal instructions and view balances and the status of instructions online. The CMS allows participants to send instructions to LCH Ltd to lodge, release, or substitute non-cash securities as collateral, and to deposit and withdraw cash. Triparty transactions can also be updated. LCH Ltd's CMS is integrated with LCH Ltd's back office.

The CMS is available for participants to view balances and input collateral instructions 24 hours per day. Instructions are processed by the collateral operations team between 7.00 am and 11.00 pm (UK time), and have been extended to between 8.00 am and 5.00 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 (see 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.

SwapClear applies variation, initial and additional margin to its credit exposures to its participants, using margin systems that are tailored to the particular attributes of the cleared products (CCP Standard 6.1). LCH Ltd has access to timely price data, and has procedures to address situations in which price data are not readily available or reliable (CCP Standard 6.2). SwapClear's initial margin model aims to cover price changes over the expected close-out period with 99.7 per cent confidence, and includes measures intended to reduce the need for procyclical changes (CCP Standard 6.3). SwapClear's initial margin model recognises offsets between SwapClear products, and between certain SwapClear products and short term interest rate (STIR) futures from the Listed Rates service, but not between SwapClear and LCH Ltd's other services (CCP Standard 6.5). SwapClear calls variation margin daily and makes scheduled and ad hoc intraday margin calls (CCP Standard 6.4). SwapClear assesses the performance of its initial margin model with daily backtesting and quarterly sensitivity analysis (CCP Standard 6.6). The Independent Model Validation team conducts annual validations of SwapClear's margin model (CCP Standard 6.7). LCH Ltd's margin systems are designed to take into account the operating hours of related payment and settlement systems (CCP Standard 6.8).

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.

As a result of LCH Ltd's introduction of the Spider service, which allows for portfolio margining between SwapClear products and STIR futures from its Listed Rates service, there are now two margining classes in the Joint Rates service – an OTC Rates margin class and a Listed Rates margin class (see Box A for more details). For clearing participants that have opted into the service, Spider moves futures positions from the Listed Rates margin class into a combined portfolio with SwapClear-

eligible products if doing so reduces the overall required margin for that clearing participant.⁵¹ The OTC Rates margin class includes all SwapClear products and those STIR futures that are transferred as part of the portfolio optimisation process of the Spider service. STIR futures that are not transferred to the OTC Rates margin class remain in the Listed Rates margin class. The discussion in this section of the Assessment relates only to the OTC Rates margin class.

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 requirements using its PAIRS model, which uses the 'historical expected shortfall' methodology (see 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 (see 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. This includes liquidity margin, credit multiplier margin, and basis risk additional margin, which are described below. LCH Ltd also collects 'margin floor add-on' to reduce the potential for procyclical increases in initial margin (see CCP Standard 6.3), as well as daily and monthly DFAM (see CCP Standard 4.7).

Counterparty risk multiplier margin is called on a daily basis where a participant's ICS rises above a predetermined threshold. The multiplier 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 lower-rated participants as determined by ICS.

Liquidity add-on (also called 'initial margin multiplier') aims to cover the risk of closing 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 DMP. Liquidity add-on is calculated on a 'per account' basis. The liquidity add-on requirement for a house or client account is calculated as the larger of:

- Currency liquidity margin, 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.

51 Australian clearing participants are not currently permitted to use the Spider service.

- Concentration margin, which is based on initial margin and is intended to apply to portfolios that are large relative to the market. Concentration margin is applied to accounts with initial margin requirements above a predetermined threshold and is set as a percentage of the initial margin requirement, with the percentage rising from 30 per cent to 100 per cent.

SwapClear calculates a liquidity margin requirement for each house and client account at the end of each day, and calls the required liquidity margin the next morning.

Basis risk add-on is used to cover 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 overnight index swap (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. Basis risk add-on is calculated at the end of each day, with the incremental change called the next morning.⁵²

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 zero-coupon yield curves, inflation curves, and exchange rates throughout each business day in order to calculate its daily initial margin calls (see CCP Standard 6.3) and daily variation margin calls (see CCP Standard 6.4). SwapClear also receives updated yield curve and inflation curve data at three scheduled times each day (9.00 am; 2.15 pm; and 5.00 pm UK time), and can obtain updated data on an ad hoc basis at other times. SwapClear uses these data to re-calculate variation margin and initial margin requirements at the house and client account level. If the combined payment implied by those two requirements exceeds participant-specific thresholds, SwapClear will make an intraday margin call (see CCP Standard 6.4).

LCH Ltd receives data on interest rate swaps from banks and brokers via Reuters and Bloomberg. Upon receipt, each quote is 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 receives data on inflation swaps from participants active in inflation swaps. LCH Ltd 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. Otherwise, LCH Ltd could use the previous day's observation.

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

⁵² 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 liquidity margin requirements calculated for individual house and client accounts. SwapClear may call 'group add-on' to mitigate this risk.

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 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. 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 a seven-day holding period.⁵³ 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 during the 10-year look-back period. LCH Ltd uses the 2 500 most recent overlapping five-day periods (that is, a look-back 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 Group introduced a Procyclicality Policy during the assessment period that sets standards for mitigating procyclicality in its margin models and policies. The policy was approved by the LCH Ltd Board and is required to be reviewed annually. The policy provides guidance and sets standards with respect to margin, ICS ratings and Unfunded Contributions to default funds. The policies on margin reflect guidance from the European Systemic Risk Board on limiting procyclicality.⁵⁴ The policy places obligations on the first-line risk function of each service, the Group and CCP Head of Counterparty and Credit Risk, CCP CROs and Group and CCP Heads of CaLM Risk to demonstrate to the satisfaction of ERCo each year that the standards set out in the policy are being enforced.

SwapClear's initial margin methodology contains features intended to reduce the potential for procyclical initial margin changes, including the use of a long look-back period and a slow moving measure of volatility. The measure of volatility is an exponentially weighted moving average with a high decay parameter (0.992), so it places a fairly high weight on past observations.

53 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 results in fewer backtesting breaches than calculating the initial margin requirement using seven-day returns.

54 See 'ESRB Report on the efficiency of margining requirements to limit pro-cyclicality and the need to define additional capacity in this area', available at https://www.esrb.europa.eu/pub/pdf/other/150729_report_pro-cyclicality.en.pdf?52420a9b7facbeffd8df67c70d6d9e3e

As an additional measure to mitigate procyclicality and ensure initial margin is above minimum levels required under EMIR, LCH Ltd has established an initial margin floor. The floor is calibrated to cover potential losses over a five-day holding period with 99.5 per cent confidence, based on a 10-year look-back period, with no scaling based on volatility. LCH Ltd calculates the margin floor corresponding to the portfolio of each house and client account on a daily basis. SwapClear calls 'margin floor add-on' on a daily basis from each house or client account with initial margin below the floor, to bring the account's initial margin plus add-on up to the floor.

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 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 (see CCP Standard 6.1).

SwapClear collects 'price alignment interest' (calculated daily and paid monthly) from participants that have received variation margin and pays it to participants that have paid variation margin. 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. Price alignment interest is needed to ensure the fair price of the swap is unaffected by the fact that variation margin is exchanged. Price alignment interest in each currency is calculated using the relevant overnight rate, such as the Federal Funds rate for USD.

SwapClear calls and receives daily variation margin and initial margin on the same schedule. After the service closes, SwapClear uses updated yield curve, inflation curve and exchange rate data to calculate 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 9.00 am UK time that it will pay the amounts (see also 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 receives updated yield curve and inflation curve data at three scheduled times intraday (9.00 am; 2.15 pm; and 5.00 pm UK time), and can obtain updated data at other times on an ad hoc basis. Following each intraday update to its data, SwapClear recalculates the variation margin and initial margin requirements of house and client accounts. SwapClear then calculates the payment, if any, required to fully collateralise these two requirements. 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 a proportion of the participant's initial margin, subject to an absolute cap and floor. LCH Ltd assigns higher credit tolerances to higher-rated participants as determined by ICS, with the highest credit tolerance set at 8 per cent of initial margin, capped at £50 million.

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-and-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 look-back period (see 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.

LCH Ltd introduced the Spider service during the assessment period, which allows for portfolio margining between SwapClear products and STIR futures from its Listed Rates service (See Box A for more information). For clearing participants that have opted into the service, Spider moves futures positions from Listed Rates into a combined portfolio with SwapClear eligible products if doing so reduces the overall required margin. LCH Ltd has provided evidence that there are strong and stable correlations between SwapClear products denominated in 14 of the currencies it offers and these STIR futures. 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. LCH Ltd consulted with the Bank (and other regulators) before it introduced the Spider service.

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 quarterly sensitivity analyses to assess the validity of the assumptions of its initial margin model, comparing the model's performance when individual assumptions are varied 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 99.95 per cent coverage in the 18 months to September 2016.

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.

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 monthly to the MRMC and LCH Ltd ERCo, and quarterly to the LCH Ltd Risk Committee.

Backtesting results would prompt investigation by SwapClear risk management if SwapClear’s 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, the Group Head of Market Risk, or the LCH Ltd CRO 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 quarterly sensitivity analysis of its initial margin model.⁵⁵ 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 MRMC on a quarterly basis, and can be escalated to the LCH Ltd ERCo. 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.

The sensitivity analysis of SwapClear’s initial margin model conducted in June 2016 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, portfolio-margin add-on, basis risk add-on, curve construction and inflation product performance in July 2015. The next review is expected to occur in late 2016. 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 (see CCP Standard 2.6). SwapClear sought and received validation of its margin model with respect to the implementation of the Spider service from external validators.

55 The frequency of sensitivity analysis changed during the assessment period; sensitivity analysis was previously conducted on a monthly basis. LCH Ltd has stated that this change was prompted by management demand for additional analysis as well as a desire to maintain consistency with LCH Group Risk policies.

SwapClear provides a high level description of its initial margin model on its website. SwapClear also provides participants with a tool 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.

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 (see CCP Standard 9). The PPS operates in the UK from 9.00 am to 4.00 pm UK time, and then in the US from 4.00 pm to 9.00 pm UK time. These times reflect the operating 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 4.00 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 (9.00 am; 2.15 pm; and 5.00 pm UK time) in the event exposures exceed participant-specific tolerances.

In accordance with the regulatory priority for the 2015/16 assessment period, LCH Ltd recently implemented an Australian PPS similar to the model operated 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 (self-PPS) (see CCP Standard 9.1). Other clearing participants would still be able to make AUD payments via the existing UK PPS arrangements, which would operate in parallel to the Australian system. Under the Australian PPS, payment instructions are made during the Sydney business day. LCH Ltd is also awaiting regulatory approval regarding a proposal to accept AUD cash for initial margin purposes via the Australian PPS (see CCP Standard 5.2). Under the proposed arrangements, clearing participants that have established PPS arrangements under the Australian PPS would be able to input AUD cash deposit or withdrawal instructions during the Sydney business day. LCH Ltd already accepts AUD-denominated government securities as initial margin. In the assessment period LCH Ltd made changes to allow clearing participants to lodge AUD securities in Austraclear; before that, LCH Ltd accepted AUD-denominated government securities only in Euroclear and Clearstream.

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.

LCH Ltd maintains a robust framework for managing its liquidity risks (CCP Standard 7.1). LCH Ltd manages liquidity risk across the CCP as a whole (rather than at a service level). LCH Ltd has operational and analytical systems in place to measure and monitor its settlement and funding flows (CCP Standard 7.2). LCH Ltd seeks to maintain sufficient liquid resources by setting daily operational liquidity targets (which reflect business-as-usual requirements) and a default liquidity requirement (which reflects 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). Together, these form LCH Ltd's total liquidity requirement; LCH Ltd's internal policies require that available liquidity resources relative to its total liquidity requirement be above 100 per cent and a buffer amount (CCP Standard 7.3). LCH Ltd uses liquidity stress tests to determine the size of its default liquidity requirements (CCP Standard 7.8).

LCH Ltd's primary sources of liquidity are cash posted by its clearing participants and LCH Ltd's own capital. Cash is invested in accordance with the LCH Group Investment Risk Policy, and LCH Ltd has arrangements in place to convert its investments and collateral held in custody into cash in a timely manner (CCP Standard 7.4 and 7.6). LCH Ltd also has arrangements in place to manage its AUD liquidity risk. As part of these arrangements, 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 (CCP Standard 7.4). LCH Ltd uses its ESA to settle its AUD obligations (CCP Standard 7.7). LCH Ltd has explicit rules and procedures that set out the actions it would take to address a liquidity shortfall or to replenish its liquidity resources (CCP Standard 7.9).

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 a 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.⁵⁶ 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 – that is, liquidity from one clearing service can be used to meet liquidity requirements in other clearing services.

LCH Ltd uses its liquidity resources to meet:

- *Operational liquidity needs* – that is, business-as-usual liquidity draws, 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* – that is, liquidity requirements in the event of the default of a clearing participant. These include: fulfilment of settlement obligations of the defaulting participant (these primarily arise from the RepoClear and EquityClear services); posting variation margin to non-defaulting participants; potential 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.

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

⁵⁶ Until October 2016 there was a single Group Liquidity Plan that had specific sections for each of the LCH Group CCPs. Since then, each CCP has had its own Liquidity Plan.

Other potential draws on liquidity include disruptions in liquidity 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.

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 (see CCP Standard 7.2), as well as daily and intraday liquidity stress testing (see 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 (see CCP Standard 7.3), with reference to stress testing.

LCH Ltd also provides participants with information to assist them to manage their liquidity needs. For example, a tool is provided to participants to assist them in calculating their initial margin, initial margin multiplier, basis risk and margin floor add-on (see CCP Standards 6.1 and 6.3). Participants are typically warned by LCH Ltd if they are close to being called for DFAM (see 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 has visibility over the liquidity available, which incorporates overnight margin 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, there are only inflows of liquidity. CaLM is then able to make informed decisions about investing excess cash.

Collateral Operations monitors LCH Ltd's intraday liquidity usage by monitoring balances at commercial concentration banks using SWIFT messages every 15 minutes.

LCH Ltd maintains a minimum liquidity coverage ratio (LCR), which is the ratio of available liquid assets to stressed liquidity requirements (see CCP Standard 7.3). The LCR is calculated and monitored on both an end-of-day and intraday basis.

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. LCH Ltd’s CaLRM function is responsible for recalculating and monitoring the operational targets daily.
- *Default liquidity requirement:* LCH Ltd defines the default 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 (see 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 most active currencies within LCH Ltd, assuming complete closure of the foreign exchange markets. Liquidity stress testing is conducted by LCH Ltd’s CaLM function.

Together, these form LCH Ltd’s total liquidity requirement. 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.

As noted in CCP Standard 7.2, monitoring the LCR, as well as other day-to-day management of liquidity risk, is the responsibility of CaLRM. Any breaches of the LCR must be notified to the ALCo and LCH Ltd ERCo, and the ALCo 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 Group CRO, the CRO of LCH Ltd and the head of CaLRM for LCH Ltd, who would determine the action required.

Liquidity needs in currencies that are less actively traded 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 and reported to the ALCo, as required.

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. Cash is invested predominantly in very short dated reverse repo transactions with daily maturities, as well as in highly liquid government securities, in accordance with the LCH Group Investment Policy (see 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 (see CCP Standard 7.6). LCH Ltd can also seek additional liquidity by selling collateral it holds outright.

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

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.

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 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 monitoring less actively traded currencies, as discussed 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 GMRAs with a number of market participants to facilitate this. 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. As discussed in CCP Standard 7.3, 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 largest clearing participants and their affiliates giving rise to the largest payment obligations in extreme but plausible conditions.

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 has informed the Bank that it would 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).

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 applied 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). Nonetheless, other tools that LCH Ltd would use are not applied on a day-to-day basis (for example, repo, borrowing, FX transactions).⁵⁷ As noted in CCP Standard 7.4, LCH Ltd has GMRAs 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 'war games'. One aspect of these tests is that LCH Ltd conducts a capacity testing exercise with entities with which it has GMRAs in place to test the amount of liquidity that LCH Ltd could raise under repo. LCH Ltd also simulates the liquidation of a defaulting clearing participant's collateral by asking counterparties to show hypothetical bid prices. 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.

⁵⁷ 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 repo on a business-as-usual basis.

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 (that is, settlement of AUD variation margin between LCH Ltd and its clearing participants' settlement banks (that is, 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, which allows it to pay out AUD variation margin prior to receiving all inward margin payments. 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 has accounts with the BoE (for concentration of GBP), the Bank of Canada (for concentration of CAD) and the Swiss National Bank (for concentration of CHF). In the current assessment period LCH Ltd moved its concentration account for EUR from the BoE to the DeNederlandsche Bank. LCH Ltd has informed the Bank that it favours the use of central bank facilities if they are practical and available and is in discussions to open accounts with other central banks.

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. 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 the defaulter was also a 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 EquityClear and RepoClear services. 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 total initial margin requirements of the two largest clearing participants in each service are used to model its cover two variation margin outflows. It is assumed there is no offsetting of variation margin payments across services (this methodology is discussed further below).

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 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 ALCo and 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. The results of this quarterly review are presented to the ALCo and material findings are reported to the LCH Ltd ERCo. Any changes to the liquidity stress testing model are proposed by CaLRM and must be approved by the ALCo and 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 uses the total initial margin requirements of the two largest clearing participants and their affiliates to model its cover two variation margin outflows. To ensure that variation margin requirements in a range of extreme but plausible scenarios are captured the initial margin requirements used in the calculation are summed across LCH Ltd’s services with no offset, ignoring the settlement netting in fully fungible variation margin flows that would be likely to occur in practice. In addition, the total margin requirement used here includes add-ons for sovereign, concentration and wrong-way risks, thereby in practice exceeding the 99.7 per cent coverage that is captured by the initial margin requirement alone.

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 tools that would be used to address what LCH Ltd calls business-as-usual shortfalls (that is, how LCH Ltd would fund liquidity to meet operational or default liquidity needs). LCH Ltd typically holds a substantial buffer of liquid resources in excess of those required to meet the projected operational and default liquidity requirement. Therefore LCH Ltd would be able to continue to use these business-as-usual tools in the event of a liquidity stress that exceeded business-as-usual requirements (for example, an event beyond a cover two default). The Recovery Plan addresses the additional tools that could be applied in the event that business-as-usual tools were insufficient to meet the liquidity shortfall.

LCH Ltd has a range of tools routinely available to manage its day-to-day liquidity needs, all of which would also be available to address a liquidity shortfall. These include, but are not limited to: 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 FX 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 also 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 (VMGH); requesting voluntary payments from non-defaulting participants; and by closing all outstanding SwapClear contracts and close the service (see 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' (a liquidity crisis can reflect market-wide conditions, or be linked to a particular market). LCH Ltd incorporates 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.

LCH Ltd's settlement with respect to the SwapClear service's cash-settled derivatives involves cash payments, and the transfer of non-cash securities for margin requirements. LCH Ltd's Rulebook specifies the conditions under which the discharge of a payment, transfer instruction or other obligations by the CCP or its participants becomes final and irrevocable (CCP Standard 8.1). In addition, LCH Ltd's Rulebook defines the point after which accepted but unsettled payments are irrevocable (CCP Standard 8.3). Final settlement of obligations occurs on the value date, with margin called intraday where appropriate (CCP Standard 8.2).

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 (see 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* (the Settlement Finality Directive). The Settlement Finality Directive 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 the SwapClear service's cash-settled derivatives involves cash payments and the transfer of non-cash securities for margin requirements.⁵⁸ 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 (that is, the participant's PPS bank; see CCP Standard 9 for more details on the PPS), generally via SWIFT.⁵⁹ 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 funds have been transferred from LCH Ltd's concentration bank to the participant's PPS bank.

By means of the CMS, clearing participants instruct the transfer of securities pursuant to the clearing participant charge via 'Securities Transfer Orders', sent to a Securities System Operator (that is, a CSD

⁵⁸ All derivative contracts cleared through SwapClear are cash-settled. Variation margin and default fund contributions are also required in cash. SwapClear offers optionality with respect to the characterisation of variation margin payments under SwapClear Contracts. SwapClear Clearing Members may elect to treat variation margin as collateral or for settlement. Where a SwapClear Contract is collateralised to market, the aggregate net present value over the life of the contract, whereas for settled to market contracts, the exposure is extinguished and the net present value reset daily.

⁵⁹ Fax or email confirmation would be used in a contingency scenario where SWIFT was unavailable.

or securities settlement facility (SSF)). (For the SwapClear service, transfer of securities is relevant for the purpose of collateralisation. As discussed in CCP Standard 1.2, 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.) 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.

For each revaluation of participants' obligations where a net call is made on a participant, the participant's PPS bank is required to make an irrevocable commitment to fund the obligation due to LCH Ltd. This commitment is due by 9.00 am UK time if the call was made overnight, or within one hour if the call was made intraday.⁶⁰ Calls made in GBP, EUR, USD or CAD 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 is not made 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 9.00 am UK time; and instructions for other currencies are sent at 8.00 am UK time. Where the 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.

⁶⁰ Confirmation of calls made via the Australian PPS (see CCP Standard 9 for further details) are subject to the same one hour limit on days on which the SwapClear service is open, but are due at 10:00 am (Sydney time) on the next open day where the call instruction is delivered on a day when LCH Ltd is closed.

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.

LCH Ltd uses its PPS to settle cash payment obligations with its clearing participants. LCH Ltd uses a combination of commercial bank money and central bank money to conduct its money settlements (CCP Standard 9.1).

LCH Ltd sets risk-based criteria for banks participating in its PPS in order to manage and limit credit and liquidity risks arising from the use of commercial settlement banks (CCP Standards 9.2, 9.3). LCH Ltd does not conduct money settlement on its own books (CCP Standard 9.4). LCH Ltd's PPS Agreements clearly state when payments are final and provide for intraday money settlements (CCP Standard 9.5).

In accordance with the regulatory priority for the 2015/16 assessment period, LCH Ltd recently completed the implementation of Australian PPS infrastructure similar to the model operated 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 (that is, to self-PPS).

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.

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. Variation margin and settlement net to zero across all participants. By contrast, initial margin, default fund contributions and participation fees result in a net increase or net decrease in funds held by the CCP.

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*. The PPS provides for settlement of margins and other payments between LCH Ltd and each clearing participant. 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.⁶¹

LCH Ltd operates a UK, a US, and, as of September 2016, an Australian PPS (see CCP Standard 9.5); 11 banks currently participate in the UK PPS, while seven banks currently participate in the US PPS. Participation in the Australian PPS is currently limited to one bank, with three more expected to join in the near future. In its statement of risk appetite, as set out in the Group Risk Governance Framework, the LCH Group Board specifies that it expects the Group CCPs to use central banks for payments and cash settlements where possible. LCH Ltd uses the BoE as its concentration bank for GBP; the Bank of Canada for CAD; the Swiss National Bank for CHF; and the Bank for AUD. In August 2016 LCH Ltd transferred its EUR concentration banking to the DeNederlandsche Bank (from the BoE). 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.⁶²

The Australian PPS arrangements implemented in the current assessment period are similar to the model operated in the UK and US (see CCP Standard 6.8). The Bank expects any clearing participant that has joined the SwapClear service as a direct clearing participant since LCH Ltd had its CS licence varied to allow it to offer that service in Australia, and that also has an active ESA, to become a PPS bank and to use those 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.

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 to be met 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 (see CCP Standard 8.1).

61 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.

62 Citibank is the concentration bank for USD when the PPS is operating in the United Kingdom. BNY Mellon is the concentration bank for USD when the PPS is operating in the United States.

LCH Ltd has credit exposure to its concentration banks, which begins once funds are received by the concentration bank 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 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, as outlined in the LCH Group Settlement, Payment and Custody Risk Policy. These criteria include:

- a requirement that the bank maintain an ICS below a predefined threshold⁶³
- operational requirements around accounting and SWIFT messaging
- a requirement to adhere to LCH Ltd procedures.

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 rises above 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. 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. In the event that a bank no longer wishes to participate in the PPS, a minimum of 90 days' notice must be given and arrangements made with LCH Ltd for an orderly exit. 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 arrangements are recorded by LCH Ltd's Collateral Operations team, and would be temporary until replacement PPS arrangements were established.

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

- a more stringent ICS threshold
- 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 related to both investment and concentration activity), while overnight unsecured exposures are subject to fixed limits
- more stringent monitoring and escalation of intraday limit breaches.

LCH Ltd also maintains contingency options for its commercial concentration banks, in accordance with the LCH Group Payment, Settlement and Custody Risk Policy.

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 initial and ongoing due diligence of PPS and concentration banks, as well as quarterly monitoring of operational performance. The LCH Ltd ERCo is notified of the results of this ongoing monitoring. Operational and legal due diligence is performed both prior to, and at least every two years following, acceptance of a new PPS bank, and involves Legal department review. The due

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

diligence process aims to provide certainty 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. LCH Ltd also monitors its intraday exposures to commercial concentration banks via reports generated every 15 minutes.

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 and remain liable for meeting obligations due to LCH Ltd until funds have been transferred to LCH Ltd's concentration bank. They must maintain contingency arrangements for meeting obligations to LCH Ltd in the event that a PPS bank failed or experienced an operational disruption. PPS contingency arrangements are tested on an annual basis. Participants' credit exposures to individual PPS banks are limited 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 (that is, a 'PPS Agreement') with the commercial banks that participate in the PPS.⁶⁴ 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 9.00 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).⁶⁵ 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. PPS banks must make concentration payments (that is, transfers to the relevant concentration bank) within two hours of receipt of instructions from LCH Ltd (see CCP Standard 8 for further detail, including on finality of settlements). The BoE, SNB and RBA concentration bank accounts are each governed solely by a specific agreement between LCH Ltd and the applicable central bank. Also, 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 terms and conditions that all PPS transfers onwards to the concentration bank should be made within two hours of the transfer request being made by LCH Ltd (see 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.

64 There is a specific agreement for the UK PPS, US PPS and the Australian PPS.

65 The AUD PPS Agreement states that for VM calls LCH Ltd needs irrevocable commitment within one hour of receipt of PPS call instruction if the instruction is received on a day on which LCH Ltd is open for business, or by 10 am the next day on which LCH is open for business if the PPS call instruction is received on a day on which LCH Ltd is not open for 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.

LCH Ltd has powers to manage a clearing participant default under its Rulebook, and has internal documentation setting out the Joint Rates service DMP (CCP Standard 12.1). The LCH Ltd default rules give LCH Ltd the right to undertake a number of actions in respect of a defaulter, including: hedging the market risk on the defaulter's contracts; transferring contracts to other participants; and terminating contracts (CCP Standards 12.1, 12.2). LCH Ltd allocates losses to clearing participants in a way that is intended to provide participants with incentives to bid competitively in the auction of the defaulter's positions (CCP Standard 12.1). LCH Ltd has published its Rulebook and a high-level overview of the Joint Rates service DMP on its website (CCP Standard 12.3). Default management procedures are tested and reviewed on at least an annual basis. Clearing participants are required to participate in these tests (CCP Standard 12.4). LCH Ltd's default management procedures are designed to take into account potential impacts on relevant jurisdictions and markets (CCP Standard 12.5).

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.

LCH Ltd made various changes during the assessment period to the way a default would be managed in the SwapClear service. The changes reflect the introduction of its portfolio margining service (Spider), which allows for margin offsets between its SwapClear and Listed Rates services. In particular, it has created a single DMG – the Joint Rates service DMG – that would manage a default of any clearing participant of the SwapClear or Listed Rates services. LCH Ltd also changed the way it would allocate losses within its default waterfall. Losses would now be allocated depending on whether the defaulting clearing participant was: active in the OTC Rates margin class only; active in the Listed Rates margin class only; or active in both margin classes (see CCP Standard 4).

Rules and procedures

The LCH Ltd Rulebook sets out the contractual rights and obligations of LCH Ltd and its clearing participants (see 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 'Rates Service Default Management Process Annex', 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 DMP 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 Joint Rates service DMP is described in multiple tiers of 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 and the LCH Ltd Risk Committee, and is also approved by the LCH Ltd Board annually.

- The LCH Ltd Default Management Guidelines (owned by the LCH Ltd Risk Management department) implement the DMP according to the Group Default Management Policy, and outline the key roles and responsibilities in managing the default of a SwapClear or Listed Rates clearing participant. The guidelines are reviewed by the LCH Ltd ERCo when there are material changes.
- The Rates Service Default Management Process describes the details of the Joint Rates service DMP and follows the principles outlined in the Group Default Management Policy and the LCH Ltd Default Management Guidelines. It is subject to frequent 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 Joint Rates service DMG would be responsible for the day-to-day management of the default process. The Joint 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.⁶⁶ 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 has a DCMT; the LCH Group DCMT would meet to consider coordination across CCPs if required.

The Joint Rates service DMP 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' (see CCP Standard 12.2). LCH Ltd would undertake the following actions after a default, mostly in parallel:

- 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 Chairman of the Joint Rates service DMG would organise a meeting within one hour of the declaration of default and the Joint Rates service DMG would be given access to risk-related information

⁶⁶ 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 Joint 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.

- 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 client(s) 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.⁶⁷ 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 participant(s) 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 would combine the portfolios of any clients that did not port, and the combined portfolio would be hedged and auctioned separately from the defaulter's house portfolio.

3. Hedging and portfolio splitting

The Joint 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 portfolio 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 IRD 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 Joint 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 IRD sub-portfolios, one or more inflation derivatives sub-portfolios and one or more sub-portfolios containing futures.

The Joint 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.⁶⁸

⁶⁷ 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).

⁶⁸ 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.

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 portfolio. 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-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.⁶⁹ 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 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 Joint 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 Joint Rates service DMG determined the winner.⁷⁰

Use and sequencing of financial resources

In the event of a clearing participant default, LCH Ltd would allocate any losses it incurred during the DMP according to the default waterfall as specified in the Rulebook. In all cases, pre-auction losses would first be applied to the defaulter's margin and default fund contributions and CCP capital allocated to the default fund.⁷¹ After these were exhausted, pre-auction losses would then be applied to non-defaulting clearing participants' prefunded default fund contributions, the order of which would be determined by the margin class of the defaulter. That is, whether it was: active in the OTC Rates margin class only; active in the Listed Rates margin class only; or active in both margin classes.

69 Under section 2C 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.

70 Any coupons, price alignment interest and fees 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.

71 Pre-auction loss includes the net cumulative loss that SwapClear incurred due to variation margin, fees, coupons and price alignment interest, and hedging activities prior to the first auction.

Losses would then be allocated to non-defaulting clearing participants' unfunded default fund contributions if they could not be absorbed by participants' prefunded default fund contributions.

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 is 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; for the Listed Rates margin class the order would also be the same 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.

Auction-loss allocations would also be made according to currency and product. Each surviving clearing participant's default fund contribution would be allocated to currency- and product-specific pools in proportion to the surviving participant's market risk in each currency and product (that is, into so-called Auction Incentive Pools). For example, a participant with a portfolio mostly consisting of IRD denominated in AUD would have most of its remaining default fund contribution attributed to an AUD IRD pool. Auction losses would be allocated 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 or that submitted uncompetitive bids before being allocated to the currency-specific pools of winning bidders and pools attributed to other currencies.

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 DMP. 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 DMP, then LCH Ltd may call Unfunded Contributions (Assessments) from clearing participants. If, at any time in the DMP, 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).

As discussed under CCP Standard 4.8, SwapClear has rules and procedures to replenish the default fund following completion of the DMP. If the value of the SwapClear default fund was lower than the SwapClear Fund Floor (that is, the minimum size of the default fund – currently set at £1 billion) when the DMP was completed, SwapClear would call non-defaulting clearing participants for contributions in order to bring the SwapClear default fund up to no less than the SwapClear Fund Floor. The default fund size would be recalculated using the usual method based on stress tests on the first day that is both 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 (see 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. 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, although to date it has not exercised these powers.

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 (see CCP Standard 1.5).

The LCH Ltd Rulebook provides LCH Ltd with discretion regarding aspects of the DMP. 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 Joint 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 (see CCP Standard 12.4).

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

The Joint Rates service DMP 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 (see CCP Standard 12.1). LCH Ltd notifies its participants of any amendments to the Rulebook. A high-level summary of the DMP 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 DMP. The LCH Ltd 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.⁷² 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 DMP 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

⁷² 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.

Joint Rates service DMP. A prospective participant must pass a driving test as part of its pre-membership requirements to demonstrate its ability to participate in the DMP (see 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 replicate the auction component of the DMP. Participants may be required to take part in further driving tests before clearing any additional currencies or new products. Each clearing participant is also required to participate in any Joint Rates service fire drill as required, or demonstrate that it has an affiliated clearing participant that can participate.

A clearing participant can meet both of these requirements 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 DMP.

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 Joint Rates service DMP 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 DMP that might impact market stability would be the hedging of the defaulting participant's portfolio. The design of the Joint Rates service DMP should help to ensure that this potential stability impact is mitigated, to the extent possible, and that no jurisdiction is unduly favoured or disadvantaged. This would be achieved through the methodology applied in neutralising the defaulting participant's portfolio, the composition of the Joint Rates service DMG, and the design of the auction process, as well as through the design and use of fire drills:

- The Joint Rates service DMG would attempt to eliminate as much of the risk in the defaulter's portfolio as quickly as possible. This should serve to minimise losses on the portfolio; the timing of hedging activity may also influence any market impact from the hedging trades. 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 Joint 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 February 2016 fire drill. Accordingly, the Joint 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 Joint Rates service DMP 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.

LCH Ltd has rules and procedures that enable a clearing participant's customers (or 'clients') positions and collateral to be segregated from those of its clearing participant and to be ported if its original clearing participant defaulted (CCP Standard 13.1). The SwapClear service offers a number of account options that provide different combinations of position and collateral segregation (CCP Standard 13.2).

LCH Ltd has a number of arrangements in place to increase the likelihood that a defaulting clearing participant's client's positions and collateral could be ported to another clearing participant. For example: in almost all cases, SwapClear knows the identities of its clearing participants' direct clients (that is, clients of clearing participants); it encourages its clearing participants' clients to nominate a backup clearing participant to which its positions would be offered if its clearing participant defaulted (clients can nominate up to three backup clearing participants); and would provide a defaulting clearing participant's clients time to find a backup clearing participant if they did not have one (CCP Standard 13.3). LCH Ltd discloses its rules, policies and procedures about the segregation of a clearing participant's clients' positions and related collateral (CCP Standard 13.4).

LCH Ltd has indicated that it is currently investigating further steps that could be taken to streamline the porting of client positions. This includes seeking pre-consent (from clients) to share client information and potentially to port outstanding positions to a backup clearing participant in the event of a participant default. LCH Ltd has also provided refresher 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. LCH Ltd is encouraged to continue its dialogue with the Bank on its client clearing arrangements, including its progress with arrangements to support the porting of client positions in the event of a participant default.

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.

LCH Ltd has rules and procedures that are intended to protect a clearing participant's clients' positions and collateral from the default or insolvency of that clearing participant. LCH Ltd has informed the Bank that a client's positions and collateral are segregated from those of its clearing participant at all times.⁷³ The extent to which SwapClear accounts protect 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 (see CCP Standard 13.2 for a detailed explanation of the alternative account types offered). As noted in 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 EMIR, CCPs are required to offer clients the option of both individual segregation and omnibus segregation. To meet EMIR requirements, individually segregated accounts must protect each client's assets using the so-called 'asset segregation' model. Under this 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. This contrasts with the so-called '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.

LCH Ltd offers three broad types of client accounts: an Individual Segregated Account (ISA); an Omnibus Segregated Account (OSA) using gross margin; and an OSA using net margin.⁷⁴ The accounts differ in the extent to which each individual client's positions and collateral are segregated from those of other clients (that is, 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.

The account structure offered by the SwapClear service to direct clients is described below. SwapClear clearing participants are free to choose which of these accounts they offer their clients, although they are obliged under EMIR to offer their clients the option of individual and omnibus segregation.

- *Individual segregation.* The ISA is an asset-segregated individual position account. It contains positions of a single legal entity and positions are not exposed to losses from positions outside that particular account (and accordingly 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 and which would thereby be segregated for that client's benefit upon its clearing participant's default. In addition, a client's excess margin is

⁷³ Segregation applies only to LCH Ltd's books and records. Operationally, only FCM customer funds are segregated.

⁷⁴ SwapClear also offers the CFTC-recognised FCM model of clearing participation, under which clearing services are offered to clients using the legally separated operationally comingled (LSOC) model. This model seeks to legally segregate clients from other clients, and to ensure that in the event of a default a client's positions and assets cannot be used to meet the obligations of any other party.

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).

- *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.⁷⁵ 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 the position set in which it resides. Lodged collateral is held on a comingled basis across all position sets and clients. In the event of a clearing participant default, the extent to which clients within the Gross OSA are exposed to losses on lodged collateral would depend on the size of the loss. If aggregate liquidation proceeds were sufficient to cover aggregate margin requirements, all clients would share the loss (such that the clearing participant's administrator would receive a smaller excess of liquidation proceeds over margin requirements). However, if aggregate liquidation proceeds did not cover aggregate margin requirements, losses would be allocated based on the default waterfall (see CCP Standard 12.1). 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 OSA accounts, including dedicated accounts for affiliated entities; participation in a Net OSA account 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 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).

SwapClear also offers account segregation for indirect clients (that is, the clients of clearing participants' clients) in the form of an indirect omnibus segregation account. LCH Ltd has informed the Bank that positions of all indirect clients of each direct client would be held in an omnibus sub-

⁷⁵ 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.

account specific to that direct client. Initial margin is called on a net basis across all the indirect clients' positions in that sub-account.

In order to register trades into the SCCS, the clearing participant or direct client must provide certain information to SwapClear about the direct client, such as the name of the legal entity, ultimate parent name, country of incorporation, registered address and key contact details. 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 as part of its SCCS for its client accounts. 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 in place 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 lodged as collateral, by the clearing participant as principal. 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 this does 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).

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. 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 default of a SwapClear clearing participant, 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. Clients are encouraged to nominate at least one backup clearing participant to which its positions would be offered if its clearing participant defaulted (clients can nominate up to three backup clearing participants).⁷⁶ Although it is not common practice for backup clearing participants to guarantee to accept transferred trades, the likelihood of portability is increased because nominated backup clearing participants would have an established relationship with the client and operational

⁷⁶ Under the FCM model, LCH Ltd would seek to port the participant's clients to another FCM clearing participant, under advice and approval from the CFTC.

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 default, the client would be given the opportunity to find an alternative clearing participant (see 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). This rule is in place to comply with Articles 48(5) and 48(6) of EMIR, which requires CCPs to have a defined period after default before client positions and collateral can be closed out.⁷⁷

If a clearing participant default occurred, SwapClear would confirm with each individual client of the defaulted clearing participant whether it 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 valuation 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 is currently investigating further steps that could be taken to streamline the porting of client positions. This includes seeking pre-consent from clients, to facilitate rapid sharing of client information (including positions to be ported), and to permit porting itself (subject to approval by an alternate clearing participant) in the event of a participant default.

Factors such as 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 or an individual position set within a Gross OSA. LCH Ltd publicly discloses aspects of its portability arrangements on its website.

Portability procedures are tested in SwapClear fire drills, which are exercises run by SwapClear every six months for SwapClear and its clearing participants to practise aspects of the DMPs (see CCP Standard 12.4). Following an initial test of its ability to port client positions in August 2015, LCH Ltd conducted an additional test for all services (servicing clients) in October 2015. The test involved a theoretical assessment and a practical test of porting procedures. Although the results reinforced the finding that the porting process could potentially be challenging for a clearing participant that has a large number of clients, LCH Ltd remains comfortable that it could handle such porting for its current clearing membership. In the event that there were early warning signs regarding a material deterioration of the credit quality of a clearing participant, LCH Ltd may also seek to proactively manage client porting prior to any default.

LCH Ltd is encouraged to continue its dialogue with the Bank on its broader client clearing arrangements, including its ongoing testing and review of arrangements to support the porting of client positions in the event of a participant default and to ensure the timely updating and general integrity of client information.

⁷⁷ LCH Ltd takes into account the additional time required to port a client's positions and collateral in other ways, for example, by extending the assumed hold-out period by an additional two days for client accounts when calculating initial margin requirements (see CCP Standard 6.3).

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 5.00 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 5.00 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.

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.

LCH Ltd has management and control systems in place to identify, monitor and manage general business risks (CCP Standard 14.1). LCH Ltd has allocated liquid net assets funded by equity to enable it to continue operations and services if it incurred general business losses and to implement its Recovery Plan and Wind-down Plan (CCP Standards 14.2, 14.3). Specifically, LCH Ltd has capital set aside to cover risks including operational and legal risks, credit risks, market risks, and business risks, as well as the implementation of its Recovery and Wind-down Plans. LCH Ltd's capital is invested in accordance with the LCH Group's Investment Risk Policy (CCP Standard 14.4). LCH Ltd has guidelines for capital management in place and options for raising additional capital (CCP Standard 14.5).

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 (see CCP Standard 3.1). As discussed in 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 also 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 (see CCP Standard 15)
- investment risk arising from the investment of member collateral to manage daily liquidity needs (see CCP Standard 15)
- operational risk arising from inadequate or failed internal control processes, people and systems, or from external events (see 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 information technology (IT) processes (see CCP Standard 16)
- information security risk arising from the loss or misuse of sensitive information (see 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.

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

Monitoring of business risk is the responsibility of the head of each service within LCH Ltd (that is, the Global Head of Rates and FX Derivatives is responsible for monitoring business risks within

SwapClear). LCH Ltd identifies key drivers of business risk and monitors these business risk drivers on a quarterly basis. The results are then reported to the LCH Ltd Board following each quarterly review. This monitoring of business risk also drives LCH Ltd's calculation of its business risk capital requirements (see 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 reforecast 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 New Product Approval Committee (NPACo) is responsible for the assessment, challenge, monitoring, oversight and approval of proposed new products and services. The NPACo assesses new proposals in accordance with the LCH Group New Product Approval Process. This includes a commercial and/or business feasibility review as well as an assessment of the expected cost and benefit, regulatory requirements and associated risks of a proposed new product or service. The LCH Ltd CEO retains the right to veto the launch of any new products or product enhancements (see 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 2015, LCH Ltd had available capital resources of €500.3 million after the deduction of LCH Ltd's capital contributions to its default waterfalls.^{78,79} Of that, LCH Ltd has allocated total capital of €306.9 million to cover: credit and market risks not covered by dedicated financial resources (for LCH Ltd this includes, among other things, treasury risks (see CCP Standard 15.4)); operational risk (including legal risk); business risks; and 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 (see CCP Standard 4). LCH Ltd's capital position is calculated by the Finance department on a monthly basis and 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. For example, 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. When making its own assessment of capital necessary to cover business risks, LCH Ltd identifies and quantifies reasonably foreseeable business risk drivers and considers the simultaneous occurrence of two or more of these scenarios. The effectiveness of LCH Ltd's risk mitigation strategies are also considered when

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

79 LCH Ltd provides the Bank with monthly updates of these figures.

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

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

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 (see CCP Standard 3.5). The Wind-down Plan demonstrates how LCH Ltd could achieve an orderly wind-down within six months. As at 31 December 2015 LCH Ltd had allocated capital of €120.9 million, equal to six months' operating expenses, to implement this plan. The capital that LCH Ltd allocates to meet its regulatory capital requirements cannot be used to cover other losses (see 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 (see 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 (see CCP Standard 15.4). The remainder would be allocated to clearing participants in proportion to each clearing participant's share of margin.
- 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. As discussed under CCP Standard 14.2, 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 (see 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 Capital Strategy sets guidelines for capital management and outlines options for raising additional capital, if needed. In line with this strategy, LCH Ltd targets a minimum level of profitability to generate capital, through retained earnings. This capital is used to support business development and project spending, and pay dividends to shareholders, and would be used to absorb any unexpected losses.

The Capital Strategy also details options for generating capital to support transformative initiatives or meet capital pressures arising from infrequent events. As a wholly owned subsidiary of LCH Group, the LCH Ltd Capital Strategy is developed in consultation with the Group. Historically, equity capital has been raised at the Group level and provided to LCH Ltd. It is expected that any future equity capital-raising would similarly occur at the Group level. Any increase in the share capital of LCH Group would require shareholder approval. LCH Ltd's Capital Strategy is reviewed and approved by the LCH Ltd Board each year.

In developing its Capital Strategy, LCH Group takes into account the insurance that it holds against a number of general business risks (see CCP Standard 14.3), as well as arrangements for the allocation of non-default losses.

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.

LCH Ltd invests its own and its participants' assets with supervised and regulated entities that meet a number of operational and legal requirements (CCP Standard 15.1). LCH Ltd aims to ensure that it has prompt access to its assets and the assets provided by participants by conducting operational and legal due diligence on all custodians and CSDs (CCP Standard 15.2). To diversify its exposure, LCH Ltd uses a range of custodians and CSDs and monitors its relationships with each on a daily basis (CCP Standard 15.3). LCH Ltd maintains an investment strategy that is consistent with the LCH Group Investment Risk Policy; the strategy applies to all services, including SwapClear (CCP Standard 15.4).

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 below a predetermined threshold and satisfy a number of operational, legal and regulatory requirements (see 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 (see CCP Standard 4.2). Should the ICS of a custodian or CSD rise above 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 BCM, service availability and data loss; its legal due diligence covers matters including client asset protection, sub-custodian appointment, internal controls and default arrangements. This due diligence is refreshed at least every two years.⁸⁰

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, the Operations and Legal departments must be satisfied that assets belonging to LCH Ltd are fully segregated, identifiable and accessible promptly in the event that the custodian or CSD defaulted (see 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 (see CCP Standard 4.2).

LCH Ltd monitors the level of service provided by custodians and CSDs, and reports are provided to the LCH Ltd ERCo quarterly. LCH Ltd senior management may engage with custodians if any shortcomings are identified.

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 quarterly. To diversify its exposure, LCH Ltd uses a range of CSDs and custodians. This includes two major international CSDs, the UK domestic CSD and two US custodians. In addition, in the assessment period LCH Ltd extended its list of eligible collateral locations to include Austraclear, the Australian CSD, which can now be used to lodge AUD-denominated collateral. As discussed in CCP Standards 15.1 and 15.2, LCH Ltd also regularly reviews the credit standing and performance of its custodians.

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

80 The most recent due diligence was completed in April 2016.

single counterparty should not exceed a predefined proportion of LCH Ltd's capital resources.⁸¹ In addition, 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 ALCo and the LCH Ltd ERCo if a legal opinion confirming the bankruptcy remoteness of the intermediary and the segregation of assets in the event of insolvency is provided.

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 counterparties, 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 risk as part of the liquidity risk management framework. Investment counterparties must maintain an ICS below a specified threshold. In practice, LCH Ltd invests the vast majority 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 below 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; 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, on average each month, at least 95 per cent of investments with commercial banks must be on a secured basis, while at least 90 per cent of investments with commercial banks must be on a secured basis at all times.

⁸¹ As discussed in CCP Standard 9.3, 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.

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.

LCH Ltd holds capital to cover a portion of uncovered credit and counterparty credit risk, as required under EMIR (see CCP Standard 14.2). Some of this capital is held to cover investment risk, including credit risk associated with unsecured bank deposits and triparty reverse repos, as well as other credit risks related to investments. As discussed under CCP Standard 3.5 and CCP Standard 14.3, in the event of 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.

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.

LCH Ltd manages its operational risks in accordance with the overall LCH Group Risk Governance Framework, and the LCH Group Board has ultimate responsibility for the LCH Group operational risk appetite (CCP Standards 16.1, 16.2). LCH Ltd targets system availability of at least 99.7 per cent for all systems related to the operation of the SwapClear service and peak capacity utilisation of 50 per cent (CCP Standard 16.3). System availability averaged 99.84 per cent over the 2015/16 assessment period and SwapClear met its capacity utilisation target each month.

LCH Ltd maintains its information security framework in line with the LSEG Group Information security policy which was adopted in January 2016. LCH has also adopted LSEG's Physical Security Policy. LCH Ltd considers that it has sufficient, well-trained and competent personnel and other resources to operate the SwapClear service, both on a business-as-usual basis, and to perform projects and implement changes (CCP Standard 16.4). LCH Ltd has also implemented arrangements to ensure that resources shared between the LCH Group CCPs can be managed effectively (CCP Standard 16.4).

LCH Ltd manages operational interdependencies with its participants through operational participation requirements (CCP Standards 16.4, 16.6). Dependencies on service providers are managed in accordance with the LCH Group Outsourcing Policy and the LSEG Group Procurement Policy and are subject to ongoing monitoring and contingency arrangements where appropriate (CCP Standard 16.5). LCH Ltd requires its outsourced service providers to have implemented business continuity and information security arrangements, and clauses in LCH Ltd's legal agreements with its critical service providers provide rights of access to information for the BoE and LCH Ltd's other regulators (CCP Standards 16.9, 16.10). LCH Ltd assesses critical service providers against its own policies and standards.

LCH Ltd maintains business continuity arrangements that provide a high degree of redundancy and, through the use of multiple data centres, target the resumption of operations within two hours

following disruptive events. These arrangements are regularly tested (CCP Standard 16.7). Participants are required to maintain appropriate operational and business continuity arrangements, and LCH Ltd tests these arrangements on an annual basis (CCP Standard 16.8). LCH Ltd also tests business continuity arrangements with critical service providers on a regular basis (CCP Standard 16.9).

Since LCH Ltd is a UK-based CS facility, any crisis management actions would be led by the BoE in its role as LCH Ltd's primary regulator or as the UK resolution authority (CCP Standard 16.11).

Consistent with the Bank's regulatory priority for the 2015/16 period, LCH Ltd has continued its efforts to enhance resilience to operational risk. The Bank encourages LCH Ltd to continue the process of improving operational resilience according to the timelines established in accordance with its refreshed change management programme. The Bank expects to continue to engage closely with LCH Ltd and the BoE on operational risk management in the 2016/17 assessment period.

LCH Ltd is also encouraged to continue its dialogue with the Bank on its cyber risk management arrangements. As part of this, the Bank expects LCH Ltd to review its cyber risk management arrangements in light of CPMI-IOSCO guidance on cyber resilience for FMIs released in June 2016. Cyber risk continues to be a regulatory focus and the Bank will continue to engage actively with the BoE's oversight of LCH Ltd's Cyber framework.

In accordance with the Bank's 2015/16 priorities, LCH Ltd continued its work to extend its operating hours and operational support to the Australian time zone. LCH Ltd has identified a preferred solution to further extend SwapClear's operating hours on a permanent basis. The proposed solution is dependent on a major system upgrade that is scheduled to occur in the next assessment period. In the interim LCH Ltd will continue to consider other options to extend opening hours, although any proposed change would require approval from the BoE. The Bank expects LCH Ltd to continue progressing towards a stable and resilient extension of the operating hours of the SwapClear service.

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 and controls have been developed in accordance with the overall LCH Group Risk Governance Framework (see CCP Standard 3.1). LCH Group maintains an Operational Risk Policy (ORP). The ORP contains the principles and standards for the identification, assessment, management, reporting and monitoring of operational risks facing all CCPs within the LCH Group. The ORP is supported by the Operational Risk Manual (ORM), which contains the LCH Group procedures and systems for the identification, assessment, management, reporting and monitoring of operational risks. As with the ORP, the ORM applies to all LCH Group CCPs, including LCH Ltd.

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

- Primary responsibility for the day-to-day identification and management of operational risks – the first line of defence – lies with LCH Ltd's business lines and management services. These include the SwapClear 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 ORP and ORM). Appointed staff within each area are responsible for ensuring

that the risk profile for their business line is current and that the Business Head approves actions in relation to risks outside 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.

- Responsibility for the second line of defence lies with the LCH Group Operational Risk department (ORD) and the Operational Risk Management Committee (ORMC). The ORD sits within Group Risk and reports to the LCH Group CRO. The ORD produces a monthly Group Operational Report, provides operational risk policy support to each LCH Group business line and maintains the ORP and ORM (see CCP Standard 16.2). In 2016, LCH formed the ORMC. The ORMC 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. As discussed above, the ORMC manages the updating and review processes for the ORP.
- The third line of defence comprises the LCH Ltd Internal Audit department and Audit Committee. The Internal Audit department reviews the management of operational risks within LCH Ltd (see CCP Standard 16.2). The LCH Ltd Audit Committee's charter 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 operational risks facing the CCP on an ongoing basis. The LCH Group ORD requests that staff within the SwapClear service submit control performance reports and Key Risk Indicators quarterly, as well as conducting first-line control assurance and a Risk and Control self-assessment. Second-line control assurance is conducted by the ORD.

LCH Ltd also maintains a Global Incident Management Procedure that documents the procedures, roles and responsibilities for recording, reporting, and resolving operational, security and IT incidents affecting the SwapClear service (see CCP Standard 16.7). Operational risk identification is also addressed in LCH Ltd's Change Management Framework (see CCP Standard 16.2).

Where an 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 above LCH Group's risk appetite, a mitigation plan must be developed and implemented to bring the risk within the specified risk appetite. The LCH Group Board is responsible for determining the LCH Group appetite for operational risk (see CCP Standard 16.2).

Consistent with the Bank's regulatory priority for the 2015/16 period, LCH Ltd has continued its efforts to enhance resilience to operational risk. As part of the ongoing process of responding to the findings of existing reviews, LCH Ltd implemented a number of system upgrades in the assessment period, including a significant upgrade in October 2015. Following these upgrades and sustained focus on operational risk, the SwapClear service has seen a reduction in serious incidents (as well as improvements in other key performance metrics), even as volumes traded across the platform have increased. The Bank encourages LCH Ltd to continue the process of improving operational resilience according to the timelines established in accordance with its refreshed Change Management programme. The Bank expects to continue to engage closely with LCH Ltd and the BoE on this issue in the 2016/17 assessment period.

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 has ultimate responsibility for the LCH Group operational risk appetite, standards and policies, as defined in the Board’s charter (see CCP Standard 3.1). The LCH Group operational risk appetite and ORP are reviewed annually by the ORD, and any changes must be approved by the LCH Group Board. Changes to the ORP must also be approved by the boards and risk committees of each of LCH Group’s CCPs, including LCH Ltd, as well as LCH Group Audit and the ERCos. The ORP was last reviewed by the ORD in January 2016 and key changes approved by the LCH Ltd Board the following month.

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 ORP and ORM, and reports to the LCH Ltd Audit Committee on these findings.

LCH Ltd 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 within LCH Ltd.

In accordance with the LCH Ltd Change Management Framework, changes and projects are assessed based on their organisational importance, urgency and complexity, and assigned one of three levels of priority (low, high or critical). Changes in all three priority categories are reviewed and approved by the LCH Ltd IT Change Advisory Board, which consists of IT staff and management. High or critical priority changes are also reviewed and approved by the LCH Ltd Change Management Committee, which consists of senior management from IT and each of the LCH Ltd clearing services (including SwapClear).

LCH Ltd operates a ‘hub and spokes model’ approach to project management. The LCH Group Projects Team, which sits within the LCH Group Technology and Operations department, oversees the overall LCH Group portfolio of change, including projects with a group-wide scope. The LCH Group Projects Team is also responsible for defining the governance and delivery framework for projects. There are also project management responsibilities embedded within each of the LCH Ltd clearing services (including SwapClear) and support functions (for example, finance, IT). Projects can therefore be managed by the Group Projects Team or within LCH Ltd, 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 include references to the SwapClear Service Level Agreement (SLA), which is an internal LCH Ltd document that defines the expected availability and performance of the SwapClear service (see CCP Standard 16.3).

In 2016, LCH Ltd updated its ORP to clarify the key components of the Group Operational Risk Framework. Key points for clarification to the framework:

- **Risk Control Self-assessments.** In addition to day-to-day self-assessment of risk by each business line, in future each business line will also perform an annual self-assessment of its area's risk profile.
- **'Deep Dive'.** A risk identification tool has been introduced to provide an in-depth review and understanding of individual processes. The aim of the deep dive is for the first and second lines of defence to obtain a view on the controls and governance around a particular process.
- **Scenario Analysis.** Assessments of plausible severe losses will be carried out by experienced business managers and risk management experts. Over time, these assessments are expected to be validated and subject to reassessment through comparison against actual losses, if applicable.
- **Operational Risk Universe.** Risk categories and their definitions have been introduced for the purpose of monitoring operational risk through a single centralised source. The categories and definitions are subject to review at least annually.

The ORP and ORM take into account the Basel II requirements, EMIR and the CFTC's *Core Principles for Derivatives Clearing Organizations*. LCH Ltd's Test Framework is benchmarked against ISO 29119-1:2013 *Software and Systems Engineering – Software Testing*. The LCH Group Information Security Policy (see CCP Standard 16.3) is aligned with ISO 27001:2013 *Information Security Management* and ISO 27002:2013 *Information Technology – Security Techniques standards*. LCH Group policies relevant to business continuity management of the SwapClear service are benchmarked to ISO 22301:2012 *Societal Security – Business Continuity Management Systems* (see 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 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 (that is, system unavailability of no more than 60 minutes in any one calendar month).⁸² SwapClear met this target over the assessment period, with IT system availability of 99.84 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:

82 LCH Ltd applies a weighting system when calculating service unavailability: a weight of one is applied to minutes for which there is full service outage; a weight of 0.5 or 0.25 is applied for partial outages, depending on the nature of the incident; and a weight of zero is applied 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).

two times current daily average throughput; or 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 document. This document describes how LCH Ltd seeks to reduce the risk to performance of its clearing services due to potential changes in capacity. The LCH Ltd IT department is responsible for collating weekly and monthly capacity and performance data, which are reported to senior IT management. These data are also reported to the LCH Ltd Board. 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

LCH Group maintains an Information Security Policy. The objective of this policy is to ensure the availability of the LCH Ltd Group CCPs' critical business applications through implementation of technical, physical, procedural and personnel controls, which provides protection around the integrity and confidentiality of the key information they use, store and disseminate. The policy is reviewed and approved annually by the LCH Ltd LMC following any material and organisational change. 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 Policy and all supporting standards. LCH Ltd's approach to information security is overseen by Business Control Forums, LCH Ltd LMC and Audit Committee. Between them they provide advice and develop guidance in accordance with the Group Information Security Policy. The LMC and Audit Committee include the LCH Ltd Chief of Staff. Information security updates are also reported at the Business Control Forums (BCF) on a monthly basis. LSEG has also appointed a Chief Information Security Officer (CISO) for the LSEG group.

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 prevent and detect 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 is also encouraged to continue its dialogue with the Bank on its cyber risk management arrangements. As part of this, the Bank expects LCH Ltd to review its cyber risk management arrangements in light of CPMI-IOSCO guidance on cyber resilience for FMIs released in June 2016.

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 both an enterprise and departmental level. The key systems supporting LCH Ltd's clearing and settlement processes are operated within secure buildings. Clearing operations are separated from general office areas with permitted access determined, documented and maintained at a senior manager level. 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 a Recruitment Policy in place which sets appropriate pre-employment screening for prospective LCH Group employees. Employees of LCH Group, including LCH Ltd, are subject to performance reviews at least annually. LCH Ltd's performance review process is also used to identify the training needs of staff. LCH Ltd employees' knowledge of relevant systems and processes is embedded and assessed as part of their induction, as well as ongoing mandatory training and regular performance discussions with their line manager.

LCH Group has an Anti-Fraud Policy in place 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 (see 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. Risks identified in the key person risk assessment are managed through various initiatives.

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 (see CCP Standard 16.3). Planned system changes must meet the requirements of the SLA prior to implementation, with many of these changes specifically aimed at improving the performance of the SwapClear service against the SLA.

Resources shared with a related body

LCH SA provides staff for LCH Ltd in relation to the SwapClear service. Under the terms of this arrangement, accountability for all services outsourced to LCH SA resides with LCH Ltd. LCH Ltd is required to retain sufficient resources to ensure that all clearing services could be run without the services provided by LCH SA and other Group entities. LCH SA's provision of services to LCH Ltd may only be terminated if a minimum period of notice is provided to LCH Ltd.

LCH Ltd also receives services, on a 'pass through' basis, from LCH.Clearnet Luxembourg (LuxCo) – a company jointly owned by LCH Ltd and LCH SA. LuxCo holds certain third party licences and associated support agreements under which LCH Ltd is entitled to benefit. Should one entity fail, the other would retain access to the third party licences, although may be required to meet any shortfall for the continued operation of LuxCo.

In the current assessment period LCH Ltd transferred responsibility for some of its IT and support services to BSL, which provides shared technology and support services across all LSEG entities, including LCH Ltd. The transfer was undertaken in two phases and completed in early April 2016. The

BoE has stipulated that LCH Ltd conduct a review of the outsourcing process six months after the completion of the second phase (around October 2016) in order to assess the effectiveness (and robustness) of the new arrangements. The Bank will LCH engage with LCH Ltd and the BoE regarding the results of the review and any related recommendations in the next assessment period.

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, 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.

Dependencies on clearing participants and other FMIs

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 (see CCP Standard 3.1); participation requirements related to operational capabilities (see CCP Standard 16.6); and by requiring all clearing participants to take part in periodical LCH Ltd and LCH Group BCM testing (see 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 (see CCP Standard 9), and relationships with its custodian banks, CSDs and securities settlement systems (see CCP Standard 15).

Dependencies on service providers

Any outsourcing by LCH Ltd is governed by the LCH Group Outsourcing Policy, which sets out the requirements that must be met when an LCH Group CCP is outsourcing, or considering outsourcing, services to an external service provider. This policy ensures 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: service level agreements 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 Information Security 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 programme with a schedule of routine

audits. In addition, all LCH Ltd service providers are required to implement business continuity arrangements equivalent to those of LCH Ltd (see CCP Standard 16.9).

The contractual requirements defined above must be met in accordance with the broader LSEG Procurement Policy, which specifies the due diligence standards that LCH Ltd must meet in relation to the mitigation of operational risk with respect to external service providers. The Procurement Policy requires that all 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.

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 policies as they relate to 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 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.

LCH Ltd has informed the Bank that, in designing the above policies, LCH Group had regard to the CPMI-IOSCO *Assessment Methodology for Oversight Expectations Applicable to Critical Service Providers*.⁸³

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

83 Available at <http://www.bis.org/cpmi/publ/d123.htm>.

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 provider.* LCH Ltd outsources some IT support and data processing services to third party suppliers, primarily BSL. 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 (see CCP Standard 16.9).
- *Utility providers.* Operational risks posed by utility providers are managed in the context of business continuity (see 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 support to Australian clearing participants

The operating hours of the SwapClear service (currently from 6.00 am London time to 7.00 pm New York time) are such that trades executed during the Australian business day when the SwapClear service is closed are not novated to LCH Ltd until the Australian evening 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. LCH Ltd has identified a preferred permanent solution to further extend SwapClear's operating hours. The solution is dependent on a major upgrade of its trade registration and margining system that is scheduled to occur in the 2016/17 assessment period. In the interim LCH Ltd will continue to consider other options to extend opening hours. 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 has a total of 14 staff in its Sydney office, covering regulatory compliance, operations, operational support, 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 (see 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 bank(s). 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 periodical LCH Group BCM testing (see 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 approach to business continuity is defined in the LCH Group BCM Policy. This policy describes the LCH Group business continuity model that all LCH Group CCPs are required to follow, including requirements for threat assessment and monitoring, and the key roles and responsibilities in relation to BCM. BCM is managed centrally within LCH Group by the BCM Team, which coordinates all BCM policies and efforts across the LCH Group CCPs and acts in an advisory and training capacity on BCM for each CCP. The BCM Team is accountable to the LCH Ltd COS.

The LCH Group BCM 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. The review of the BCM Policy is carried out by the LCH Ltd and LCH SA BCM Teams, and changes to the policy require the approval of the LCH Group Audit Committee and Board.

The LCH Group BCM Policy is supported by the LCH Group Major Incident Management Process and LCH Group CMT Plan (see '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, and services provided to LCH Ltd by its IT support and data processing provider (see CCP Standards 16.5 and 16.9).

The LCH Ltd IT Disaster Recovery Plan defines LCH Ltd's BCPs in relation to LCH Ltd's 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 Bank will expect LCH Ltd to review these arrangements in light of CPMI-IOSCO guidance on cyber resilience. 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 Audit Committee and LCH Group or 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). All of LCH Ltd's data centres have the same capacities, and are permanently staffed. 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 disaster recovery objectives are also supported by the maintenance of office-specific BCPs that set out tailored recovery scenarios and procedures. Potential scenarios which may require the transfer of work area responsibilities are documented in the LCH Group Threat Assessment. This document sets out the process by which LCH Group CCPs identify and document threats to business activities, mitigation strategies to address these threats, and reporting requirements for each CCP (including LCH Ltd). The Threat Assessment is updated annually by the BCM teams.

LCH Ltd has established a BCP for its Australian operations. The Australian BCP 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 BCP is reviewed and updated on a quarterly basis, or as and when organisational or personnel changes occur. LCH Ltd conducted a BCP exercise for its Sydney office in April 2016 to test its ability to respond to a localised business continuity event. The Australia Country Head maintains the Australian BCP.

LCH Ltd is required to notify the Bank of any material incidents relating to business continuity and operational risk. In addition, the Australian BCP contains explicit provisions for communication arrangements between the Bank and staff in LCH Ltd's Australian operations. The LCH Group also maintains a BCM Regulatory Reporting and Notification Requirements document, which details the procedures for external communication with regulators (including the Bank), emergency services, the market, industry and media.

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. LCH Ltd conducted several fail-over tests between its data centres during the assessment period, consisting of tests between its synchronous data centres as well as between its synchronous and asynchronous data centres.

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. LCH Ltd also undertakes an annual disaster recovery exercise which involves all clearing participants and critical service providers. All LCH Group staff are required to undertake BCM awareness training on an annual basis.

Incident management

LCH Ltd 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. LCH incidents are categorised based on their impact on LCH Group's CCPs' ability to meet their financial, legal or regulatory obligations, or the availability of critical business services to participants or partners.

All IT incidents are initially handled by the LCH Ltd Incident Handling Team. Specific notification and escalation requirements are set out for each category of incident, including invocation of the Major 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 are mandatory for all incidents in the three highest severity categories.

The LCH Group Major Incident Management Process would be invoked in the event of high severity incidents. The LCH Group Major Incident Management Process specifies procedures to invoke BCPs and to coordinate and resolve major incidents across all LCH Group CCPs. 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 CCPs would be coordinated and effective, to minimise the impact on staff and clearing participants. LCH have established a Global CMT as well as regional CMTs located in London, Paris, New York and Sydney. Membership of the LCH Ltd CMT comprises representatives from all critical LCH Ltd departments, including the LCH Ltd CEO and the Heads of the clearing services (including SwapClear). In the event of an LCH Group-wide crisis, the LCH Group CMT would be responsible for coordinating and managing the crisis response. The CMT plan specifies the LCH Ltd CMT's responsibilities in the event of an LCH Ltd-specific 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 changes to the CMT Plan must be approved 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 Materiality Matrix 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 BCM 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, although does review the disaster recovery arrangements that prospective participants have in place for their own operations as part of its due diligence during the on-boarding process.

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 (see CCP Standard 16.5), the LSEG Information Security Policy (see CCP Standard 16.3) and the LCH Group BCM Policy (see CCP Standard 16.7). LCH Ltd has informed the Bank that, in designing these policies, LCH Group had regard to the *CPMI-IOSCO Assessment Methodology for Oversight Expectations Applicable to Critical Service Providers*.

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.

LCH Ltd considers its IT support and data processing provider to be a critical service provider (see 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. As noted in CCP Standard 16.7, LCH Ltd also undertakes an annual disaster recovery exercise that involves all clearing participants and critical service providers. The staff of the external service provider also participate in testing during fail-over and work area recovery exercises, as these staff support these processes.

As noted in CCP Standard 16.4, in the 2015/16 assessment period LCH Ltd transferred responsibility for some of its IT and support services to BSL, which provides shared technology and support services across all LSEG entities, including LCH Ltd. The transfer was undertaken in two phases and completed

in early April 2016. LCH Ltd has informed the Bank that its outsourcing of technology and support services to BSL is consistent with the requirements set out in the LCH Group Outsourcing Policy. The BoE has stipulated that LCH Ltd conduct a review of the outsourcing process six months after the completion of the second phase (around October 2016).

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 CCPs. LCH Ltd's arrangement with its IT support and data processing provider is intended to ensure that LCH Ltd and its regulators have access to the provider's 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 (see 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. LCH Ltd notified the Bank of its outsourcing of technology and support services to BSL during the 2015/16 assessment period.

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.

As discussed in CCP Standard 3.5, 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. 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 pending EU legislation relating to CCP recovery and resolution.

LCH Ltd has notification requirements with the BoE and the Bank when BCPs 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 LCH SA include requirements to ensure ongoing service provision in the event that one of these CCPs entered into resolution (see 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.

LCH Ltd has objective and transparent participation requirements set out in its Rulebook (CCP Standard 17.1). These requirements are tailored to the risks the CCP faces, and are designed to

ensure that clearing participants are of suitable financial standing and have sufficient operational capabilities to conduct business (CCP Standard 17.2). LCH Ltd monitors clearing participants' compliance with its participation requirements on a regular basis, and has the authority to suspend or terminate participation or take other disciplinary or remedial action in the event of a breach of these requirements (CCP Standard 17.3).

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.

Financial participation requirements imposed by LCH Ltd ensure that clearing participants have adequate financial resources to withstand unexpected losses. SwapClear participants are subject to minimum capital requirements and must be appropriately regulated (see CCP Regulation 17.2).

Operational requirements seek to ensure that clearing participants are able to effect the settlement of their obligations with LCH Ltd (see CCP Standard 9.1), to engage in the DMP (s CCP Standard 12.1) and to monitor the risks they pose to LCH Ltd (see CCP Standard 16.6). 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 (see CCP Standard 1.3).

The LCH Ltd CRMC is responsible for reviewing and recommending or rejecting prospective clearing participants. The LCH Ltd ERCo has the ultimate discretion to approve or reject the application of a new clearing participant, and is notified of decisions taken by the LCH Ltd CRMC. 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 2016, SwapClear had 105 participants, predominantly large banks and their subsidiaries. Five 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 acceptable risk control standards, a central counterparty should endeavour to set requirements that have the least restrictive impact on access that circumstances permit.

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 at <http://www.lch.com/documents/731485/762691/procedures+section+1+-+18.12.14.pdf>.

Overview of participation

LCH Ltd assigns each SwapClear clearing participant a particular category of clearing membership status, depending on the type of clearing membership sought:⁸⁶

- *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.⁸⁷
- *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.

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 must meet these participation requirements, and LCH Ltd has the right to impose additional requirements on clearing participants.⁸⁸ A SwapClear clearing participant must also satisfy all participation requirements specific to each of the other LCH Ltd-operated clearing services that it participates in.

Financial requirements include minimum net capital requirements and default fund contributions (see CCP Standard 4.4). SwapClear clearing participants must hold at least US\$50 million in net capital.⁸⁹ Prior to admitting a clearing participant to the SwapClear service, LCH Ltd must be satisfied that the prospective clearing participant (or a clearing participant's related entity in the same corporate group) is also 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

86 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.

87 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.

88 SwapClear clearing participants with Clearing Member Status, FCM Clearing Member Status or Special Clearing Member Status are subject to the same participation requirements.

89 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.

ensure that the SwapClear Rulebook is enforceable in the clearing participant's home jurisdiction (see CCP Standard 1.6).

Operational participation requirements include the maintenance of adequate risk management arrangements, technical infrastructure and operational capacity (see CCP Standard 16). Clearing participants must open accounts with eligible PPS banks in each currency in which they incur settlements, to pay and receive cash obligations to and from LCH Ltd (see CCP Standard 9.1). Prospective clearing participants must participate in a driving test prior to being admitted to SwapClear, and all clearing participants must participate in SwapClear fire drills, which are held twice a year (see CCP Standard 12.1).

To address the balance between open access and the risk individual clearing participants bring to the CCP, the LCH Ltd Credit Risk Team monitors SwapClear clearing participants' exposures and key credit risk indicators (see CCP Standards 4.1 and 17.3). Risk management controls such as concentration limits and additional margin may be applied based on a clearing participant's ICS and a range of other financial indicators (see CCP Standard 17.3).

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 (see 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 (see CCP Standard 13.2).

LCH Ltd imposes no restrictions on eligibility of clients; this 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 (see 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 changes relating to the list above, the LCH Ltd Credit Risk 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 to Senior Risk Management and the LCH Ltd CRMC for approval or escalation to the LCH Ltd ERCo where required.

In addition to imposing notification requirements on clearing participants, LCH Ltd carries out regular monitoring of clearing participants' compliance with the participation requirements. The LCH Ltd Credit Risk Team assigns an ICS to each clearing participant, and their credit quality is monitored on an ongoing basis when relevant information becomes available (see 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 CRMC at least annually, and lower-rated clearing participants are subject to more frequent reviews. The deterioration of a clearing participant's ICS would trigger an ad hoc review of the participant's compliance with the participation requirements, in accordance with LCH Ltd's internal Counterparty Credit Risk Policy (see 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, over and above LCH Ltd carrying out more detailed monitoring and increasing margin 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 in breach of the participation requirements, decisions to impose additional conditions on the participant are taken by the LCH Ltd CRMC and the LCH Ltd ERCo is notified. 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 allowed for a clearing participant 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 LCH Ltd CRMC can recommend to the LCH Ltd ERCo that a clearing participant is suspended or its SwapClear membership terminated. Such actions would be taken in accordance with the Termination of Clearing Member Status procedures set out in the LCH Ltd Rulebook. Under the default rules, the LCH Ltd CEO has the discretion to declare a member in default as soon as it believes a participation requirement is breached. Once a default notice has been issued, withdrawal of a clearing participant occurs in accordance with the Default Procedures (see 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, in the event that the participant is not in default and such a decision occurs independently of the operation of the Default Rules and Procedures.

In the case of a 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 this 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.

LCH Ltd's rules, procedures and agreements with clearing participants allow it to gather basic information about clearing participant's direct clients and indirect clients (that is, clients of clients), in order to identify and monitor material risks arising from tiered participation arrangements (CCP Standards 18.1, 18.2). LCH Ltd collects information about tiered participation through direct participants and its own systems, which allow it to identify clearing participants' clients who comprise a significant portion of a clearing participant's or total CCP activity (CCP Standard 18.3). LCH Ltd regularly monitors and manages any material risks arising from tiered participation arrangements (CCP Standard 18.4). LCH Ltd began to implement client clearing in Australia in November 2015.

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 (for the purposes of CCP Standard 18, the term 'indirect participants' will be 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.

The SCCS primarily operates using a principal-to-principal model of clearing participation. Direct participants must be approved by LCH Ltd ERCo before allowing indirect participation through SwapClear's client clearing arrangements. Direct clients enter into principal-to-principal relationships with their clearing participant(s). LCH Ltd has no principal relationships with, or direct credit exposures to, any indirect participants other than when porting occurs after the default of a clearing participant. 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 default of a direct participant (see CCP Standard 13). LCH Ltd also faces indirect risks arising from material dependencies between large indirect participants and direct participants, which are primarily managed through the monitoring of direct participant positions (see CCP Standard 18.3).

To access the SCCS, LCH Ltd requires direct clients to submit a range of documents to the clearing participant during the on-boarding process. Key information must be then sent by the clearing participant to LCH Ltd. This includes:

- the legal name of the client (SwapClear Client identifier)
- legal entity identifier of the client
- country of incorporation of the client
- immediate and ultimate parent names and country of incorporation
- categorisation
- registered address

- client contact details (including the details of at least two individuals to contact in the case of default of the direct participant)
- the client account type (ISA or OSA)
- the client account used within SCCS to clear trades (SwapClear Client account identifier).

LCH Ltd asks clearing participants for an update of client information annually and requires clearing participants to immediately contact the LCH Ltd Onboarding department if client contact details change.

LCH Ltd's principal-to-principal model of tiered participation means that it only faces credit exposures to direct participants (that is, its 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 (see 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 SCCS.⁹⁰

18.2 A central counterparty should identify material dependencies between direct and indirect participants that might affect the central counterparty.

As noted in CCP Standard 18.1, LCH Ltd collects information about tiered participation arrangements using its own systems and from information provided by direct participants. As discussed in CCP Standard 13.2, information collected during the on-boarding process allows LCH Ltd to identify its direct clients (although LCH Ltd will not always be able to identify indirect clients). This 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.

Using its own systems, LCH Ltd can also determine the size of direct and indirect participant positions. As discussed in CCP Standard 18.1, LCH Ltd can identify and monitor the proportion of direct participant activity attributable to a particular indirect participant. This allows LCH Ltd to assess the degree to which a direct participant may rely on its indirect participants.

Based on this information, LCH Ltd has not identified any material dependencies between direct and indirect participants to date.

⁹⁰ LCH Ltd has informed the Bank that it currently has no indirect clients.

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.

As discussed in CCP Standard 18.1 and CCP Standard 18.2, LCH Ltd is able to identify and monitor the positions of its indirect participants. Should the monitoring of client accounts give rise to concerns about the size of positions in a clearing participant's client account, LCH Ltd can conduct more detailed monitoring.

LCH Ltd has informed the Bank that it can monitor the proportion of indirect participant activity relative to the capacity of its direct participant, in order to evaluate a direct participant's exposure to a specific indirect participant. As discussed in CCP Standard 18.1, LCH Ltd also 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 materially 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 it provides services to). In the event that LCH Ltd had 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 (see 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. LCH Ltd has portability arrangements in place to mitigate the risks arising from a clearing participant default (see CCP Standard 13.3).

Although LCH Ltd does not actively encourage direct participation in situations where indirect participants account for a material proportion of the transactions processed by a CCP, LCH Ltd is receptive to increasing the number of SwapClear direct participants, assuming participation requirements can be met (see CCP Standard 17).

As per CCP Standard 17.2, LCH Ltd imposes no restrictions on the eligibility of indirect participants, which is instead left at the discretion of the direct participant.

18.4 A central counterparty should regularly review risks arising from tiered participation arrangements and should take mitigating action when appropriate.

As discussed in CCP Standard 18.1 and CCP Standard 18.3, LCH Ltd monitors and manages tiering participation risks as part of its daily monitoring of direct participation exposures. LCH Ltd primarily seeks to manage concerns regarding tiered exposures by imposing additional margin requirements. LCH Ltd has formal initial margin and margin add-on standards, which set out how the CCP monitors and manages, on a daily basis, the credit and liquidity exposures that arise from tiered participation arrangements. Concentration/liquidity risk and counterparty credit risk, arising from both direct and

indirect participant activity, are specifically addressed in the Margin Add-On Standard. 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 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 (see 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.

Standard 19: FMI links

A central counterparty that establishes a link with one or more FMIs should identify, monitor and manage link-related risks.

LCH Ltd maintains links to multiple CSDs/SSFs and trade repositories (TRs) in relation to its SwapClear service.⁹¹ LCH Ltd identifies, monitors and manages operational and financial risks related to its link arrangements in line with its internal policies and procedures (CCP Standard 19.1). LCH Ltd's links with CSDs are governed by contractual agreements (CCP Standard 19.2). LCH Ltd has a link arrangement with Austraclear, an Australian CSD and SSF. This arrangement supports LCH Ltd's use of its ESA and its management of its AUD liquidity needs; during the assessment period it also began allowing its clearing participants to lodge eligible AUD-denominated securities in Austraclear to cover margin obligations. LCH Ltd consulted with the Bank during the establishment of this link (CCP Standard 19.3). LCH Ltd does not operate any interoperable links with any other CCPs in relation to the SwapClear service (CCP Standards 19.4, 19.5).

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

LCH Ltd maintains links with multiple CSDs and TRs with respect to its SwapClear service. 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

91 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.

whether it is directly with the FMI or through an intermediary.⁹² LCH Ltd does not operate any interoperable links with any other CCPs in relation to the SwapClear service.⁹³

LCH Ltd links with TRs for the purpose of reporting cleared OTC transaction data. LCH Ltd does not rely on TRs for the provision or maintenance of any data for its own operations. Accordingly, LCH Ltd's links with TRs do not give rise to material operational or financial risks or interdependencies. Nevertheless, such links could give rise to reputational or regulatory and compliance risks. LCH Ltd mitigates these risks via: selection of TRs in accordance with the LCH Group Procurement Policy (where allowed under regulatory requirements); monitoring of each TR's operational performance; review of proposed regulatory changes; and mandatory inclusion of the Regulatory Reporting Team for all projects under LCH Ltd's new change management process, which should 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 (see CCP Standards 5.1 and 15.1).⁹⁴ LCH Ltd has a link with Austraclear to support its Australian operations, including its management of its AUD liquidity needs and the operation of its ESA (see CCP Standard 7 and CCP Standard 9). During the assessment period LCH Ltd also began allowing its clearing participants to lodge eligible AUD-denominated securities in Austraclear to cover margin obligations (see CCP Standard 6.8) in addition to a link already in place with Euroclear Bank for AUD-denominated securities.

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, as well as details of service availability, business continuity, default management arrangements and internal controls (see CCP Standard 15.2). The LCH Group Operations department, in conjunction with the Group Legal department, performs due diligence prior to CSD link establishment, with the LCH Ltd ERCo responsible for final approval upon request from CaLM, Operations or Clearing Services (see CCP Standard 15.2 for more details).

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 (see 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 ORP and ORM (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).

92 Links to payment systems are addressed in CCP Standard 9.

93 LCH Ltd maintains interoperable links with European Central Counterparty N.V. and Six X-Clear Limited for cash equities clearing, and with Oslo Clearing for clearing of cash equities and certain exchange-traded derivatives.

94 LCH Ltd also uses custodians for the transfer and lodgement of non-cash collateral; as discussed in CCP Standard 15, custodians are subject to the same due diligence processes as linked CSDs.

Changes to LCH Ltd's operations that may impact its links with CSDs are assessed in accordance with LCH Ltd's Change Management Framework (see CCP Standard 16.2).

As required under the Group Settlement, Payment and Custody Risk Policy, LCH Ltd performs operational due diligence on all CSDs both prior to, and at least every two years following, link establishment, and sooner if there are significant changes (CCP Standard 15.2). This due diligence covers matters including BCM and service availability. LCH Ltd must also have at least one formalised and regularly tested backup arrangement 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.

The LCH Ltd Operations Management team monitors the level of service provided by CSDs and reports to the LCH Ltd ERCo quarterly. Although no operational standards are prescribed, management will engage with a CSD if shortcomings are identified (CCP Standard 15.2).

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 for each CSD 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* (see 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 (see CCP Standard 3.5). Any backup or contingency options available to mitigate such impacts are also considered. For example, LCH Ltd has contingency arrangements in place to facilitate settlement at its linked CSDs in the event SWIFT and the CMS were down.

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 (see CCP Standards 1.2, 15.2). When conducting due diligence on a non-UK domiciled custodian or CSD, LCH Ltd also seeks legal advice on that jurisdiction.

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. Its participation in Austraclear supports its management of its AUD liquidity needs and the operation of its ESA (see CCP Standards 7 and 9). During the assessment period LCH Ltd also began allowing its clearing participants to lodge eligible AUD-denominated securities in Austraclear to cover margin obligations (see CCP Standard 6.8). 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.

LCH Ltd publicly discloses its Rules and Procedures and a range of additional relevant information related to its risk management procedures (CCP Standard 20.1). This includes information regarding the process of novation, and general descriptions of system design and the roles and obligations of LCH Ltd and its clearing participants (CCP Standards 20.2, 20.3). LCH Ltd provides new clearing participants with comprehensive training and documentation, and has a range of refresher training courses available to existing clearing participants on an ad hoc basis (CCP Standard 20.4). LCH Ltd makes general information regarding its services and key data available on its website (CCP Standard 20.5). LCH Ltd publishes an annual qualitative disclosure document that provides responses to the CPMI-IOSCO *Disclosure Framework for Financial Market Infrastructures* (see CCP Standard 20.5).

LCH Ltd publishes risk and activity data in accordance with the CPMI-IOSCO quantitative disclosure standards for CCPs on a quarterly basis.

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.⁹⁵ 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, DMP 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.

Detailed information specific to the SwapClear service is available on the SwapClear public website. This website describes the products that are eligible to be cleared through the SwapClear service, and additional service offerings such as trade compression. Additional information also available on the SwapClear website 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 dealt with 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 (see CCP Standard 1.2).⁹⁶ 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

95 Available at: <http://www.lch.com/rules-regulations/rulebooks/ltl>

96 See Regulations 12 (Novation) and 16 (Registration), LCH Ltd General Regulations, pp. 87 – 95. Available at <http://www.lch.com/documents/731485/762691/general-regulations-230516.pdf/0b53bce9-1488-4d0f-8159-411353c16ee3>.

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.

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 (see 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 DMP (see CCP Standard 12) and invocation of the business continuity arrangements (see CCP Standard 16.7).⁹⁷ 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 Ltd website, including about 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 the SwapClear Service Description, which provides an overview of the SwapClear service and its operational features. The document 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. This document also contains detailed information regarding SwapClear data available to participants, SwapClear margin multipliers and the pricing of SwapClear products. In addition, 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 behaviour 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 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

97 See the Default Rules and Business Continuity Procedures. Available at <http://www.lch.com/documents/731485/762691/default-rules-24.06.16.pdf/6cadb552-d258-4809-8de8-f62dd949d12e> and <http://www.lch.com/documents/731485/2008793/Procedures+section-6-07.04.16.pdf/f985701c-91b8-4ed6-bb54-b393df97e5db>, respectively.

Risk Committee disclosure report (also available upon request) and IM back-testing results. LCH Ltd may also provide stress-testing reports of clearing participant and client accounts upon request. Clearing participants are informed of relevant aspects of LCH Ltd's business continuity arrangements through regular testing of these arrangements.

20.5 A central counterparty should complete regularly and disclose publicly responses to the CPSS-IOSCO *Disclosure Framework for Financial Market Infrastructures*.⁹⁸ 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 Principles.⁹⁹ LCH Ltd will update this document internally at least once every year.

In January 2016 LCH Ltd started to publish risk and activity data in accordance with the CPMI-IOSCO quantitative disclosure standards.

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.¹⁰⁰

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.

The Bank holds regular meetings with LCH Ltd to discuss matters relevant to its compliance with the CCP Standards, and related aspects of its risk management and operational arrangements. The Bank has been kept informed of relevant developments during the assessment period (CCP Standard 21.1). LCH Ltd provides the Bank with financial, activity, risk and operational data and reports on a regular and timely basis (CCP Standard 21.2).

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;**

98 The CPSS was renamed the CPMI in September 2014.

99 Available at http://www.lch.com/documents/731485/762522/lch.ltd-cpmi-iosco-self-assessment-2015-for-publication-180416_1.pdf/c282e7f2-245e-4199-848e-0cd716580cea.

100 Membership information is available at <http://www.lch.com/members-clients/members/current-membership>
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>

- (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;
- (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 hold two scheduled meetings each quarter:

- A business and regulatory developments meeting 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.
- A working-level meeting primarily to discuss data submitted to the Bank by LCH Ltd under CCP Standard 21.2. This meeting involves LCH Ltd staff members responsible for clearing risk policy and implementation of risk management arrangements.

These meetings provide 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 targeted sessions. 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.¹⁰¹

During the 2015/16 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.¹⁰²

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. As noted in CCP Standard 21.1, the quarterly working-level meeting between the Bank and LCH Ltd provides a forum for discussion of developments observed in the data.

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.

¹⁰¹ Under s824B(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 notification obligations under CCP Standards 21.1 and 21.2.

¹⁰² Audited annual reports are available at <http://www.lch.com/about-us/annual-reports-statements>.

Abbreviations

AIP	Auction Incentive Pool
ALCo	Asset and Liquidity Committee
AMUG	Australian Member User Group
ANZ	Australia and New Zealand Banking Group Limited
ASIC	Australian Securities and Investments Commission
BCM	Business Continuity Management
BCP	Business Continuity Plan
BoE	Bank of England
CaLM	Collateral and Liquidity Management
CaLRM	Collateral and Liquidity Risk Management
CBA	Commonwealth Bank of Australia
CCO	Chief Compliance Officer
CCP	Central counterparty
CCP Standards	Financial Stability Standards for Central Counterparties
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CFR	Council of Financial Regulators
CFTC	U.S. Commodity Futures Trading Commission
CMG	Crisis Management Group
CMRC	Credit Risk Management Committee
CMS	Collateral Management System
CMT	Crisis Management Team
COO	Chief Operating Officer
COS	Chief of Staff
CPMI	Committee on Payments and Market Infrastructures

CPSS	Committee on Payment and Settlement Systems
CRMC	Credit Risk Management Committee
CRO	Chief Risk Officer
CS	Clearing and settlement
CSCC	Cyber Security and Continuity Committee
CSD	Central securities depository
CTO	Chief Technical Officer
DCMT	Default Crisis Management Team
DCO	Derivatives Clearing Organisation
DFAM	Default fund additional margin
DMG	Default Management Group
DMP	Default Management Process
EC	European Commission
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)
ERCo	Executive Risk Committee
ESA	Exchange Settlement Account
EU	European Union
ExCo	Executive Committee
FCM	Futures Commission Merchant
FEX	Financial and Energy Exchange
FMI	Financial market infrastructure
FSMA	Financial Services and Markets Act 2000
FSS	Financial Stability Standards
FX	Foreign exchange
Global College	Multilateral Arrangement for Regulatory, Supervisory and Oversight Cooperation on LCH.Clearnet Ltd
GMRA	Global Master Repurchase Agreement
HR	Human Resources
ICS	Internal credit score
ICSD	International central securities depository

IOSCO	International Organization of Securities Commissions
IRD	Interest rate derivative
ISA	Individually segregated account
IT	Information technology
LCH Group	LCH.Clearnet Group Limited
LCH LLC	LCH.Clearnet LLC
LCH Ltd	LCH.Clearnet Limited
LCH SA	LCH.Clearnet SA
LCR	Liquidity coverage ratio
LIBOR	London Interbank Offered Rate
LMC	Local Management Committee
LSEG	London Stock Exchange Group plc
LuxCo	LCH.Clearnet Luxembourg
MoU	Memorandum of Understanding
MRMC	Market Risk Management Committee
NAB	National Australia Bank Limited
NCA	National competent authority
NPACo	New Product Approval Committee
OIS	Overnight index swap
ORD	Operational Risk Department
ORM	Operational Risk Manual
ORP	Operational Risk Policy
OSA	Omnibus segregated account
OTC	Over-the-counter
PAIRS	Portfolio Approach to Interest Rate Risk
PPS	Protected Payments System
PPSA	Personal Property Securities Act 2009
PSNA	Payment System and Netting Act 1998
RTTR	Real-time trade registration

SCCS	SwapClear Client Clearing Service
SLA	Service Level Agreement
SRR	Special Resolution Regime
SSC	Shared service company
SSF	securities settlement facility
STLOIM	Stress-test Losses Over Initial Margin
TR	Trade repository
UK	United Kingdom
US	United States
VMGH	Variation Margin Gains Haircutting
WBC	Westpac Banking Corporation